Final Report of the Fermilab Citizens Task Force

Initial Compiled Draft
March 23, 2008

Sections

I. Introduction

A. The ILC and Its Potential Location At Fermilab

It's a simple idea. Take the smallest possible particles and give them the highest possible energy. Make them collide. From this simple idea have come the science of particle physics, the technology of particle accelerators, and a deep understanding of the fundamental nature of the physical universe. Beginning with the earliest colliders from the 1930's, each generation of accelerators builds on the achievements of the previous ones, raising the level of technology and the potential for discovery ever higher. And with each succeeding generation, the cost and scale increase.

The Quantum Universe

Now, at the start of the 21st century, the field of particle physics has reached the most exciting period in 50 years. We live in an age when the long-awaited opportunity to explore great questions is leading toward a revolutionary new understanding of the universe. The technological means are finally at hand to address some of the most fundamental and vexing questions about the nature of the universe.

- Are there undiscovered principles of nature: new symmetries, new physical laws?
- How can we solve the mystery of dark energy?
- Are there extra dimensions of space?
- Do all the forces become one?
- Why are there so many kinds of particles?
- What is dark matter?
- What are neutrinos telling us?
- How did the universe come to be?
- What happened to the antimatter?

The next generation of accelerators will at last provide the tools for discovery that scientists have anticipated for decades.

The Energy Frontier

Fermilab is the nation's only dedicated laboratory for accelerator-based particle physics and currently operates the highest-energy accelerator in the world, the Tevatron. Some 1500 physicists from across the nation and around the globe collaborate on its many experiments at the Tevatron. However, this is a distinction that Fermilab will soon lose.

In late 2008, the Large Hadron Collider (LHC) at CERN near Geneva Switzerland will begin operating with an energy seven times higher than the Tevatron's. It will bring together physicists from dozens of nations to collaborate in experiments at the new energy frontier. It will open up the Terascale, the region of ultra-high energy where physicists believe they will discover answers to many of their most profound questions.

Once operations at the LHC begin producing physics results, Fermilab's Tevatron will shut down. Many US particle physicists have already joined the CERN experiments, and many more will do so when the Tevatron ceases operations in 2009 or 2010. At this point and for the first time, the U.S. will lose its traditional role as a leader in the international field of particle physics and a major role in all of science.

The International Linear Collider

For many years, the global community of particle physicists has explored the question of what accelerator should follow the LHC. Around the turn of the century, they converged on the International Linear Collider (ILC). The ILC would address the basic questions of 21st century physics from a different perspective from the LHC. Unlike the LHC's proton-proton collisions, the ILC would create collisions between electrons and positrons. The LHC is a circular design, moving particles increasingly faster around the large ring until they reach the energy for collision. The ILC's design calls for an accelerator in straight underground tunnel about 20 miles long, accelerating particles from either end for a collision in the middle. Results from the LHC will be needed to confirm whether the ILC is the right follow-on machine.

Locating the ILC at Fermilab

The enormous cost and scale of the ILC has suggested from the very beginning that it be designed and constructed as a global project. A Global Design Effort (GDE), an international organization of physicists and engineers was formed to collaborate on the ILC design, with many countries contributing money and resources. The GDE is managed by a U.S. physicist and much of its U.S. work is conducted at Fermilab. Conventional wisdom says that, to host the project, a nation must pledge to pay roughly half the cost, including all of the physical construction of the tunnel itself. The US physics community and the Department of Energy declared their interest in hosting the ILC in the US, at Fermilab, if the cost proves affordable. At least three other regions of the world including Europe and Asia are also fielding teams to explore locating the ILC there.

By the end of 2006, the GDE had agreed on a general design, DOE had confirmed its interest in building the ILC at Fermilab subject to cost and LHC results, and Fermilab had converged on a general north-south alignment with the laboratory at the center, but with flexibility for the exact siting of tunnel and surface structures. This orientation was driven by a number of factors including the favorable stable geology of a large bedrock layer 100 meters below ground and the vast resources and facilities that exist at Fermilab itself.

High Costs of the ILC

In early February 2007, the ILC Global Design Effort released its Reference Design Report, containing a preliminary design for the machine—and a preliminary cost, in "ILC Value Units." Depending on the interpretation, estimates of the actual cost in US dollars ranged from about $8 billion to nearly $30 billion. The Department of Energy, the chief US funding agency for the ILC, had anticipated a lower estimate. Later in February, at a meeting of the High Energy Physics Advisory Panel, DOE Under Secretary for Science

Raymond Orbach asked the particle physics community to propose an alternative plan to the ILC, in the event that its construction schedule stretched out because the cost was too high.

Then, in mid-December 2007, Congress passed and the President signed an Omnibus Funding Bill that resulted in the Consolidated Appropriations Act for Fiscal Year 2008. The Act cut federal funding for US R&D for the ILC from $60 million in the President's FY2008 Budget Request to $15 million. Since one quarter of the fiscal year had already passed by the time the bill became law, the $15 million had already been spent. In the US, research and development for the ILC was over for the rest of the fiscal year.

Further, the FY2008 budget zeroed funding for the US contribution to the international ITER Project, for which the US had committed $160 million for the current fiscal year, through high-level interagency agreements. Canceling funding for the US share of ILC R&D and zeroing the nation's contribution to ITER called into question the ability of the US to collaborate reliably on large international science projects. Combined with the multibillion-dollar ILC cost estimate and a strong signal from DOE that a fast start for the project was unlikely, the probability of an ILC sited at Fermilab in the foreseeable future began to seem less likely.

What's Next

At present, there is little to suggest that the ILC will be built any time soon, much less at Fermilab. However, it has always been a long-term vision. Results from the LHC are still needed to confirm the design and efficacy of the ILC. In the meantime, Fermilab is moving forward with plans for a much smaller project, Project X, to test and confirm some of the key design concepts of the ILC using the existing infrastructure that will become available when the Tevatron shuts down.

B. Origins and Purpose of the Task Force

The SSC Experience

The ILC is not the first time that Fermilab has proposed to build a new accelerator in northern Illinois. The laboratory worked diligently to become the host of the Superconducting Supercollider in Illinois in the late 1980s. Local citizens, particularly an organization called CATCH, "Citizens Against the Collider Here," mounted an aggressive campaign opposing the SSC's construction in Illinois. This citizen action was a result of a number of factors including Fermilab's and the States' lack of open and honest interaction with the public over the siting of the facility and the many concerns of the public surrounding potential impacts and land takings. Ultimately, DOE chose a site in Waxahachie, Texas for the SSC. It would have had an energy far higher than the LHC's had Congress not canceled the project in 1993. Fermilab recognized the mistakes it made working with the public in the 1980's and had no wish to repeat the SSC experience with the ILC.

The First Community Task Force

In 2004, Fermilab had convened an earlier Community Task Force of local citizens to ask for their recommendations on how the laboratory should interact with local communities when issues arise that affect both the laboratory and the community. Among their recommendations was the suggestion that Fermilab form a new task force, with different membership, specifically to address ILC-related issues. This Task Force ultimately provided Fermilab with and extensive list of recommendations which the laboratory. Through this process, Fermilab learned that decisions made with public participation are better decisions not just for the community but for the laboratory. To Fermilab's surprise, the laboratory found that not only did it have nothing to fear from public participation in laboratory planning and decision-making, it had much to gain.

Fermilab had approached the process of public participation with some trepidation. They worried that the neighbors expect to have input on scientific and technical decisions in which they lacked expertise. This was not the case. Neighbors sought input on the implications of constructing and running large projects for surrounding communities. Fermilab wondered how successful they could be in developing working relationships with neighbors and even getting CATCH members to participate. Both turned out to be true and the experience of the Community Task Force turned out to be positive for all participants. One of the key recommendations of that first Task Force was to convene a new Task Force at such time when the ILC became a real prospect for Fermilab so that the community could weigh in on key issues. It was against this backdrop the Fermilab Citizens Task Force was formed.

Forming the Task Force

Timing, the first task force had suggested, is everything. Convene the new ILC Task Force well before making important decisions (exact siting, for example), but after establishing the general parameters of the new machine. If you wait too long, citizen input will have little impact. If you start too early, there will be too many unknowns for the group to act meaningfully. By the end of 2006, the Global Design Effort for the ILC had agreed on a general design, DOE had confirmed its interest in building the ILC at Fermilab subject to cost and LHC results, and Fermilab had converged on a general north-south alignment with the laboratory at the center, but with flexibility for the exact siting of tunnel and surface structures.

Throughout the process, Fermilab worked closely with an experienced public-participation consultant, the Perspectives Group, to plan, design and facilitate and evaluate the operations of the ILC Task Force.

In the fall of 2006, Fermilab put out a call to the community for nominations to the ILC Citizens Task Force. The stated purpose of the Task Force was to provide guidance and advice to Fermilab to ensure that community concerns and ideas are included in all public aspects of ILC design including:

Orientation of the ILC beam line

- Location for the underground tunnel
- Community issues related to locating an underground tunnel

- Surface Structures located off the Fermilab property
- Where to locate surface structures
- Aesthetic issues
- Features that could be included to benefit communities

Construction-related Issues

- Timing of activities
- Safety
- Mitigating noise, traffic, and other disruptions

Fermilab-community relationships on the ILC

- Maximizing economic benefits to the region
- Communicating and working with neighbors
- Building effective relationships with local government and communities
- Strengthening the role of the community in the long term mission of Fermilab

The laboratory hoped for at least enough nominations to create a diverse 15-member group. Press coverage of the formation of a new Task Force was strong, and Fermilab ultimately received nearly 100 nominations. A committee of previous task force members and Fermilab envoys to the community selected 25 members—a larger-than-optimal number, but one dictated by the high quality of the nominees and their connections to the community.

The members included:

- Members of local municipal and county governments (a mayor, county board members, city council members, aldermen, economic development officials, a park board member)
- Local business people
- A stay-at-home mom
- Members of environmental organizations and environmental consultants
- A science communicator
- A retired airline pilot, founding member of CATCH
- A college teacher
- A neighborhood association chair
- School district superintendents
- The Executive Director of a construction-industry labor-management organization
- A Department of Energy official
- A physicist from a neighboring laboratory
- A Fermilab physicist.

A full list of members and their affiliations are found in Appendix A.

Task Force Process

The Task Force began operations with an all-day Saturday workshop in January 2007. Subsequent meetings took place one evening a month. Meetings were open to all. Members of the press attended frequently, and many meetings received significant local coverage. The group agreed to devote the first months to learning about all aspects of the ILC. In the fall of 2007, the Task Force chose topics that merited community

involvement to develop its recommendations and conclusions in a report to Fermilab. Fermilab, in turn, pledged to incorporate the Task Force recommendations into planning and policy to the greatest possible extent.

The group devoted much of 2007 to learning about all aspects of the ILC. They consulted a wide range of experts from Fermilab and beyond as they gathered and discussed information about:

- The science of particle physics, and Fermilab's place in the global physics community
- **T**he ILC itself: its likely dimensions, energies, configuration, and the science it would enable
- The Global Design Effort, the worldwide organization created to design and develop a cost for the ILC
- Issues related to siting an underground tunnel and surface structures, including property rights, siting criteria and possible tunnel orientations
- Environmental issues, including impacts on ground water, radiation, construction issues, impacts of surface structures, potential environmental benefits
- Safety, including radiation safety
- Construction-related issues, including timing, safety, noise, pollution and how to mitigate impacts
- Surface structures, including locations, footprints, aesthetic issues, potential benefits to communities
- Economic impacts of building or not building the ILC at Fermilab
- Governance of an international science facility
- Community issues, such as communicating and working with neighbors, building relationships with local governments, strengthening the community role in the long-term mission of Fermilab.

By the end of November 2007, the Task Force had completed the education phase of its work and had chosen the topics to address in its recommendations. In January 2008, the Task Force outlined the contents of its report and its recommendations with the goal of presenting its report to Fermilab by April 2008.

A full list of Task Force Meetings and topics can be found in Appendix B. All materials, photos and videos of the process can be found on the web at (insert web address here).

C. Purpose of This Report

This community task force committee has taken on this task with great enthusiasm and rigor. The report to follow is comprised of the collective sentiment of the 25 committee members and the conclusions and recommendations within are based on our education throughout this process as well as the foundations of each of our community

experiences and values. While each member of the committee comes from a separate viewpoint and experience base, the common thread of concern for the communities in which we live and raise our families drove our initial commitment and in the end our recommendations are based with that in mind.

While there are many topics discussed throughout this report, the core purposes that will be discussed are:

- To provide Fermilab with a set of recommendations to help guide its interactions with local communities and their residents. This includes providing recommendations and feedback regarding community outreach and timing should the ILC project come to fruition
- To outline the many implications and potential impacts of bringing – or not bringing – the ILC project to Chicago's collar counties.

Each of the topics discussed in this report will have these considerations threaded throughout. The committee has taken great care to ensure that the best interest of both the communities and the project were considered when making our recommendations.

While the Committee has come to learn more about the operations of Fermilab as well as its impact on the local, national, and global communities and has allowed for a broader understanding of the science behind the laboratory, the focus of this report has remained unchanged.

With this report, the committee is fulfilling its task of guiding Fermilab from the perspective of the local community on how to move forward with the proposed ILC project while avoiding as best as possible any negative sentiment from the surrounding and partnering communities. We also, through our extensive education from within and outside of the committee work over the past year and a half, have been able to surmise the benefits, concerns, and potential impacts that bringing such a large-scale scientific project to our region could realize.

The committee has also taken the responsibility of making recommendations regarding the planning and implementation of this project, as it is realized through our discussions that each piece has an impact on the community at large. These will be discussed at length throughout the document.

D. Statement of What The Task Force Has Come To Recognize Over The Course of This Process

In presenting its analysis, concerns, and recommendations, the Task Force acknowledges that its perspective and approach have been shaped by the year-long process described above. The report grows out of a collective experience informed by the presentations, inquiry, discussion, and feedback that have made up this process, as the Task Force has sought answers to its questions and presenters have addressed their respective fields in connection with the ILC and Fermilab. This process has

allowed the Task Force to become better informed without losing sight of its role in providing critical feedback. Accordingly, it is appropriate to acknowledge up front several broad realizations that have emerged from the task force process, and which in turn serve as a point of departure in writing the report.

First, the Task Force has come to recognize that Fermilab, the research conducted there, and the people who work there make significant contributions to the advancement of scientific discovery, technological innovation, and the regional economy. Given its role in developing technological and human resources within the Northeastern Illinois region, Fermilab is itself a resource to be valued independently of whether or not the ILC is pursued, making reinvestment in Fermilab's future a matter of local and national concern.

Second, should the international community pursue development and construction of the ILC, the location of the project in the United States and specifically at Fermilab should receive serious consideration in this country, as the ILC would facilitate continued scientific leadership by the United States and build on the central role that Fermilab already plays in the nation's commitment to research in physics.

Third, regardless of the future of the ILC at Fermilab, there is a collective recognition of a value in national investment in scientific research, including long-term research even when immediate application is not apparent. Although it is not for this task force to offer judgments as to which scientific endeavors should be given priority over others in the nation's decision making, the Task Force recognizes a value in the nation making the kind of long-term investment in research and eventual application of research that the ILC or similar projects represent. This recognizes that American leadership and competitiveness depend on consistent investment and commitment to the technologies, research, and people that are associated with a project on the scale of the ILC.

Nonetheless, although the task force has come to these general realizations, it remains focused on the purpose set before it. The report lays out a clear, objective, conscientious assessment of the challenges that are posed by locating the ILC on this site and of the considerations that would have to be made in regard to the community, its concerns, and effective communication. These include issues related to the siting of the ILC, the construction of off-site facilities, worker safety, public health, environmental issues, construction of the ILC, economic considerations, political considerations, past lessons, and community engagement. The report offers both general cautions and specific recommendations.

II. Bringing the ILC to Fermilab

A. The Decision to Pursue Siting the ILC at Fermilab

In 2000, the global physics community reached consensus that the next big project in particle physics should be the International Linear Collider (ILC). The ILC will represent a major breakthrough in particle physics achieving significantly higher energies than even the new Large Hadron Collider.

The question of where to locate the ILC was influenced by the experience of an earlier project that failed to reach completion. After the cancellation of the Supercollider project, also known as the SSC, which was built at a new, previously undeveloped site in Texas, it became clear that such a large-scale project should ideally be constructed at a preexisting laboratory and not from scratch at a new location.

Not only is Fermilab the premier particle physics laboratory in the US, but it also offers several other advantages as a proposed site for the ILC:

- With other large scale high energy physics projects such as the LHC located at CERN, in Europe and JPARC, in Japan, it appears on a worldwide basis that Fermilab would be the leading candidate for the proposed ILC.
- As the LHC comes on line, Fermilab will be closing down the Tevatron project in 2010, thereby, being in a position to reallocate both substantial physical and human resources to carry out the objectives of the ILC project.
- Numerous additional supportive infrastructures exist in the region in the form of strong universities and the nearby Argonne National Laboratory.
- Additionally, and of no small importance, is the fact that the underground geology of Northern Illinois is well suited for the construction of the projects proposed system of tunnels.

In summary, with its availability of human and physical resources, nearby collateral institutions, and geologic characteristics, Fermilab represents an appealing option in terms of where to locate the ILC.

B. The Benefits Of Locating The Project at Fermilab

Many of the benefits of bringing the ILC to Fermilab will only become evident as the resulting technologies flow from the completed project. However, a number of the potential benefits of locating the project here in the US, and, more specifically, at Fermilab, can already be enumerated.

Among the most desirable reasons for having Fermilab chosen as the home of the International Linear Collider, is that of maintaining and advancing American scientific prestige and leadership in the wider global community. Ultimately, from a technological

perspective, this goal is also closely intertwined with the objective of maintaining a future position of global economic leadership.

A closely related benefit is that of demonstrating that the US is committed to the goal of continuing to be both a fully engaged and reliable partner in the future endeavors of the international scientific community. Without maintaining a high level of trust, on the part of our international partners, with regard to a continued US commitment, our nation's ability to influence the future of "BIG" science could become seriously compromised. Undertaking the ILC project is a clear indication of our intention to continue in our role as a significant partner.

Also, it is the belief of our Task Force that we cannot emphasize enough the importance of having the ILC located at Fermilab to provide direct accessibility and invaluable hands-on experience for thousands of US scientists, technologists, students, and participating industries that would be interacting with the project.

A further high priority benefit of locating the ILC at Fermilab would be that of taking full advantage of all of the in-place resources of the Lab's existing physical infrastructure and the already proven expertise of its scientific and technical workforce.

Another incalculably important benefit of siting the ILC at Fermilab is that of facilitating American spin-off innovations and future competitive leadership in the technologies that would be expected to emanate from the ILC's basic research programs. Examples of prior spin-off innovations resulting from basic physics research would include the World Wide Web which was created as a bi-product of work at the particle accelerator at CERN, in Switzerland. Basic research in particle physics also resulted in the invention of the transistor and MRI or magnetic resonance imaging technology.

Locally, another example of the benefits from high energy physics research is Illinois' first to be approved proton beam cancer treatment center, which will be built just north of the Fermilab campus. Proton radiation therapy will make certain forms of inoperable cancer accessible to alternative treatment. This will positively benefit our area residents since there are currently only five of similar facilities located elsewhere throughout the United States.

Fermilab has also made another very significant contribution to our area through its role in influencing the establishment of the Illinois Math and Science Academy, which was created to accelerate the development of those students who have demonstrated an exceptional aptitude for math and science studies. This initiative is critically important at a time when our high school students are only at the middle level based on international math and science testing.

Also important is the significant impact that Fermilab has had on the economy of our area and our state. As recently as 2006, the Lab paid out $195 million in total compensation to its employees, which was available for expenditure in our local

communities. Also, in 2006, the Lab spent $70 million in procurement purchases from businesses located within the State of Illinois.

In summary, the benefits of locating the ILC at Fermilab are apparent for many reasons, ranging from advancing America's scientific prestige, to remaining a respected partner in the international scientific community, to retaining the Lab's intellectual and economic resources for the benefit of our nation and our local communities.

C. The Costs Of Failing To Build and Locate The ILC at Fermilab

In addition to the benefits articulated above, an assessment of the value of locating the ILC (or a similar large-scale particle physics project) at Fermilab should include an awareness of the potential costs of not locating the ILC here. These costs include consideration of research and leadership opportunities that may be lost and the potentially diminished impact of Fermilab on the community, region and nation. Such an approach acknowledges that a post-Tevatron Fermilab, without additional large scale projects, may mean significant changes in levels of staffing and investment, and in Fermilab's ability to continue in its national and international leadership role. The report as a whole addresses several specific concerns, briefly noted here.

First, the rationale for the ILC is its potential to allow researchers to build on recent discoveries in high energy physics, opening up new areas of research and inquiry, in addition to requiring accompanying technological innovation that would be required to bring about the project. Specifically, locating the ILC at Fermilab maximizes opportunities for these discoveries and innovations to take place in this country, laying the foundation for further discovery, innovation, and investment in the United States. In general, not funding the ILC would likely limit the pace and scope of the scientific advances; not locating the ILC at Fermilab would potentially limit the benefits derived from the project for the region and the nation.

Second, the role of the United States in funding and developing other large scale scientific projects, and in its early support for development of the ILC, has afforded it a leadership position in the worldwide scientific community. If the ILC is built and is not located in the United States, then Fermilab and the nation will to a significant extent cede that leadership role to the host country. Moreover, withdrawal from the ILC process altogether or significant under funding relative to existing commitments can only diminish the credibility and standing of the United States in the eyes of other nations invested in physics and other cooperative ventures.

Third, to the extent that major centers of research are a magnet for the best minds and technological investment, the United States stands to lose if the major international centers of research are located overseas, as may already be in evidence in the emergence of the LHC at CERN. Having those human and technological resources invested elsewhere affects both the present and future of the region and the nation. Not only does this encourage American researchers and technicians to focus or locate

elsewhere, but it also reduces the influx of talented and accomplished international professionals into the nation's economy. With investment focused on other international centers, researchers associated with the advances of the ILC are more likely to develop their ideas and applications near to these centers, as has been the case in past decades in regard to Fermilab and the surrounding area.

Similarly, one of the strengths of the United States has been its leading centers of higher education. Fermilab already offers opportunities for scientists and students to conduct their research directly at Fermilab or by building on the discoveries made there. Fermilab's ability to remain on the cutting edge therefore impacts universities, departments, faculty members, and students across the country. These academic programs also benefit from the elite students they attract from around the world to study at these universities. To the extent that Fermilab becomes a less desirable or viable center for research and study, this comes with a significant cost within higher education, which is in turn a concern for the nation's future investment in physics and its ability to reap the benefits.

Fourth, specific to the region, a decision to limit reinvestment in Fermilab as a preeminent center of research has significant economic costs in terms of jobs and spending. Fermilab currently is a major employer, bringing highly educated and accomplished professionals to the area, while requiring a range of other occupations in support of its work. These employees contribute to the communities and development of the region. In addition, Fermilab's presence supports the development of other businesses and investment within the area, including the ventures of former employees of Fermilab or those companies that would take advantage of the human resources associated with the two national laboratories in the area. With a reduction in the number of professionals working and living at or near Fermilab, this also would remove well-educated, diverse, engaged members of the community. Moreover, the ILC would itself require investment in Fermilab and the region on a large scale. The impact of that level of spending on the region's economy, and as a reinvestment in the nation's economy, should not be minimized. The ILC's presence would maintain and boost regional investment; its absence not only misses an opportunity for reinvestment, but also would possibly contribute to a reduced footprint of Fermilab in the area.

It is important to note that the ILC would be a successor project to Fermilab's current operations. The current collider, the Tevatron, will shut down once the Large Hadron Collider begins full operation in Europe. The ILC would not be an entirely "new" project from the ground up, but a continuation of Fermilab's leadership in particle physics research. Ignoring the value of the physical infrastructure at the current Fermilab site, and the associated tax based investment cost thus far, the real economic impact should consider the vacation of the site along with the population of direct and support workforce that would not likely find other employment in the same field in this area. There would likely be an extensive migration to another technically sound science locale. Given there are over 1,500 specially trained or scientific employees involved with Fermi, plus innumerable administrative, subcontractors and suppliers based in the area, the vacation of Fermilab could be equated to the closing of a large military base or other

tax based facility.

However, the difference Fermilab represents to the local community in direct and indirect employment and careers, is that Fermilab's needs and dependence on the local economy and suppliers provides a far more technically challenging (read incrementally greater) opportunity to the public. In the case of a military base, or federal penitentiary, the community career support opportunities may be much more limited to rote and clerical jobs. Also, in the case of a military base or penitentiary, the sacrificed jobs due to a closing may more likely result in re-training the affected workforce into a similar career. The retraining of scientists and technical staff to become insurance salesmen is not likely to provide the challenge an intellectual mind desires!

Finally, not pursuing this project potentially misses an opportunity for the lab to build new ties to the community. As this task force experience has already demonstrated, it is possible for Fermilab to articulate to an interested public what it does, why it does it, and what the value of its activities may be. This project would force Fermilab to engage with the community to an extent not realized in the past. This would not only potentially lead to greater understanding within the community, but it would also facilitate Fermilab's own examination of its role as a responsible neighbor, economic engine, and center of education.

D. Major Types Of Community Concerns That Would Have To Be Weighed And Addressed.

The optimal relationship for Fermilab to maintain with its neighboring communities has always been a symbiotic one. Constructing and operating the ILC at Fermilab needs to be based upon developing this type of relationship. The many benefits for neighboring communities that would result from building the ILC here have already been noted. It's obviously important that those benefits be widely accepted within the region as clearly outweighing the perceived negative costs with location, construction, and operation of the ILC. It's equally important that those perceived negative costs be minimized to the extent possible, and to the satisfaction of local communities. Perhaps less well appreciated is the importance that broad community support can contribute to the success of the ILC. The "I" in ILC stands for international. Physicists from all over the world would come to Fermilab to work. A local community that embraces both the work done there, and the people who do it, would help to make the ILC a more desirable, productive project to work on.

The cornerstone for developing this type of symbiotic relationship should be to establish an open process that engages, respects, and acts on community input. Such a process would need to accomplish several things:

- Build the level of trust necessary to sustain an ongoing, positive relationship between the surrounding communities and the Laboratory during the construction and operation of the ILC

- Reduce the potential for misunderstandings and help curtail the spread of misinformation
- Provide a well understood venue for local communities to raise concerns and voice anxieties.

The ILC at Fermilab would go through several general phases: design, construction, and operation. Building and sustaining the desired symbiotic relationship between the Laboratory and its neighboring communities during these phases would require a broad, flexible open process that adapts to dealing with different issues and concerns at different times and on different levels.

In the design phase, there would be concerns about site layout issues, including location, impact, and aesthetics, especially for the parts of the ILC extending outside the boundaries of Fermilab. Impacted communities should have avenues for voicing comments and concerns during the site layout process. Information on property rights and eminent domain would have to be made publicly available, with forums for open discussion. The process for land acquisition would need to be laid out in detail, discussed, and modified as necessary. Both local government bodies and affected individuals must be encouraged to participate, in order to make the process as smooth and cooperative as possible.

Environmental issues would also need to be addressed in the design phase. Environmental studies and impact statements should be made public and easily accessible. The potential impact of the underground tunneling on local water supplies would need to be specifically addressed.

The construction phase will present a different set of issues and concerns. Disruptions, congestion, and other nuisances would be unavoidable, given the size of the project. However, close coordination of the construction work with local communities could minimize the impact of the construction.

Safety and health issues would be another major concern to the surrounding communities, both during construction and in subsequent operations. The public will demand proper assurances that the ILC follow the basic dictum “do no harm”. These assurances should be specific, documented, and measured, where feasible.

Once construction has been completed and the ILC enters into operations, its impact on surrounding communities may become more difficult to quantify. It is critical for local communities to become aware of the likely long-term impact of having the ILC at Fermilab. Estimates on staffing levels needed to operate the ILC, as well as general operating and capital improvement expenditures would help local communities assess the benefits of having the ILC built in their area.

Related projects of similar type and scale can help to provide realistic expectations of the impact of locating the ILC at Fermilab. The aborted Super Conducting SuperCollider (SSC), down in Texas, should provide a number of valuable lessons. Fermilab was one

of finalist sites for the SSC. The Laboratory's efforts on community outreach relative to that project should provide a useful list of lessons-learned, both negative and positive. Another useful lesson from the SSC project would be the impact of its cancellation on the surrounding communities. The Large Hadron Collider (LHC), in Switzerland, presents a very similar situation to that of a Fermilab-hosted ILC. A facility of similar scale to Fermilab's Tevatron was replaced by a much larger facility that extended out into the local community. Experiences in construction and operation of the LHC should be very applicable to the ILC. Finally, the Deep Tunnel Project in the Chicago metropolitan area could serve as a primary example of community impact resulting from a large scale tunneling in this geological area.

In the end, the type of symbiotic relationship that Fermilab and the surrounding communities would hope for with the ILC can only come about if communication and accommodation become cornerstones for that relationship. It is important for the Laboratory to provide accurate and readily accessible public information on all aspects of the project, with emphasis on benefits, costs, and local impact. It is particularly critical that the parts of the ILC lying outside the Fermilab boundary be openly presented and discussed as design and construction of the facility progresses. As with any symbiotic relationship, it must be a two-way interchange, with both sides accommodating the other in order to maximize benefit for both.

III. Siting The ILC

A. Background

The decision regarding where to place the ILC will likely be the single largest cause of concern and potential opposition to the project. The ILC must be located in suitable geology that is adequate to support the tunnels, be located at a site that is sufficiently large to contain the structures and support facilities, and have access to needed infrastructure, such as power sources and cooling waters. Although these technical specifications are critically important considerations, the ultimate siting of the ILC also will depend on the commitment of the host government to support the project and the estimated costs associated with a specific site.

The U. S. Government has made an initial determination that Fermilab would be the location of the ILC should the U.S. support siting the ILC in this country. The preliminary rationale for locating the ILC at Fermilab is that the site meets the technical siting criteria and also has an excellent infrastructure in place, including key scientific and support personnel. Because Fermilab is already conducting high-energy physics, the existing Fermilab infrastructure, and its highly skilled human capital, siting the ILC at Fermilab is likely to be cost-effective compared to other potential sites in the United States.

However, siting a project as large as the ILC will likely be of significant concern to local communities. People will raise a myriad of issues (e.g. inconvenience from construction, fear of radiation, questions about land use, proximity to “my house” and the “not in my backyard” phenomena, fear of a nuclear explosion, etc.) regarding potential impacts and raise questions regarding whether Fermilab is the best or most appropriate location for the facility. Those people directly affected by the siting of the ILC may never be convinced that the impacts they may experience can be justified by the cost benefits of the project. Consequently it will be crucial to the success of the project for the Department of Energy (DOE) to be able to make the case to the public that the chosen site is the best one given the relevant criteria.

B. Key Community Concerns

To make the case for siting the ILC at Fermi, the DOE and project supporters will have to develop a sound rationale and justification. It will not be sufficient to simply state that Fermilab is the best site or that the ILC will bring continued economic benefits to the surrounding communities. The decision to site the ILC cannot be viewed by the public as a unilateral, a priori, or political decision.

The rationale and justification presented to the public will need to address the following topics:

- A demonstration that the decision to site the ILC at Fermilab was not automatic and that various options were considered and evaluated before the decision was made.
- Recognition that the concerns of each and every person and community about siting need to be heard, acknowledged, and are being addressed.
- Other viable options for U.S. sites have been identified and considered in terms of costs and benefits. A comparison of those options should clearly indicate that Fermilab is the best site.
- The ILC has certain technical needs, and the underlying geology of a selected site also must meet certain requirements and characteristics (e.g. length of ILC tunnel 30-55 km, periodic surface structures, linearity, north-south orientation, cryogenics, construction access, emergency exiting, etc.). Any site must possess the necessary characteristics to make a siting decision. Those characteristics and an explanation of how Fermilab meets those criteria must be clearly presented.
- Centering the project on Fermilab's existing campus may have significant benefits to the nation, project and community. This site location takes advantage of existing facilities---labs, shops, offices, computer systems, etc.; provides for management of radioactive materials via existing facilities and protocols; and can take advantage of existing accelerators. (Note: Someone will raise the question as to whether or not these benefits offset the net benefits of other possible sites.)
- Fermilab has a significant cost advantage over other sites because of the existing infrastructure. Perhaps this question could be answered with a simple comparison of a greenfield site someplace else plus the cost of duplicating all of Fermilab's assets, compared to the cost of building the ILC at Fermilab where those assets currently exist and would not have to be built. The key would be to estimate the cost of duplicating Fermi's relevant assets.
- The public should be given a description of how the infrastructure available at FNAL and the support structure of the surrounding communities makes FNAL unique and the best site.
- The relative advantages and disadvantages of siting the ILC at Fermilab for both the project and the affected communities.
- A description of how the siting decision was made, who were the players and decision-makers, and the role of the international scientific community in the decision.

C. Recommendations

The public and interested communities need to be informed as to why Fermilab is being considered to host the ILC. The DOE should develop and provide the public the reasons for selecting Fermilab as the preferred site, and those decisions should be detailed in a publicly available siting document.

In addition, it is important that the public and local communities have input into any final decision to site the ILC at Fermi. In order to gain public trust and acceptance of the project, DOE should involve the public and ask for their input prior to any final siting

decision is made. In other words, the Task Force recommends that DOE not make a final decision and announce that Fermilab is the site of the facility without local input, thus leaving the community out of any consultation on siting the project at Fermilab. If the project is presented as a “done deal”, then community opposition is likely to be enhanced.

In considering the suitability of Fermilab as the site for the ILC, the following issues should be addressed prior to any final decision being rendered by the DOE:

- Establish the exhaustive and multi faceted rationale for locating and centering the ILC facility at Fermilab including technical and economic criteria.
- As the work on site selection occurs make all information available, have transparent decision making processes, and seek community input. Consult and inform the public early in the process.
- Clarify the limitations and requirements for sites.
- Consider alternatives including greenfield sites at other locations in the U. S.

In communicating with the public, provide facts and information that is correct and include any potential expansions or revisions such as the possibility of extending the total length of tunnel.

- Openly discuss and compare the pros and cons of a Fermilab centered site.
- Identify the issues and concerns that residents will raise (e.g. radiation, trash. light and noise, traffic, etc) and have real answers. An extensive amount of modeling will be needed in order to have adequate and sufficient information.
- Provide opportunity for public input on the issues considered and the decision-making process.

IV. Off-Site Facilities (Surface sites and facilities outside the Fermilab campus)

A. Background

The siting of the tunnel and the location and design of the off-site surface facilities have the potential to be the most controversial aspect of the project as well as to illicit the most opposition from local communities and the directly affected individuals. Although the Task Force has been given some general information on the nature of the surface facilities, the details and specifications for the facilities are not known at this time. However, we know that several facilities will be required along the tunnel route off of the Fermilab site property to provide access to the tunnel through vertical shafts, and that some type of surface structure or land will be required. Given that information, potential public concerns can be identified and some general recommendations to address those concerns can be made despite the lack of specific details regarding the off-site facilities.

B. Key Community Concerns

The surface facilities will impact citizens in at least two ways. First, there will be impacts to the community from siting, constructing, and operating an industrial facility in the community. Impacts on property values, quality of life, zoning, air and water quality impacts, noise and other issues will need to be addressed. Second, some individuals will be impacted directly either by the use of their land for the facilities or by being adjacent to the facility. The surface facilities have the potential to have significant impacts on the community and individuals. The siting of such facilities and the exact routing of the tunnel must be completed in a manner that minimizes both community and individual impacts.

In siting the facilities, the following concerns and issues should be addressed:

- Safety of the facilities
- Disruption and specific impacts related to construction
- Impact on property values
- Impact on land-use and the environment
- Compatibility of the facilities with surrounding community and natural environment
- Locating the facilities to minimize impacts to community and individuals
- Designing facilities to minimize impacts to community and individuals
- The need to minimize operational impacts such as emissions and noise
- Long-term maintenance and site remediation
- Maximizing voluntary property transfers
- Minimizing takings and impacts to residential property and dedicated open space

Answers to a number of specific questions will need to be answered. Some questions that are likely to come are indicated in Table 1, and the DOE will need to address those questions as well as others brought up by the communities affected.

C. Recommendations

With respect to the tunnel alignment and off-site surface facilities, the Task Force has the following recommendations:

- Within the technical and geologic constraints required for the ILC, the tunnel alignment should be finalized using criteria that minimize the number of off-site surface facilities as well as the potential impacts of those facilities.

- When considering the tunnel alignment, potential surface facilities should be located in existing industrial and commercial areas and should avoid residential and dedicated open space/natural areas.

- Because the surface facilities have the potential for being the most controversial aspect of the project, the Task Force recommends that the DOE engage the public as early as practical on this matter. Once a tunnel alignment has been determined, the DOE should meet with potentially affected landowners and community leaders before the information is released to the general public and press. Early communication with affected landowners is essential

- Locations of surface facilities must be as flexible as possible to accommodate the concerns of the communities and siting process.

- Surface facilities should be designed to minimize the land needed as well as the impact on adjacent properties. It is important that the DOE incorporate those goals into the design of the surface facilities and to also prepare detailed design and functional descriptions of the facilities in order to provide early and correct information to the public.

- Surface facilities should also be designed to blend with adjacent land uses and community values. Where possible, the DOE should incorporate options for multiple uses of the sites if there is interest in doing so from the local community (e.g. public park, educational or multiple-use centers). This will go a long way towards acceptance of the facilities.

- To the extent feasible, land for surface facilities should be acquired through voluntary agreements with the current landowner. Condemnation proceedings should only be used where all other options have failed.

- Where an option exists to conduct operations or activities at on-site Fermilab facilities as opposed to off-site facilities, the DOE should select the on-site option.

The work and activities of the off-site facilities should be minimized to avoid impacts. In that regard, any potentially hazardous or potentially disturbing activity such as rock removal, radioactive waste management, or major transportation activities should be centered on the Fermilab site as opposed to the off-site surface facilities.

- The DuPage County Forest Preserve District owns and manages a relatively large amount of acreage in the potential site corridor. The DOE and Fermilab personnel should specifically meet with Forest Preserve staff and Commissioners very early in the process to explain plans and investigate any potential options or roadblocks regarding surface facilities.

- The DOE should work with landowners and communities to mitigate impacts from surface facilities to the maximum extent possible.

TABLE 1. Potential Questions of Concern that Need to Be Addressed in Siting Surface Facilities for the ILC Project

- How can the off-site facilities' size and impacts be minimized?
- Why can't everything be underground?
- Will they be safe?
- How will access be controlled?
- How will they be secured?
- If my kid breaks into one of them, will he fall down the big hole? contract radiation poisoning? get electrocuted?
- Will they be a nuisance (noise, trash, light)
- Will they be unattractive? How can they be designed to blend into the community?
- Will they detract from my property value?
- After construction, will they produce a noticeable traffic load on our streets?
- Who decides how large these are and where they will be located?
- How will these off-site facilities and locations be used/impact me/my neighborhood/the community during construction versus normal operations over time?
- Will there be any radioactive material delivered or removed through these access points? (During construction or normal operations).
- What type of equipment and or material will be delivered or removed through these access points and at what frequency? Can delivery traffic be restricted to between 7 am and 9 pm?
- Will there be any radioactive material removed through these access points?
- Will these sites be 100% maintained by FNAL?
- Will condemnation of properties be required to proceed or complete these access points?
- What happens if the ILC should cease before completion (SSC)?
- What happens once the ILC construction work is complete?
- What happens when the ILC operations cease (i.e., it is replaced with a newer larger machine)?
- What is the expected life of the ILC – 20, 50, 70 years?
- How does the total mass of buildings needed get incorporated into the surrounding communities (very different scales)

V. Worker Safety

A. Background

Potential worker exposure to radiation, both during construction and during operations, is a key factor that sets this project apart from other major construction projects. We believe that the public readily grasps other hazardous aspects of major construction projects, like falls, equipment accidents, use of explosives, etc., and will not be unduly concerned about worker safety issues other than radiation.

Worker safety issues are dictated by OSHA, enforced by the DOE and their operations contractor(s). Fermilab frequently exceeds Federal standards for worker safety, and its years of experience and exemplary safety record attest to this success. Two features set radiation concerns apart from other safety issues: radiation is to the ordinary citizen invisible and undetectable, and radiation's effects are slow to be felt. The Karen Silkwood saga (so ably played by Meryl Streep in the 1983 Academy-award nominated film *Silkwood,* and the subject of more than 7,920 web pages) is still in the mind of the public; so is public distrust of government.

We believe that people want to know that they and their co-workers are safe at the work place, and not bringing hazards home from there. Worker exposure might occur from multiple sources. Air quality and ventilation are two key issues to be explained fully.

B. Recommendations

We recommend that benchmark radiation exposure be explained in terms to which the general public can relate, e.g., in terms of exposure to sunlight or to chest X-rays. If this project appears imminent, we recommend that Fermilab not only continue to be vigilant, fully enforce OSHA, Fermilab and recognized international collider work safety standards, but to publicize these efforts and standards. As an example, Fermilab might make the employee safety handbook, appropriate Material Safety Data Sheets, and other relevant materials available to the public as a communication tool. An explanation of how CERN handles these issues might serve as another tool. If/when the ILC project starts up, Fermilab might publish the CERN safety track record.

VI. Public Health and Safety

A. Background

The same factors drive public health and safety concerns, viz., radiation and air/water pollution. We believe the public's fear of radiation and distrust of government are reality-based. The public does not differentiate the many forms and levels of radiation, but needs to be educated. There will be potential exposure to radiation, dust, volatile organic compounds, hazardous air pollutants, water pollution, hazardous waste, noise, light, and vibration pollution. Potential public exposure, no matter how small or imagined, must be addressed.

An issue that touches public health and safety is Fox River water—how much will be required, how will it be treated for re-entry, what safety issues will exist at the intake and return, and how will they be addressed. These issues will affect all those who use the Fox River for recreation (the canoers, swimmers, fishermen, etc.) or for drinking water.

We recognize that linear colliders have been built before, and many of the concerns are known. These "known factors" simply need to be communicated to the public. The public needs to be reassured that life will continue as before once the construction is completed, i.e., that the air will be breathable, the water drinkable/fishable/paddleable, the quality of life will go on as before.

B. Recommendations

We recommend that the same openness and transparency in communication with the public be maintained. Focus should be on the positive aspects. The Illinois Department of Transportation does this all the time: how long has the public put up with extended road repair in the hope that the future will bring less congestion? The ILC project should be handled in the same unobtrusive manner in which current Fermilab operations are conducted. The importance of education about radiation, its types, levels, and effects on human health, cannot be overemphasized.

VII. Environmental Issues

A. Background

A wide range of environmental issues concern the public, limited not only to the construction phase, but also in the operating phase. Among the most important of these issues are water table impacts, the use of Fox River water, loss of open land, wildlife impacts, air/water pollution, and recycling opportunities (e.g., for construction debris).

The ILC project would extend far beyond the borders of Fermilab property. People have an increasing concern over dwindling natural resources, and particularly about this project, which would reach below the current water table. Kane County has already alerted the public to potential ground water shortages by 2030, and this will heighten concerns about ground water impacts during construction and during operation, including water usage by off-Fermilab site facilities.

There are issues regarding air/dust dispersal, trash, sewage from tunneling operations and project operation, heat transfer, energy usage from on and off Fermilab property. Communication about potential damage from tunneling operations to private property, and the minimal potential for damage from earthquake action are important.

Finally, what is the potential for use of the tunnels after the ILC life is over? Tourist attraction, or mammoth wine cellar?

B. Recommendations

We recommend that the project adopt the goal of no permanent impact on water quality and quantity, wildlife habitat, other natural resources, at the end of the project. We recommend stressing “green” and incorporating “green” practices whenever possible, and communicating this to the public. We recommend establishing wildlife corridors in the project, committing dollars to the preservation and restoration of natural resources, and taking advantage of every recycling opportunity. Finally, we recommend designing with the end in mind, i.e., use of the properties after decommissioning.

VIII. Construction.

A. Background

The construction phase will be the most visible phase of the ILC project. Public perception and fear of the tunneling process will likely drive public reaction in the initial phase of the project. Public opposition will likely crystallize at the point of the start of construction.

Because of the length of the project, and previous history of extremely large and complicated construction projects, people dislike any such projects in their back yards. They may not realize that, except for the access shafts, it is *below* their back yards.

The public, as in any construction project, will be concerned with property value impacts, quality of life impacts, impacts of tunneling vibrations on family pets and local wildlife. Effects on private wells, and general “builder’s liability” are also concerns, and who pays for any damage. This project will be only 30 miles long, and many people would be reassured by learning details of the MWRD “Deep Tunnel” project, that has so far tunneled 109 miles in similar communities.

B. Recommendations

We recommend communicating and maintaining a frequently updated schedule of operations by all media possible. Akin to the “sidewalk superintendent” viewing holes in the construction fences of city buildings, we recommend inviting the public to see the tunneling and other operations, via live or TV presentations, videos, school trips, etc. Dust containment will be important, as dust is the most visible contaminant to be produced.

IX. Economics

A. Background

The economic impact of a project like the ILC will be significant to the region. It is important to accurately quantify all potential costs and benefits of the project, as well as the potential impacts of closing or drastically reducing the activities of Fermilab as discussed earlier. This section discusses an number of areas where economic impacts need to be explored and accurately accounted.

Construction Impact

The impact of construction expenditures for a project such as the ILC could be expected to benefit Illinois firms and increase demand and thus raise wages for Illinois labor. It is difficult to distinguish between local and regional benefits, but one might expect the region to benefit more than other areas of the country due to transportation costs, if for no other reason.

There would also be costs associated with the construction phase, including local and state government provisions of services (water, sewer, fire and police), a reduced property tax base, road construction, repair (due to heavy truck traffic) and upgrade, environmental degradation, ground water issues, and possibly land acquisition costs. At this point in time it is not yet certain who would foot these various costs, but they were specific commitments of local and state government for the proposed Superconducting Supercollider in 1988.

Finally, the increased demand for labor for an ILC type project would increase the cost of labor as the market got tighter. (This is a byproduct of large construction projects and not a reason to avoid building them.) It would be a temporary construction phase issue, but could have a significant effect on business and employment patterns during that time and during the readjustment of those patterns which would occur when the construction activity ceased. It is important to note that the Chicago and north east Illinois construction industry is uniquely positioned and qualified to build a project of this magnitude. The original construction of Fermilab and all of the subsequent research projects were built with local labor as was Argonne National laboratory. The general construction boom in the area has lasted many years and not overtaxed the contractor or manpower base. Projects like the Deep Tunnel, I355 Toll Way, O'Hare Airport expansion, and general construction projects of many different scale and dimension continue to be built throughout the region on time and on budget.

Long Term Impact

Over the longer term, or operational phase, the local and regional economies would also benefit. The detrimental effects of the construction phase would presumably be

absent during this period. (Importantly, if the benefits of operation during this phase can be clearly and reasonably shown to be worth the variable cost as opposed to fixed cost of operation- generally, the one time construction cost of the facility - a strong argument could be made for keeping the laboratory in operation in the event the ILC was not sited here. This would, however, be tempered by consideration of opportunity costs, alternative uses of the property, and other factors, such as loss of open spaces, etc.) Some of the costs shown for the construction phase would persist in the operations phase, such as fire, sewer, and environmental degradation. “The project would contribute to an existing regional groundwater overdraft condition. Numerous residences are within the “annoying noise level” contours around the service areas. There is a moderate potential for aggravating an existing ozone air pollution problem.”<1>

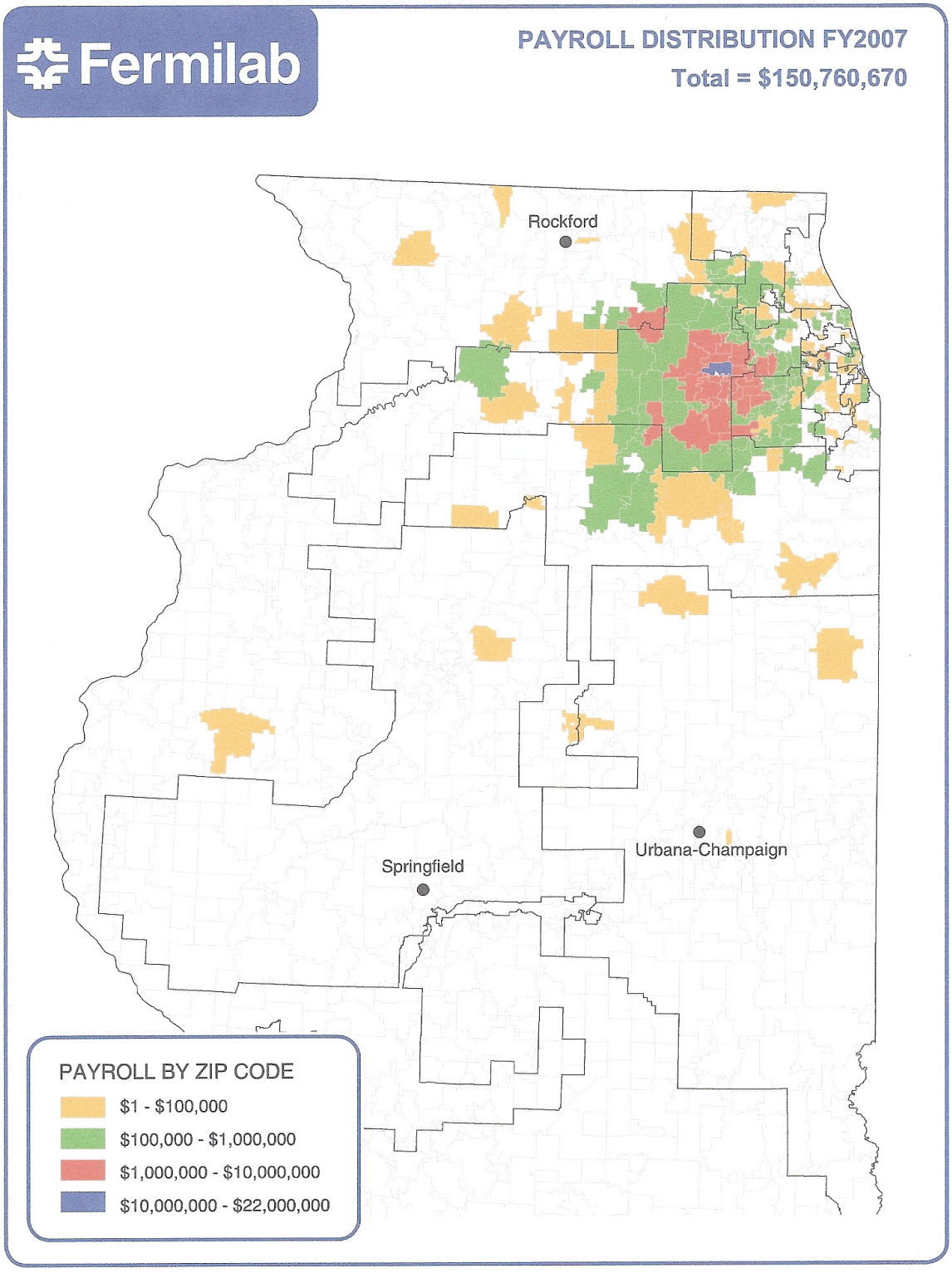
The quality of people associated with the ILC that would become part of the community would greatly enhance our level of human capital. This would promote more parental involvement with education, and would have a positive effect on our education institutions, encouraging more young people to pursue technical training and graduate degrees, especially in the sciences. Numerous colleges, universities and other related institutions would benefit from association with these technicians, engineers and scientists.

On page 2 is shown the procurement distribution for Fermilab for FY2002-2007. (On this page and on the next two pages I assume the information is for an operational phase although there may have been some construction activity as well.) On page 3 is shown the payroll distribution for FY 2006, and on page 4 is a summary of Fermilab data for an unknown year. These data were produced by Fermilab staff.

I*nternational Governing Model*

The design for the ILC was to incorporate a formula for the sharing of business generated by the construction and operation of that facility. Specifically, a donor country's share of the business benefits would be in proportion to their contribution to the project's funding. This considerably dilutes the benefits shown above as the United States was to pay half the cost of building the ILC, and other nations the remainder. Even though SSC proponents made similar claims for their project, with no formula for business sharing, there was considerable evidence that much of the business generated by the SSC would go beyond Illinois, indeed, beyond the United States. “An article in *High Technology* considered the benefits of the SSC to firms that produce superconducting magnets and firms in the cryogenics industry. Not one of the firms expected to benefit from the SSC has (had) an Illinois address.”<2> This effect would apply to both the short and long term phases.

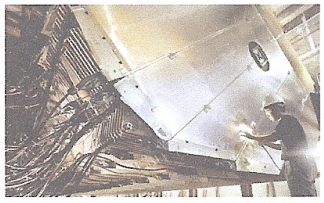
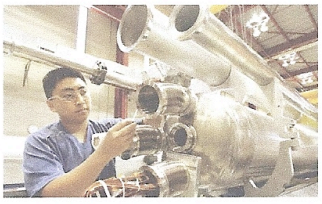
There is a much more important reason, however, for skepticism about economic benefit claims such as those described above.


Fermilab
PAYROLL DISTRIBUTION FY2007
Total = $150,760,670
Rockford
Springfield
Urbana-Champaign
PAYROLL BY ZIP CODE
$1 - $100,000
$100,000 - $1,000,000
$1,000,000 - $10,000,000
$10,000,000 - $22,000,000

Fermilab

Fermilab and the Community

Economic Impacts

Annual federal research budget	$350 million
Employees	
• Total	1,960
• Living in Fox Valley or western DuPage County	90 percent
• With Ph.D.'s	463
• Scientists	380
• Computer professionals	280
• Engineers	300
• Technicians/technical specialists	530
• Serving as community volunteers or on community public boards	dozens
Payroll	$150.7 million
Illinois income tax withheld	4.0 million
Visiting researchers and college students	
• Total	2,300
• Out-of-state and international	1,844
• In-state academic	456
• In-state industrial	3
Subcontractors working part-time on site	hundreds
Laboratory purchases from Illinois businesses	FY2006
• Total	$70,340,000
• Women-owned businesses	$ 7,618,000
• Minority-owned businesses	$ 4,339,545
• Construction spending	$18,169,000
• Percentage of total purchases in Illinois	59 percent

Printed February 2008

Honesty About Costs- Pork Barrel Economics

Its all right to celebrate jobs for fellow Illinoians and business for Illinois firms but don't be fooled into thinking that this is an economic justification for building the ILC.

Government expenditures for large scale projects are commonly supported by the business and jobs it is claimed will be produced for this senator's state or that congressman's district. This trend is reinforced by the socioeconomic impact estimates required by environmental law. A closer examination of this approach will reveal dangerous shortcomings.

Any business investment requires and comparison between expected revenue (value of output of goods and/or services) and costs. The value of output must exceed the cost by a sufficient margin for the investment to be made – there must be an expectation of reasonable profit. Wages and other expenses (cost of purchases from businesses, for example) must appear in the cost column, and projected value of output must appear in the revenue column. This is how the free market enforces efficient resource use. Good investments are profitable and succeed - bad investments fail. The market separates the wheat from the chaff.

But the jobs and business promotion approach defines these costs as a benefit – a profound and arbitrary change. Look at “payroll” and “laboratory purchases from Illinois businesses” on page 4 (Economic Impacts). These items are clearly all *costs of operation, not benefits*. Instead of using proper accounting to test the viability of an investment, *the jobs and business approach makes all investments appear viable*. The chaff remains with the wheat. If holes are dug in the ground only to be filled in again, producing nothing but filled in holes the investment still looks good because jobs and business are created. The point is that this method of analysis will justify anything and everything. This is pork barrel nonsense. It pits the potential recipient of the pork barrel largess against the rest of the nation whose taxpayers are called upon to fund it.

The business and jobs brought here by the ILC may appear as a benefit to Illinois, but to the rest of the nation they are seen as a cost paid by their tax dollars, and rightly so. It is worth noting that when the Texas site for the SSC was announced, political support for the project from the remaining states dwindled, resulting in the project's eventual demise. This underscored the pork barrel (or quark barrel as it was called by some in the press) nature of support for the SSC. If the ILC is to be funded the *entire nation* must be persuaded that it is in their best interest as well. Any meaningful economic impact study should therefore include all who are affected, including those who are “impacted” by the taxes they pay to fund the project. *This requires a focus on the real benefits of this scientific endeavor.*

Perhaps a slightly different perspective will help clarify this point. A great deal of money and effort will be expended to glorify “economic impacts” of large projects, the jobs and business generated (local pork barrel benefits). But who is to be convinced? If the SSC experience offers any guidelines the local population would overwhelmingly support the

project anyway. *The problem is that they are not the ones who determine whether the project should be funded.* Those decisions are made in Washington D. C., and the constituents of those decision makers are the ones who will pay the taxes that would finance the ILC. They care little about the pork barrel benefits that would come to Illinois if the ILC is built at Fermilab. Their representatives in Congress are the ones who must be convinced that the ILC would benefit the entire nation and is not just a favored pork barrel project in Illinois, or the ILC will suffer the same fate as the SSC.

B. Recommendations

We hope the ILC is not a wasteful, inefficient venture but we will never know by using pork barrel analysis. Support for the ILC must be elevated to a more intellectually honest level than that provided by the pork barrel thinking manifest in economic impact studies. We must not allow this science project to be equated by its support to a "bridge to nowhere" boondoggle - to fall victim to a battle over who is to get how much business and how many jobs. This is not 1933, the unemployment rate is far from the nearly 25% of that year and the ILC is not a WPA (Works Progress Administration) "make work" project – *it is a Science project*. The case for the ILC must focus on its real purpose – scientific research and the production of knowledge - rather than defining construction and operation costs as benefits and crowing about the jobs and business produced.

A high minded endeavor such as the ILC should not be supported by low minded economics.

END NOTES

<1> U.S. Department of Energy, SSC Site Evaluations – A report by the SSC Site Task Force, 1988, page 67.

<2> Craig D. Jones, "Superconducting Super Collider: An Accurate Appraisal", *Heartland Policy Study No. 23*, (Chicago IL: The Heartland Institute, October 1988) page 7. See also "Superconducting, The New Billion Dollar Business", *High Technology*, Volume 7 No. 7 (July 1987), pages 12-18.

X. Political Considerations

Anyone involved with local politics is aware that the word “change” strikes fear into the hearts of homeowners in established neighborhoods, more that almost any other word. Most people in the suburbs take a lively proprietary interest in their immediate surroundings and have chosen where they live because that place has a particular appeal to them. After they are there for a while and establish emotional ownership of their property and neighborhood, a new project of considerable magnitude is frequently seen as a threat to something they hold very dear: their home and hearth. When this threat becomes imminent, the reaction is quite predictable: “You (insert city, agency, developer) are going to change my (street, neighborhood, town) forever, not for better (steal it’s charm). The construction (inconvenience, noise, traffic, dust) will be an unreasonable burden. We do not want the increased traffic (although the potential benefits of this development are welcome). Your project will bring an undesirable “element” to our area. You are not telling us the truth about the impacts this proposal will have on us.” Add the possibility of eminent domain to this equation, and you have added the critical ingredient for local insurrection.

The ILC is a huge project with significant impacts. If you are a proponent, you may be focused on the positive aspects and see the potential negatives as obstacles to be overcome. There is no question that people who face the prospect of a 5-15 acre industrial site being established in their neighborhood at the expense of their or their neighbor’s homes will take exception to being reduced to obstacles to something they perhaps don’t understand, see the need for, or simply don’t want.

We have struggled for months with attempting to determine just how and when to best deal with what information should be shared, with whom, how best to disseminate it, and how to accommodate the fact that the project in question is only vaguely defined as to location (on it’s north/south axis) and other crucial details. It is quite a challenge to reach consensus on effective strategy. It is much easier to deal with a shopping center being proposed for a vacant patch of land at the edge of town than to anticipate the most effective way to insure a 20-30 mile long tunnel 300 feet under ground full of subatomic particles zooming around at close to the speed of light. Local neighbors will wonder just what those particles might do to our veggies growing out in the garden, much less to our kids sleeping in their cozy beds. In the first case, at least the territory is familiar and well-traveled. In the second case, too much is unclear and fuzzy, nebulous and esoteric, with assurances about things most of us don’t adequately comprehend coming from public agencies and government that, unfortunately, have occasionally in the past (and again, unfortunately, continue to be) been less than forthcoming.

If nothing else, we established the need to reach out early and often with information, honestly presented as best we know it. One effective way to get information to the public is through local government. There is a network already in place and local officials know their territory and issues. They are in a position to help a project or fight it. They know the critical people in their towns to get on board to accomplish things. They can provide an outlet for positive or negative information on a proposal. As was seen

with the ill-fated SSC, when whole communities organize against what is perceived as a common threat, that threat will be opposed vigorously and for as long as necessary.

Make no mistake: Nearly all love Fermilab as it quietly does it's thing within its boundaries. Push those boundaries north and south 10 miles, even 300 feet underground, and the affected people will take notice. If you think what was said above was melodramatic and overwrought, you have never attended a zoning meeting discussing a variance involving an above-ground swimming pool being proposed too close to a neighbor's bedroom window. Those ILC access points along the tunnel will provide some lively community theatre.

That all having been said, it is helpful to remember that the initial vocal opposition to change generally moderates as people find many of their fears are unfounded, not to mention their discovery of now much actual work is involved in fighting the battle that might require their personal effort. Most importantly, opposition is disarmed by early and frequent dialog, complete information, honest and reliable answers to questions, and a worthy project presented by trustworthy people who support and believe in its value.

Risk. Political Capital. Partisanship. Sacrifice. Communication. Leadership. What do these mean to a project like the ILC?

In the vicinity of the ILC project there are dozens of political subdivisions that represent, in different ways and at different levels, the constituents affected by the consideration, construction and operation of the ILC. While the existing Fermilab operation is self-contained within the confines of federally controlled property, the ILC will present itself to one's front porch, backyard and maybe even bedroom!

In order for the ILC to become a successful project, there must be strong belief and unity among the communities and the political subdivisions that represent the communities. Given the intellectually complicated definition of the ILC project, this is a high hurdle to jump. Unlike proposing the construction of a new auto manufacturing plant, or a new major office complex, the ILC is very difficult to visualize how it could possibly affect the communities nearby. Current residents can look at the Chrysler plant in Belvidere or the Saturn plant in West Lafayette, IN along I-65 to draw an impression of a large construction and operational project. One could review the writings of the Deep Tunnel project to learn how tunnels are constructed. Well-traveled residents could compare the ILC tunnels to the New York City subway or the Tube in London. However, none of those visually understandable projects have originated in a well-developed suburban area in the last 20 years!

From the beginning, this project has recognized the need for effective communication of the need, value and purpose of the ILC. While High Energy physics does not translate quickly into modern economic contribution or value to the average resident, and it is more difficult to understand the quest for Higgs Boson, Fermilab recognizes the need to continuously educate and inform and listen to the communities that surround it.

From effective communication and education, strong political leaders are more likely to

take on the risk of supporting the ILC and its location based upon Fermilab. This risk, along with the investment of political capital, is the foremost challenge to conquer or overcome in the political arena. If our political leadership cannot see the positive value and contribution the ILC may bring, they will become formidable opposition. Weak political leadership will most likely not support the project and forever throw what if's at it as well as generate paranoid opposition. Because the project's conceptual development, funding, construction and operation will span several decades and innumerable terms of office at all levels, ongoing effective and constructive communication and education are essential. If ground is lost to the naysayer community, recovering a political leadership and support position will be costly and untimely.

Most politicians are sensitive to the fact the public remembers every stand they take that they (the voter) disagrees with. Rarely is a political leader recognized for his leadership, vision and support of a significant issue if the public agrees with it. Maybe it is human nature, but we seem to dwell on conflict rather than success! Those that take the first steps towards strong support or strong opposition are taking the greatest risk. They must be rewarded with a successful and well-planned project.

Further, to be successful, given the mix of voter preference to various political parties or independence, this project cannot afford to become a trophy for any one party. Remember that a trophy is presented to a winner and a trophy also describes the kill. A broad base of bi-partisan support for the project and funding as well as the inconvenience of developing it is a very critical success factor. While Fermilab has travelled this road of bi-partisanship very carefully in the recent past, much more attention will be needed as the ILC will affect millions of residents, not just a few ten thousand close neighbors.

Strong political leadership has long recognized some sacrifice in the short run usually pays off in the long run. The ILC will have to prove, on a continual basis, that it represents the right sacrifice.

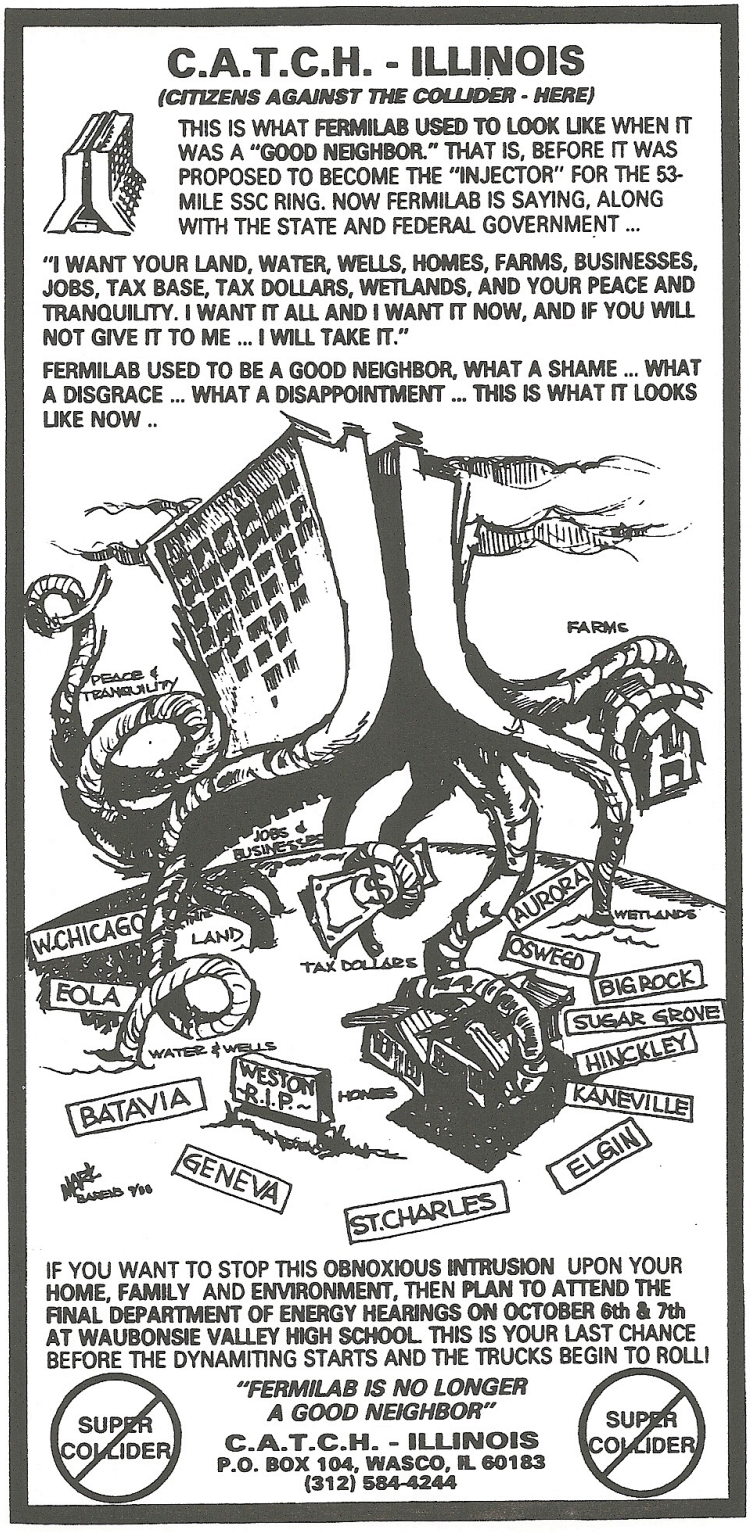
XI. Lessons Learned from Past Projects

A. The Superconducting Supercollider (SSC)

In 1988, Illinois vied with a group of other states to make Fermilab the site of the proposed Superconducting Supercollider (SSC). A fierce opposition to the project arose from landowners near the proposed tunnel site. Logically enough, the greatest depth of opposition was from those closest to the tunnel. (Unfortunately this observation offers little in the way of practical policy, except perhaps that the tunnel should not be built near anybody). There were, however, many others involved as well. The battle began in late January, 1988, and continued to November, 1988 when it was announced that Texas was the chosen site. The effect that the organization of homeowners (Citizens Against The Collider Here-Illinois, or CATCH) had on this decision has been debated ever since.

The quest for the SSC began in 1983, with appropriation of funds for research for the project. Occasional newspaper articles appeared, but no specific details were available. In September, 1985, the magnet design determined the 53 mile circumference of the proposed scientific project. This, in conjunction with the fact that a Fermilab facility was to be used as the injector, made possible a reasonable estimate of which homeowners would be affected. But it took more than two years, until February 3, 1988, before notification of homeowners was made by the Department of Energy and another six days until the State of Illinois, the entity that would seize property from home owners, would mail them their notices. Details of the project became available in area libraries on January 22, 1988, at the direction of the Department of Energy. The Scope Hearing at Fermilab was scarcely a month away at this point. The people who would become the organization known as CATCH were consequently at a significant disadvantage in speaking slots for that event, in organization, and in knowledge of the project. In its “Dear Illinois Property Owner” notification letter, the Illinois Department of Energy and Natural Resources (ENR) stated that Illinois and ENR had been working on the project for “nearly four years.” In the face of this statement, the Department went on to state that “this letter is part of a continuing effort by the State of Illinois to keep its citizens and elected officials informed about the progress of the SSC project.” This was the homeowner's first notification in that “continuing effort” to keep them informed. It was February 9, 1988. CATCH had nine days to prepare for the Scope Hearings.

This set the tone for the remainder of the conflict which was characterized by the use of State Police to control access to various public sites of importance in the conflict (to keep CATCH out), a lack of transparency in all areas, and stonewalling the release of documentation and methodology for the State's economic claims. This reduced their economic case to the status of assertions. CATCH was repeatedly told by Fermilab personnel and the State that they, the people, did not matter, only the physical characteristics of the proposed site were important. It was not a happy time.



As the conflict neared an end in Oct-Nov of 1988, the State's case for the SSC dwindled to petty epithets and implied threats by pro SSC groups. During the year some homeowners were threatened with arson and some received crank telephone calls. In

late summer and fall a number of death threats were made to a prominent member of CATCH and his family. The process has started badly and only got worse from there.

The onslaught of the powerful political apparatus of the State of Illinois left an indelible impression on members of CATCH. It has not been forgotten, nor will it be forgotten in the future. The States tactics in the early days were what motivated many to mount the resistance. The State's threats to confiscate homes and land were bad enough, but the arrogant way homeowners were dealt with early in the conflict insured large and intense opposition. One view is that the State's actions in the early phases of the conflict were the critical issue. But many in CATCH would disagree and choose instead to focus on Fermilab as the physical manifestation – the epicenter – of the entire sordid experience.

Can improvements be made in Fermilab's relationship with its community? Herculean efforts have been made by Fermilab's Office of Communication and the Perspectives Group, in conjunction with the Fermilab Community Task Force to make all issues more transparent – more open, and to promote community involvement in issues that develop at the laboratory.

That is the good news. The not so good news is that property owners will always be upset by threats to confiscate their homes or impose subsurface easements. That problem will never be eliminated, particularly in areas such as West Chicago with its long history of radiation contamination issues. But the process can be made better.

The real concern is that politicians (primarily at the State level) will be deeply involved in future siting decisions and they are not party to the Fermilab Community Task Force Recommendations for Community Participation. They were the primary instigators of hostilities during the SSC battle, and the same will probably be true in the future. The future will be confrontational, but due to the efforts described above, perhaps not so confrontational as in the past (assuming different levels of government and the Department of Energy maintain a non-confrontational posture, and not comport themselves as did the active proponents of the SSC).

B. O'Hare

O'Hare International Airport is one of the largest and most important airline hubs in the United States. Some time (years) ago it became apparent the level of departures and arrivals at that hub necessitated lengthened and/or new runways. The economic case for this is more or less obvious. The problem is that this requires land acquisition and all that entails. Like the SSC proposal, this requires a fairly large amount of surface land be taken. Also like the SSC there is no wiggle room (or very little) in determining what land is to be taken. Additionally, the homes that are close to the new runway sites, but not taken, will be subjected to increased noise levels and will therefore suffer somewhat lower property values. There was a large and organized opposition to the airport expansion.

C. Original development of Fermilab

According to *Poliscide*, a study of the politics of siting Fermilab in the late 1960's, the process consisted of “unusually harsh methods”<1> including a lack of competent appraisals (only a few homes were appraised at all), <2> withholding information, rushing negotiations, late payments, <3> and inconsistent treatment of property owners. The conclusion reached by the authors was “when a central government authorizes a project or delegates any kind of powers that are not accompanied by some rather explicit standards of conduct, these powers are implemented according to the values of the localities where the implementation takes place.”<4> The authors concluded that the localities are likely to abuse the power they assumed because of the void left by lack of Federal Government Guidelines.<5>

D. Deep Tunnel

The Deep Tunnel, a project to manage excess water, also has similarities to the SSC. It required extensive sub- surface easements (but little surface land). The program was well publicized before it was begun, its benefits were carefully explained, and it had little opposition. There was no question of radioactivity and consequently no property value issue.

This brings us to the question of subsurface easement value in the case of the SSC, Ohare, Fermilab, the SSC, and the Deep Tunnel. First, a word on the concept of value. During the SSC conflict, promoters of the SSC could not fathom how the value of a home could possibly be affected by the presence of a tunnel because, from their point of view, there was no radiation danger whatsoever. How could the value of properties over the tunnel possibly be affected? But value determination is subjective, not objective or intrinsic. The value of a good or service, or of a home, is determined by the perceptions of individuals in the market place. I*t is not dependent on whether those perceptions are in fact accurate.* A potential buyer of a home located above or near the tunnel must be concerned not only with his own perceptions or beliefs about the risks involved, but with the perceptions and beliefs of all other potential buyers, *whether or not they are correct*. If he is uncertain about those considerations, he will prefer a home further away from the tunnel.

The more complex an issue is, the less likely that individuals will be willing or able to educate them selves. And even though a source of information is available (Fermilab scientists) homeowners are unlikely to trust those whom they view as feathering their own nests. Even if a potential buyer is informed as to the nature of the project, he must consider the perceptions of all other potential buyers if he ever expects to sell the property. What do these considerations tell us about land acquisitions and concerns for home values of the projects under discussion?

O'Hare is the most straightforward case. The land taken is on the surface for obvious reasons. After the acquired homes, those adjacent to the acquired land are the most affected and the effect is clear – noise. Some will be more sensitive to the noise levels

than others, but all must consider the effect of the noise on potential buyers for their property. While those whose homes are acquired for what is presumably just compensation, those who are adjacent to the acquired homes will have a different problem – attempting to get compensation for the increased noise levels they suffer. These costs might be identified by surveys or real estate comparables and regression analyses, but it would probably be very difficult to obtain any statistically significant results.

The benefits of the Deep Tunnel were more clearly evident to the public and probably more evenly distributed than the benefits of increased commerce claimed for the airport expansion. No payment was made for the subsurface easements, and none were justified. Home values may have actually increased because of the improved water control.

Fermilab's operations have been confined to the original 6,800 acre reservation. No properties in the area have easements for tunnels or any other extensions of Fermilab activity. It is therefore not surprising if home values have not been negatively affected by proximity to the laboratory. They may even be enhanced by access to Fermilab's open space. It is interesting to note that the ongoing neutrino experiment (Minos) at Fermilab, which shoots neutrinos to a target in Soudan, Minnesota, has stirred little controversy even though the particles' paths take them underground (because of the curvature of the earth) and under homes. We might attribute this to two factors: A good job of establishing and maintaining transparency by the laboratory, and the fact that no subsurface takings were necessary and therefore no easements are noted on property titles.

The SSC, and the ILC if built, are different from the above in this respect. Easements would (or would have in the case of the SSC) appeared on the titles to property over the proposed projects' tunnels. This is a red flag calling attention to the issue of radiation. Once again, because of the information and education costs involved and the impossibility of educating an entire market of potential buyers, there would be some cost in terms of lower home values. As in the O'Hare case, this would be very difficult to measure, and the choice of the government agency charged with land acquisition would probably be to simply ignore it and assert there was no effect at all. The benefits of the science of the SSC would have been (and the ILC will be) widely available, but it would be difficult for homeowners whose property is taken or encumbered with an easement to see how their share of the benefit could in any way be greater than the cost imposed on them.

<1>Theodore J. Lowi, Benjamin Ginsberg, et al., *Poliscide* (New York, NY: Macmillan Publishing Co., Inc., 1976. page 283.
<2> Ibid., pages 247-247.
<3> Ibid., page 242
<4> Ibid, page 288
<5> Ibid, page 288

XII. Community Engagement and Timing

A. Background

As a public entity and community partner, in addition to a global partner, Fermilab was born in and continually fosters collaboration and transparency in its operations. We live in a democracy where high expectations are placed on accountability, and where process often times means as much as product. This has been demonstrated on several occasions in the past of Fermilab and other projects, both in a positive sense and from the standpoint of harder lessons learned. The focus of our group has been on what can happen when things are done properly, and this section aims at reflecting our discussion on some of the major aspects of community engagement and timing.

In this latest endeavor, the staff at Fermilab began seeking input in the possible planning of the International Linear Collider by working systemically at several levels including but not limited to the international community of scientists and governments, the federal and state levels with involvement from many groups, and the regional and local levels. Our task force was designed early in the planning process in the fall of 2006 in order to focus on the local and regional levels with the charge of bringing information to and engaging the area communities collaboratively in developing a vision for the possible recommendation for accepting or rejecting this process. The staff at Fermilab are particularly open in the planning process in their interest to see if the ILC is a possibility, because it is simply engrained in their thinking to engage and involve stakeholders in an effort to determine the best possible vision for linking the future through researching possibilities.

Throughout this process, there has been an emphasis on utilizing research in theoretical science in an effort to both gain knowledge and to lead to benefits toward practical scientific applications and technology. The very nature of this project seems to be linked to determining the smallest element of life in a manner that bridges the gap between the physical and biological sciences in an effort to solve many mysteries that compose our daily lives. Fermilab brings to this table not only the immediate scientific inquiry but also the concept and process of linking systemic elements in a dynamic way that involves teaming, partnering, and collaboration. In the scientific world, this manner of thinking is exemplified by the products of the research of international teams established at Fermilab. In the local realm, this is demonstrated in the unity between a state of the art scientific research facility and community with the environmental elements of sustainability in the current lab setting. Simply put, the process that both created and grew the current Fermilab facility was demonstrative toward high level science conjoined with the natural world.

This is wonderful marriage between theoretical discovery and practical processes placed Fermilab at the forefront of environmental sustainability. Our group quickly concluded that Fermilab is considered a good and trusted neighbor by area residents. The tone experienced by lab employees as residents of our communities is welcoming

and positive. The tone experienced by international visitors to our area who work with the lab also reflects this perception.

Certainly, there have been lessons learned from the past at Fermilab and other facilities as discussed in the previous section. For these reasons, the group was introduced not only to the positive potential of the ILC, but also spent a great deal of time on important items of discussion relating to all possible implications of such a project.

For the reasons outlined in this report, we have already embarked on the study of many issues in a very public setting in an effort to determine the viability of the ILC as based on local and regional impact and feedback. The people involved in this process need to reach out to the public frequently for ideas and to share information in an effort to determine both the viability of this project and to impact the final quality of this project. These are the areas of focus outlined in this report.

B. Key Community Concerns

Possible Site Orientation

We spent several meetings discussing possible site orientation choices. The intent was to position the ILC in a manner that was optimal for it's operation, the least disruptive to the area and residents, and to incorporate the land for the above ground support structures that were most possibly attainable for this project. The most interesting part of this exercise was that we moved from this discussion to planning a vision of what the specific land requirements and possible structures might look like in a manner that would enhance the surrounding area. This is how Fermilab staff think. As a group, we went from a pragmatic and utilitarian beginning to a discussion envisioning maintaining and enhancing the neighborhoods through the placement of the above ground supportive structures. This discussion also lead to the questions over property rights and impacts on specific property owners, etc.

(This should have a picture of team members doing the exercise on citing and possible diagrams or aerial photos showing the probably recommendations of the group.)

Appearance/Size/Other Uses of Possible Access Buildings & Sizes, Configurations, Aesthetics and Locations of Access Buildings and Tunnels

The discussions of this topic took place over the course of several meetings. The results still seem rather intangible, as the specifics for these buildings are not known in any great detail. Our discussions included estimates on uses of the structures, possible varied configurations of land amounts needed, possibilities including partially underground structures to multiple above ground structures. These discussions would need to continue in a very public way when the specific needs of the project are better determined. Again, the tenor of the discussion was how to create these structures in a visionary way that enhances the neighborhoods of their placement.

The actual tunnels need to be explained in detail, so that people can better grasp how far down the tunnel is located, what the access tunnels would be like, and safety precautions taken for scientists, maintenance personnel, and the public.

(Pictures of these possible structures and tunnels should be included.)

Visuals to Understand the Science

This topic should be released in a series of articles in the multiple media formats discussed in this section. This presentation must include pictures, etc. and descriptions (similar to those this task force received) written in a manner so that the public can easily understand the goals of this research both from a theoretical and practical perspective.

Major Pieces / Parts of the Collider Itself (Including Parts Onsite at Fermilab vs. Parts Offsite

Again, visuals would help with this discussion and should include references not only to the structures both on and offsite but also the connections of the ILC both locally and internationally. This section should also include the pictures that we saw involving the creation of the boring tools and process to the actual finished product. Tours should be available to the public of the current facilities and tunnels in order to familiarize them with this general concept and to put them more at ease about the finished product (and to better understand the science involved).

Why is the Collider Here vs. Farther West or at Another Location?

We discussed the asset of the current Fermilab facilities, the infrastructure already in place, the favorable underground geography, the international culture already in existence here, and the projected lower cost of this location. This area needs more detailed work and more specific explanation.

(This section would be enhanced with pictures of the infrastructure, the community aspects, and with charts listing the benefits.)

Property Values & Property Rights

These topics need further investigation, possible legislative action, and a very open discussion with the public. This discussion would best include the impact that the Fermilab and other facilities have on surrounding properties both in the immediate vicinity and in the region. It needs to be determined whether having such a facility is truly an asset (which it is) and to what extent. Any property should ideally be obtained through voluntary purchase, as that is one important aspect of a democracy. This process needs to be as transparent to the public as possible.

Safety and Radiation

This is most meaningfully discussed when impact is presented in meaningful and practical day-to-day language. It needs to be determined as to how much radiation would be generated, how it would be disposed of, and the processes for daily safety and emergency procedures outlined for the public. People are most put at ease when there are comparative and understandable explanations from similar situations. We are very aware of the level of concern from citizens (although not well understood) about the situation in West Chicago. The concerns of this project in terms of safety need to be well presented publicly on several occasions.

Noise During Construction and Operation

We discussed the real economic asset of this project as bringing new jobs, construction, and ancillary supportive industry to this area. These should be highlighted. So to should be the implications of construction and operation of this facility. One of the best communication pieces in this area is to have a well advertised / communicated troubleshooting contact source (phone number, website, etc.) both where regular updates are provided on construction progress and where people can contact those involved with their concerns. People seem to understand that patience is required during construction but are better able to cope with it if they are informed and reminded of the benefits throughout the process.

Feeling Informed About the Project & Believing Their Opinions are Sought and Heard

This entails setting up the mechanisms for communications in a variety of formats discussed throughout this section. Having websites with updates, podcasts showing processes and used for education, setting up an email system providing updates, working with media through regular news releases, providing forums and other public discussions for people to share questions and air concerns, having a hotline for expressing concerns, etc. The key is to set up reliable mechanisms that respond to concerns and questions in a timely manner. This can be done through the means discussed here and throughout this section.

Benefits of Project to the Community & Economic Issues, Maximizing Economic Benefits

Aside from being next to a project of cutting edge science for the international world, the economic benefits of this project both locally and regionally should be highlighted regularly. Many of these benefits have already been listed. Add to this list the calculation of the compounding effect of dollars spent and re-spent time and again in the local economy. Any data that can be formulated and highlighted helps people to better comprehend this type of project as an asset on it's own and as an asset through supportive industries and the infusion of dollars into the local and regional economies.

These projections may include a cost/benefit analysis that also highlights what would be lost should this project not end up in this area and in the United States.

Environmental Issues & Benefits, Including Carbon Footprint of Project

This requires further analysis, especially the projection of impact on the Carbon Footprint of the project. This would best be presented through an explanation that uses the positive experience of the Fermilab on the environment. The estimates of the impact of the ILC should be presented in a parallel comparative fashion to Fermilab. Again, Fermilab was built with the vision of environmental sustainability before it was fashionable in a more popular sense. 'Fermilab was green before green was cool and popular', and the same expectations have been discussed in regard to the ILC.

How the ILC May Effect Community Access to Fermilab

While this needs to be more specifically determined, this discussion needs to be framed in a similar fashion to our overall discussion that the ILC will only enhance the Fermilab facility and vice versa. There will be an impact. This impact will either be planned in a least invasive or in a most enhancing way. The vision must be shared with the public, and as based on the experience with Fermilab, this would be an excellent venue to gain input from the public in planning around the science and technology of this project.

C. Recommendations

1. Identify Audiences

The Task Force recommends that Fermilab identify all stakeholder organizations, groups, and communities that might be impacted by the planning, construction, and operation of the ILC. These groups can include, but are not limited to, the following:

Local Stakeholders
Local communities will most likely feel the greatest direct impact of the construction and operation of the ILC.

- Local property owners and municipalities, especially those in the construction path of the ILC and locations likely to see long-term and permanent housing of ILC employees
- Residents of Kane and DuPage counties
- Locally-based employees & contractors, especially those who may qualify for future construction and operation contracts

Regional Stakeholders
These stakeholders will want to provide input and receive information on issues of interest to the regional area around Fermilab’s Northern Illinois location.

- Transportation officials and authorities, especially those representing transportation systems in northern Illinois that may be directly affected by the construction of the ILC
- Regional construction firms and contractors, especially those who may qualify for future construction and operation contracts
- Regional hospitality industry representatives, especially during the operation of the ILC which would require housing of and subsistence for periodic ILC visitors

National stakeholders
Fermilab will need to inform state and federal stakeholders of many national and global issues related to the ILC, including support for U.S. funding, national and international scientific and funding collaborations, and global direction of the construction and operation of the ILC.

- State and Federal government officials
- The Department of Energy
- The National Science Foundation and other related national science academies
- National construction contractors, especially those who may qualify for future construction and operation contracts
- Scientific community

International stakeholders
Because the ILC is a global effort, all potential international partners, companies, and organizations should be included in the communication efforts for the ILC project.

- International physics and engineering organizations involved in the design, construction, and operation of the ILC
- International governments, especially those who directly fund and/or make in-kind contributions to the ILC
- International educational and research institutions, primarily those who would be involved with the science mission of the ILC
- International construction firms, especially those who may qualify for future construction and operation contracts

The timing of communication efforts for each of these stakeholders will be different for each group. A communication plan addressing each should be created and periodically reviewed throughout the design, construction, and operation of the ILC.

2. Plan the Timing of Communication Efforts

Communication should be part of the continuous efforts of both the Fermilab and ILC Public Affairs organizations. Communication must occur throughout the life of the project. There will never be one single “good time” to talk to the public and to stakeholders about the ILC. ILC Task Force recommendations include the following:

- Communication to the stakeholders has already begun through ILC Community Task Force. Fermilab should build upon the community connections forged through this group.
- There may not be one clear good time to talk to the public, especially those who will be most directly impacted by the ILC. A strong communications plan should use minor and major project design and development milestones as opportunities for communication.
- Start regular communications with all stakeholders early and repeat them often. People move in and out of the Fermilab area, people have many competing priorities for their time and attention, and design and development plans naturally change over time. Frequency and message consistency is needed to keep the information in front of the public, especially those in the local and regional areas around Fermilab.

Once Fermilab has determined the timing of communication efforts, staff should develop a robust plan utilizing many different communication methods and outlets.

3. Employ Various Communication Methods

Communication methods for the ILC should incorporate diverse outreach tools, media types, and venues because people today acquire information from a variety of sources. ILC staff should develop visuals and information that can be used in multiple media types and communication formats.

An obvious outlet for ILC information is the traditional news media, including newspapers, science journals, television stations, and radio stations, including public radio and television. However, more and more people do not use traditional media as their primary news and information sources, so other communication methods may include the following:

- ILC project website
  - Regularly updated information
  - A scientist-led question/answer section
  - Links to visuals and videos from exterior sources
  - Weblogs (blogs)
  - Regularly updated project podcasts and vodcasts
  - Videos about the science, the ILC project, and Fermilab discoveries
  - PowerPoint presentations
  - Visuals to show the process of siting the ILC and the extent of possible layouts for the ILC
  - Visuals to understand the history of community concerns regarding the Superconducting Supercollider and other similar controversial projects
  - Images, drawings of major pieces/parts of the collider itself (including/parts onsite at Fermilab and parts offsite)

- Teacher education efforts and a speaker's bureau led through the Fermilab Education Department
- A DVD format video about the project that can be used at community and adult organization meetings (Kiwanis, Rotary, Lions, etc.).
- Ongoing meetings, presentations, stakeholder discussions, and community forums held according to the communications timing plan
- Periodic update letters addressed directly to residents and businesses along and near the ILC path
- Periodic update newsletters to local communities and newsletter articles written for use by organizations that publish their own newsletters
- Outreach to informal locations "where the people are" such as parks, festivals, fairs, malls, libraries, etc.
- Brochures to understand the ILC science, project, and particle physics, in general, available at outreach events and upon request
- Copies of reports that can be made available to local libraries, community centers, and upon request by individuals
- Fermilab Open House in the format of the periodic Argonne Open House
- A dedicated phone number for a recorded message with short project updates
- A phone number for people to reach a person who can answer questions - While this may seem difficult given the global scale of the project, it will show stakeholders, especially those who are local, that Fermilab cares about their input and opinions.

We recommend that website content be reusable in many formats. For example, images can be used in PowerPoint presentations and brochures. Descriptions written for periodic newsletter updates can be used for a recorded phone message.

4. Explain the Science/Explain the ILC Project

The proposed ILC project represents basic research in the fundamental properties of matter and holds potential for unanticipated discoveries in both science and technology. This discussion needs to emphasize what scientists hope to learn from the ILC project and convey to the community the value of scientific exploration in laymen's terms, differentiating between applied science and basic research and explaining the benefits of both.

Start the Discussion Broadly

Begin the science and project discussions in a broad context to provide a framework for comprehending specific details that follow. Historical context may help set the stage for the project. Understanding what has been done before and what has led to where we are can help clarify the need or desire for the project. Identifying the major project components (e.g., conception, design, planning, schedule, budget, participants, construction, and operation) defines project scope and scale. General location provides a sense of place and proximity.

Convey the Science Better

Strive for clarity. Make the message easy to hear, easy to read, and easy to receive. Avoid overusing scientific jargon and vague acronyms.

- Use simple tools to get points across, such as uncomplicated language, comparisons, analogies, and graphical illustrations. For example, simple language is effective in explaining complex ideas. Relating scientific principles or objectives to everyday experiences or commonly understood themes can help illustrate a point. And explaining Dark Matter in the context of the graphical jelly bean jar is easily understood, fun, and speaks volumes to help comprehend the point being made.
- Support the project objectives with real world experience (both successes and lessons learned). Illustrating for the community the known experience on complex technical topics lends a measure of confidence to planning and design. For instance, comparisons to well-known real-world examples (such as the Chicago deep tunnel project) can demonstrate the available existing knowledge in specific areas (such as underground tunneling for the ILC).
- Help the community grasp the importance of local science discoveries. Offering examples of discoveries and technologies that issued from basic research at Fermilab in particular, such as proton therapy or MRI technology, helps our communities assess the value of doing science at Fermilab and the potential for future scientific contributions. Sharing Fermilab scientific contributions illustrates the successes in a positive light. Augment any discussions with examples from basic research at the (also local) Argonne National Laboratory, as appropriate. Toot the trumpet.
- Help the community grasp the importance *to the community* of local science discoveries. It is a significant point of pride that science discoveries have been made at Fermilab. Research here has long been at the forefront of international science, and Fermilab has played an instrumental role in maintaining America's leadership role in science and high energy physics. This leadership position is about to be lost when the Tevatron ceases operation. This has not just been a source of national pride and discovery but has provided amazing opportunities and resources to local schools.

Explain the Uncertainty

As of the writing of this report, there are many uncertainties associated with the ILC. We recommend that Fermilab describe for the community the variables and uncertainties that the ILC project entails and the efforts to address those uncertainties. For example:

- Community buy-in: Chartering and implementing the Fermilab ILC Citizens' Task Force on Communication and writing this report is helping strategize to address that uncertainty;

- Siting the project: Sharing what is known, what needs to be decided and what are the community concerns can engender useful feedback for siting consideration and planning;
- Timeline: Particularly in the early stages of a project, the community needs to understand that there are unknowns in the schedule that depend upon other variables, such as budgets, collaborative agreements, or technology availability. Engaging the community openly at appropriate intervals can help the community understand the timeline and influencing factors;
- Funding - United States Congressional budget decisions impact large U.S. science projects, as do the funding decisions of participating governments and scientific partners. The community may have interest to understand how these variables need to align for a successful project to occur;
- Priorities: Disparate priorities among scientific collaborations exist and need to be resolved;
- Governance: Collaborators need to develop a structure of governance for an international project such as the ILC. Other international collaborations, such as the International Space Station or ITER, may provide workable examples.

Maintaining communication and information exchange between the ILC Global Design Effort and Fermilab in order to help keep communities informed about the project.

5. Build & Maintain Trust

Building and maintaining community trust begins with an open working relationship with the community. Inviting inquiry and allowing for community involvement creates two-way communication channels between Fermilab and the public. We recommend the following:

- Establish an open and transparent process.
- Be proactive to get factual information about key community issues to the public as early in the process as possible. Be forthcoming with project details and answer questions from the public. When an exact answer is unknown, say so and say why.
- Recognize that every question from the public is important and deserves an answer. Avoid minimizing the importance of public concerns (such as radiation levels).
- Recognize the power of misinformation and its ability to spread. React quickly to correct misinformation through a variety of channels.

The communication process to address specific concerns of the public might include the following steps:

- Anticipate and identify possible community concerns (see XII. Community Engagement and Timing, B. Key Community Concerns).
- Plan the project to address/mitigate the concerns.

- Demonstrate that Fermilab is listening and responding to community concerns in a timely manner.
- Provide factual information to be ready to answer concerns.
- Communicate actions being taken based on community concerns.
- Put worst-case possibilities in layman's terms.
- Equate information to everyday life examples.

Frequently Asked Questions to be addressed in the various communication tools might include:

- What kinds of particles are colliding in this particle collider? Are they radioactive?
- Where does the radiation come from?
- What is radiation?
- Will radiation affect the ground water?
- What are the radiation amounts produced during operation of the ILC? (Compare to medical x-rays, etc.)
- How might radiation affect my family and me?
- How does Fermilab protect the community from radiation?
- Will the ILC pass under or near my house?
- Will there be noise problems during construction or operation phases of the ILC?
- How long will construction last, and what will happen if one or more of the construction phases are delayed after it starts?
- Will construction and tunneling affect my pets?
- How will this project affect my property values?
- What are my property rights in relation to the construction or operation of the ILC?
- What safety measures are in place with regards to construction or operation of the ILC, not only for employees but also for the communities involved?

6. Acknowledge Past and Potential Negatives

Learn from the past. Acknowledge past experiences with Kerr-McGee in West Chicago, the Superconducting Supercollider, and the development of Fermilab, and compare these examples to the proposed ILC project. Prepare for possible negative reactions to the ILC project based on these historical experiences:

- Acknowledge the West Chicago experience with radioactive thorium and explain how the ILC project differs. Explain the differences in radiation sources and emission and the safety measures planned for the ILC project.
- Learn from local opposition to the Superconducting Supercollider in the 1980s from CATCH: Citizens Against the Collider Here. Community involvement and an open communication process—including the rapid response to correct misinformation—can engender the community support needed for a successful project.

- Acknowledge the experience of the creation of Fermilab in the 1960s and the envelopment of the town of Weston. Demonstrate how Fermilab's stewardship of the prairie and open space on its grounds adds to the quality of life in the surrounding communities. The grounds are available for residents to enjoy recreational and educational activities. Discuss the annual homecoming held for the previous residents and farmers of the town.

7. Generate Excitement and Identify the Benefits of the ILC Project

Understanding the benefits of the ILC project is essential to garnering community support at all levels. The project plan should encourage community participation. Engaging the community in a shared mission heightens awareness, forges working relationships, and bestows a sense of ownership in the science objective.

- Identify the benefits of the project for the community, the state, the nation, and the world. Figure out what the benefits are – scientifically, socially, economically, or otherwise.
- Find ways to engage public participation in the project. The ILC Citizens' Task Force is a great beginning to develop a strategy for public participation. Continue the efforts throughout the project life.
- Community outreach should express enthusiasm for the project. Communicators for the project need to convey a sense of wonder to ignite community interest and a sense of purpose for scientific exploration and discovery. For instance, creative presentations capture the imagination, and engaging the audience affirms the learning experience. An example is Fermilab's Mr. Freeze show, which captivates the audience with theatrics while demonstrating scientific principles.