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A New Frontier in the Chicago Suburbs: Settling Fermi National Accelerator Laboratory, 1963-1972

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Introduction

I would like to speak about two frontiers: the American frontier explored in the 18th and 19th centuries by pioneer settlers in the West, and the scientific frontier explored in the 20th century by physicists who built Fermi National Accelerator Laboratory, the Department of Energy physics facility called Fermilab, in the prairie setting of Chicago's western suburbs. The American frontier was the subject of historian Frederick Jackson Turner's celebrated thesis about American history, presented just 100 years ago. Fermilab, an expression of the scientific frontier, was created as a laboratory to explore the frontiers of the mind – "where no one has gone before" – our understanding of matter and the universe. As you may know, Fermilab centers about a large particle accelerator. After being brought to high energy inside an underground ring of magnets, these particles are steered into collisions with specific targets. The physicists try to extend the frontiers of our understanding of nature by studying these collisions.

Turner's thesis of 1893,¹ in its simplest formulation, states that the process of confronting the frontier brought about distinctive American cultural traits such as economic and political equality, individualism, and democracy. He saw the American physical frontier as the "existence of an area of free land ... [continually receding in] the advance of American settlement westward." Despite its later fall into disfavor, Turner's thesis remains a model for interpreting historical developments. As historians of science, my coauthor Lillian Hoddeson and I feel that frontier ideals very much like those described in Turner's thesis had a dramatic effect on shaping the particular culture of Fermilab.

¹Turner, Frederick Jackson, "The Significance of the Frontier in American History," speech delivered in 1893, copyright 1920, reprinted in *The Turner Thesis: Concerning the Role of the Frontier in American History*, edited by George Rogers Taylor, (Boston: D. C. Heath and Co., 1956), 1-18.

The frontier image, as used both by Turner and the physicists, speaks to the imagination. The emotive power of the frontier symbol conveys a sense of mission – an unknown region *needing* to be settled. As a former Fermilab Associate Director, Stanley Livingston, said in 1968, “There is in mankind a driving urge to explore the unknown. In past ages much of this exploration was geographical – the search for new continents and new seas. In our generation the most challenging frontiers lie in the search for new knowledge about nature and about man, and the most dramatic progress has been made on the frontiers of science...The frontier of high energy and the infinitesimally small is a challenge to the mind of man. If we can reach and cross this frontier, our generation will have furnished a significant milestone in human history.”² This scientific frontier motivates and challenges physicists in their research, and is a persuasive rhetorical device in justifying support for manpower and funding.

Fermilab had the distinction of being created in an area of free land given to the US in 1968 by the state of Illinois for pursuit of the scientific frontier. In the pre-micromanagement era, the US government allowed Fermilab’s builders to take an individualistic approach to this project in order to cut costs. Fermilab was also the first national laboratory where broad democratic access to the research tools was part of the laboratory’s ideology; a fundamental right to any physicist submitting a proposal of sufficient merit. In creating Fermilab, the ideal of exploring the unknown frontier with science and nature in harmony was constantly applied to decision-making, for the site as well as the experimental program.

Let me briefly review Turner’s description of the frontier. Actually working from a systematic scientific method approach of examining political, social and economic factors, he said, “The frontier is the line of most rapid and effective Americanization. The wilderness masters the colonist. It finds him a European in dress, industries, tools, modes of travel, and thought. It takes him from the railroad car and puts him in the birch canoe. It strips off the garments of civilization and arrays him in the hunting shirt and the moccasin.... In short, at the frontier the environment is at first too strong for the man. He must accept the conditions which it furnishes, or perish...”³ Turner claimed that confronting the demanding conditions of nature at the frontier promoted individualism, an “anti-social” tendency producing “antipathy

²M. Stanley Livingston, *Particle Physics: The High Energy Frontier*, (New York: McGraw-Hill, 1968), 2-8.

³Note 1, 2.

to control,” resulting in democratic ideals.⁴ Turner’s work endures today as a vital commentary on our nation’s development. The frontier image represents an American attitude of optimism for the future. It distinguishes our dynamism from earlier established attitudes by allowing for understanding, growth, and change. Our ability as free individuals to question authority, with the courage and confidence to venture beyond the safe and familiar, is so much identified with the American experience that extends to the scientific process as well.

In this presentation, I will use the template of the Turner model to help interpret the development of Fermilab from 1963 to 1972. In 1963, physicists planning for future facilities drew upon a rhetoric remarkably similar to Turner’s sweeping language of the opportunities offered by free land. Literally, free land was expected for *any* site submitting a proposal in 1965-66 for the new laboratory. But the analogy goes deeper. Turner spoke of the progress stemming from individualism toward economic and political equality, and democracy. Fermilab, designed by its creators to address the physics goals of the period, as well as to meet the social, economic, and cultural needs of its community, made advances leading to the utopian settlement of these same concerns by 1972. While the site transformed over the years from natural, unhampered prairie to its next level of settlement as productive, cultivated farmland, and finally to its present existence as a managed high-energy physics laboratory, the equivalent of a progressive metropolis, the area’s heritage has been preserved. An actual remnant of Turner’s American frontier – open prairie, natural wildlife habitats, and a herd of American bison – has been maintained. In the laboratory’s re-created society, the most celebrated qualities are precisely Turner’s frontier characteristics of individualism and democracy.

It is not merely coincidental that Fermilab and the Turner thesis are both linked with the city of Chicago. It was in Chicago that Turner introduced his ideas about the unique progressive development of our nation. Addressing the American Historical Association in July 1893 at the World’s Columbian Exposition celebrating the 400th anniversary of the discovery of America, he identified the frontier as “the source of American energy, individualism, and political democracy.” In Turner’s perception of American history, the Midwest served as a balance point. He said, “The men of the frontier had closer resemblances

⁴Ibid., 14.

to the Middle region than...the other sections. [It] had a wide mixture of nationalities, a varied society, ...a varied economic life.... It was democratic and...typical of the modern United States...It became the typically American region.” Turner later defended his concepts of frontier influence with a closer examination of what he called *sectionalism*, in which the frontier produced the ideals, while the sections (in particular, the Midwest) preserved them. Turner, a son of the Midwest, recognized particular advantages here. By choosing the village of Weston, an outpost of Chicago, for the Fermilab site, those advantages seen by Turner were also noticed by the national committee searching in 1966 for the right location. It was in Chicago that pathfinders – both pioneering settlers and later physicists – could forge links connecting the *known* with the *unknown*.

History of Chicago’s Western Frontier

As William Cronon has written in *Nature’s Metropolis*,⁵ his popular and scholarly history of Chicago, the vantage point of Fort Dearborn in Chicago and its surrounding area, at the confluence of rivers and lakes made this area the frontier center for trade and the crossroads of information. The 19th-century settlement of the interior spread like wildfire with massive numbers of immigrant Europeans venturing out from the Atlantic coast. These restless adventurers established settlements en route hoping to find peace in a new “promised land” of unlimited horizons. Their search brought them into Illinois, particularly the northern area near Chicago. Key links had developed with the rest of the country, making Chicago a crucible for innovative ideas in market economics, transportation and communication.⁶ I recommend this book to you for full analysis of Chicago’s impact on our nation’s development. But for now, let’s move ahead to 1941.

THE NEXT SIX PARAGRAPHS IN BRACKETS WILL BE CUT FOR THE TALK DUE TO TIME LIMIT BUT THEY MIGHT BE OF INTEREST TO THE OTHER MEMBERS OF THE SESSION.

[[Chicago’s strategic location had already been recognized by the Native Americans who first inhabited the area. Attracted by the abundant wildlife and natural resources, Indians had occupied the forests and wetlands of the site on which Fermilab would eventually be built, particularly around the area locally

⁵Cronon, William, *Nature’s Metropolis*, (Norton: New York, 1991).

⁶Cronon, *Nature’s Metropolis*.

known as “the Big Woods.” The tribes included the Potawatomie, Sauk and Fox, led by such legendary chiefs as Checchepinqua, Shabonna, and Black Hawk. These grounds were theirs to roam until Black Hawk’s Wars of the early 1830s ended in their losses and the survivors had no choice but to withdraw from their settlements as the pioneers headed west. As white settlers acquired the open lands, government treaties and compromises pushed the Indians into drier distant areas on the Great Plains and the northern Rocky Mountains. The extensive agrarian concerns of the homesteaders meant the demise of the tall grass prairie as agricultural interests took advantage of the fertile soil and the economic market capabilities. Fences enclosed the farm frontiers and within thirty years the Illinois prairie nearly vanished as farming and livestock grazing overwhelmed the native grasses and plants. In their place, in this most fertile farmland, were amber waves of grain to fill the breadbaskets of the nation and provide fodder to feed and supply emerging cattle markets.

Illinois, offering a promise for the future, attracted many of the Europeans arriving between 1833 and 1850 and their rich diversity dramatically enhanced the cultural flavor and social life of the area. Turner called this influence a “cross-fertilization of ideas and institutions.” These settlers from vastly different experiences recognized the advantages that unity among themselves offered. Although their natural first inclination was to build strong ethnic communities and neighborhoods, they eventually united in a uniquely midwestern style to support metropolitan efforts on behalf of all the people toward the end of the 19th century. Less than 100 years later, this recognition of the importance of forming coalitions to achieve unprecedented goals, so crucial to success in a democracy, was an essential component in selection of the Midwest as the right social, as well as physical, environment for the new national laboratory.

Meanwhile, construction of the first steam railroads (1848-1860) greatly affected the economics of the area, boosting transport of crops from the outlying areas into Chicago for trade to markets around the country.⁷ Those frontier enterprises bringing trainloads of opportunistic “bounty” hunters into the home of the American bison were so successful they nearly brought on the extinction of this native animal. The original occupants of the prairie frontier were virtually eradicated and only a mere trace of this frontier survived at all.

⁷Cronon, *Nature’s Metropolis*.

Chicago, long regarded the “Second City,” has brashly displayed and promoted its significant achievements defining its unique identity, since from its beginnings it was generally dismissed as subordinate to the centers on the east coast. But its strategic location and the raw, determined ambition of its first developers kept Chicago alive through the many periods of frontier hardtimes. As “Queen of the West,” Chicago recovered from its devastating fire of 1871 with a buildup of such force and dynamism that by the World’s Columbian Exposition of 1893, the crossroads of Chicago was widely recognized as a nucleus of technological progress, as well as a cultural capitol capable of hosting the World’s Fair celebrating the discovery of the New World. Any secondary status was bravely cast off in the 1890s as a century of progress officially began and Chicago came of age with cultural, educational, and social centers all its own.⁸ Employment was the magnet attracting thousands of immigrants to “the City that Works” in an atmosphere of exciting opportunity.

As recognition of a range of urban problems grew, social reform followed and united many sectors of society to improve living conditions for all. At the turn of the 20th century, social reformation from Chicago stimulated urban awareness and influenced city planning in the surrounding areas. The local interest in traditional native landscaping and the Naturalism movement in this period inspired an appreciation for careful treatment of the outdoors. We see reference to this return to the prairie spirit in the emphasis then put on green spaces and public parks in the city,⁹ as well as in Fermilab’s much later reintroduction of the prairie philosophy in developing its site from 1967 through the present. The bucolic, pastoral features remaining in Chicago’s sprawling western communities presented a promise of escape from the busy life of the city. Speculation in real estate opportunities pushed the frontier outward bringing more voices into the dialogue for democratic development.

Chicago’s business community also flourished in the early 20th century. Commerce thrived as an extension of investing in prospective ventures. Architecture, education, the arts and the sciences illuminated the cultural life as the city and the area prospered. The Loop,¹⁰ in the center of the city, represented a vital energy to all sectors of society. However, the activities of Chicago’s underworld in the 1920s, and the

⁸Hirsch, Susan E. and Robert I. Goler, *A City Comes of Age*, (Chicago: Chicago Historical Society, 1990).

⁹*Prairie in the City: Naturalism in Chicago’s Parks, 1870-1940*, (Chicago: Chicago Historical Society, 1991).

¹⁰This is the ring of financial and municipal activity encircled by the elevated train in downtown Chicago.

devastating Great Depression of the 1930s diminished the optimism of the city's progress.]]

After Pearl Harbor was attacked on 7 December 1941, the University of Chicago, one of the nation's premiere private educational institutions, assumed a major role in the war effort. It was fifty years ago, on 2 December 1942, that Enrico Fermi, an Italian physicist who had fled fascist Italy, led us into the atomic age with his breakthrough demonstration of the first self-sustaining nuclear chain reaction. On the squash courts under Stagg Field, Fermi opened the new scientific frontier of nuclear energy. Following his wartime work in Los Alamos, Fermi continued his research at the University and founded Argonne National Laboratory southwest of Chicago.¹¹ Fermi's pioneering style was to be a model for his fellow Los Alamos compatriot, Robert Wilson, the future first director of Fermilab. Fermi's legacy to, and his scientific kinship with Wilson brings us to the heart of our story, a story of scientists at a Chicago crossroads with an opportunity to confront their 20th century frontier.

History of Physics Frontier

Critical treatment of the frontier image in relation to American science remains one of the more interesting problems on the agenda for historians of American science. The most dramatic and effective applications of the frontier image to science occurred when President Franklin Roosevelt wrote on 17 November 1944 to Vannevar Bush, director of his White House Office of Scientific Research and Development, seeking advice on how to proceed in times of peace: "New frontiers of the mind are before us, and if they are pioneered with the same vision, boldness, and drive with which we have waged this war we can create a fuller and more fruitful employment and a fuller and more fruitful life."¹² Vannevar Bush kept the analogy alive in his July 1945 report responding to Roosevelt explaining the relevance and significance of the intellectual pursuit of science. Bush used the image of an endless scientific frontier to galvanize government support of basic research in the postwar period. He wrote, using language reminiscent of Turner's: "The pioneer spirit is still vigorous within this Nation. Science offers a largely unexplored hinterland for the pioneer who has the tools for his task. The rewards of such exploration both for the Nation and for the

¹¹Wattenberg, Albert, "The Fermi School in the United States," *Eur. J. Phys.* 9 (1988), 88-93.

¹²F. D. Roosevelt to V. Bush, 17 Nov. 1944, reprinted on pp. 3-4 of reprint of the July 1945 report *Science, the Endless Frontier*, (Washington: NSF, 1960). See also Alan T. Waterman, "Introduction," pp. vii-xxvi.

individual are great. Scientific progress is one essential key to security as a nation, to our better health, to more jobs, to a higher standard of living, and to our cultural progress.” As a result, in 1950 the National Science Foundation was established, ushering in a golden age of funding for basic scientific research that flowed through the 1960s.¹³

Toward the end of this golden age, Fermilab was founded in the heartland of northern Illinois. Vannevar Bush’s enthusiastic trailblazing attitude toward confronting the frontier fueled the imaginations of the four research university physicists who planned the settlement of Fermilab’s physical site: Edwin Goldwasser of Illinois, Leon Lederman of Columbia, Norman Ramsey of Harvard, and Robert Wilson of Cornell. These four founding fathers appealed to the ideas of the frontier in forging a united coalition of scientists, business, and agencies of the local, state, and federal governments. Their efforts illustrate the classic critical struggle of the idealistic few toward establishing democratic goals for the many. Perhaps they, like Turner, felt that “frontier individualism promoted democracy.”

The need for a frontier laboratory like Fermilab grew out of conditions in physics in the early 1960s, following scientific breakthroughs achieved at the east coast’s Brookhaven National Laboratory (BNL) on Long Island, the west coast’s Lawrence Radiation Laboratory (LRL) in Berkeley, and the European laboratory CERN in Geneva, Switzerland. Ideas for future exploration of the physics frontier flourished in laboratories on both US coasts and also in Madison, Wisconsin. Numerous proposals for new accelerators were submitted by 1962 to the Atomic Energy Commission (AEC). To make a careful decision on the proposals, Norman F. Ramsey, experimental physicist from Harvard, was selected to chair a special high energy physics joint panel of President John F. Kennedy’s Scientific Advisory Committee (PSAC) and the General Advisory Committee (GAC) of the AEC. Accepting the need for a frontier instrument in the several hundred giga-electron volt (GeV) range and in recognition of Berkeley’s experience in building accelerators, the report of the Ramsey Panel, issued in May 1963, recommended as its priority, “the prompt construction of a 200-GeV proton accelerator by LRL.” The Panel also made a general recommendation for extra efforts at all major facilities guaranteeing national participation and equal consideration of all

¹³Vannevar Bush, *Science, the Endless Frontier*, 1945, Daniel J. Kevles, *The Physicists*, (New York: Knopf, 1978), Leon M. Lederman, *Science: the End of the Frontier?*, (Washington: AAAS, 1991).

qualifying proposals.

This democratic accelerator access idea was a new element in the history of accelerators. The concept was described in a short document by Lederman entitled “The Truly National Laboratory” (TNL).¹⁴ The TNL was the basis for Fermilab’s original name, “The National Accelerator Laboratory” (NAL). Lederman presented his plan to the American particle physics community in 1963 as an alternative to reach beyond the provincial access extended by the two major regional laboratories then in power, Berkeley and Brookhaven. Offering broad democratic access to the accelerator for all physicist “users,” regardless of their home institution, the TNL concept was a radical departure. The accelerator was envisioned as an institution that would strengthen equality and civil rights locally, and, in turn, inspire creative community solutions to social, economic and cultural problems, analogous to those the pioneers confronted in the unknown West. In addition, by pushing the frontier boundaries in particle physics, the laboratory would amplify American national prestige and economic preeminence.

Instead of modifying what existed but no longer worked, “both the site and management questions were reopened.”¹⁵ Lederman’s sentiments about incorporating the diverse regional interests of US physicists were put forward as the guiding force of the top-ranked project by an expanding network of support including Frederick Seitz, President of the National Academy of Sciences, reaching out to the presidents of the nation’s research universities. The effort culminated in the formation in January 1965 of the consortium of university presidents called the Universities Research Association, Inc. (URA), the management organization for the 200-GeV accelerator. Under Ramsey’s direction, URA developed strategy to build the necessary consensus in Washington, while keeping the AEC at a careful distance. In the national site contest for the laboratory that would become Fermilab, political and scientific interests clashed.

In mid-1965, the struggling community of optimistic, lower-income residents of the village of Weston in an unincorporated part of western Dupage County had fallen on hard times. A Northern Illinois Gas Company official contacted Weston Mayor Arthur Theriault about the chances of proposing a local site

¹⁴L. M. Lederman, “The Truly National Laboratory,” AGS Accelerator Department Internal Report AADD-6, Part II, 1963 Super-High Energy Summer Study, 25 June 1963.

¹⁵Norman F. Ramsey, “The Early History of URA and Fermilab,” *Annual Report*, (Fermilab, 1987), 157-61.

for the federal atom-smasher project. Theriault felt his villagers would enthusiastically embrace the plan for economic development promised in accommodating the atomic energy project. With typical pioneer candor, on 8 April 1966 the community of Weston extended their hospitality to the National Academy of Sciences team surveying the proposed sites for the new atom-smasher.

The final decision to site the new laboratory in the Chicago suburbs reflects back on the mediating role of the Midwest in settling the physical frontier. Ramsey's panel [PRESIDENT JOHNSON??] had, when it prioritized the project, doomed the innovative but lower energy midwestern proposal from MURA, the regional coalition based in Madison, Wisconsin. Midwestern physicists therefore had reason to argue for a midwest accelerator, while east and west coast physicists competed with each other for the new machine. When the Illinois site qualified for the final selection criteria, and its choice was also politically advantageous, any established eastern or western laboratory biases were dismissed in order to emphasize open access at this national facility which presented a good geographical compromise.

The Atomic Energy Commission and President Johnson decided in December, 1966 that the Weston site was the best choice for the frontier accelerator because it offered free land - 6800 acres - sufficient for the laboratory and for future expansion within the site boundaries, in addition to best matching the site criteria. All of the sites offering proposals had to donate the land, but this land, a physical expression of Turner's midwestern qualities - open and democratic - was agreeable farmland, with suitable geological composition, sufficient utilities, natural resources, assurances of compliance with projected costs, outstanding educational and research institutions, excellent transportation facilities, strong community and local industry support providing human resources and housing, and progressive attitudes toward equal employment opportunity.¹⁶

URA was ready to appoint a director for the 200-GeV project when the Weston site was chosen. Robert Wilson, the internationally-respected director of the Newman Laboratory of Nuclear Studies at Cornell University, who had openly challenged Berkeley's design for the 200 BeV accelerator project, was offered the position on 15 January 1967. After securing the AEC guarantee that he would be unhampered by

¹⁶United States Atomic Energy Commission Press Release J-282, 16 December 1966.

external forces and be free to create an exciting national scientific facility, Wilson accepted URA's offer on 7 March 1967. He immediately and intuitively recognized the resonance between the new laboratory and the concept of the frontier. He later wrote, "The spirit of science, of free inquiry, of the search for truth is deeply a part of our society. There are many frontiers of science, but an important one is particle physics."¹⁷

That Wilson, the man selected to build and direct Fermilab in its first decade, happened to be born in a Wyoming town named Frontier and that Fermilab happened to be sited near the city where Turner's frontier thesis was first presented, are but happy coincidences. However these coincidences encourage contemplation about the relationship between these multiple physical, emotional and intellectual frontiers in American history and American science. Raised on the range, and blessed with a curious mind and a practical can-do confidence that gave free rein to his creativity, Wilson possessed the strengths of a free spirit balanced by the discipline of an experimental high-energy physicist. Following his formal education and professional training at Berkeley and Princeton, Wilson had worked with Fermi at Los Alamos on the pioneering atomic bomb project in the mid-1940s. By 1960 he had completed an innovative accelerator at Cornell. An accomplished experimenter, Wilson was also part of the group planning the use of the next major international facility. His experiences in the postwar world had provided his entrance into the political arena. Wilson's feisty, independent personal style fit what was required in 1966-67 of a director for the frontier program.

The Frontier Crossroads

Just as Chicago and its surroundings had offered its fertile foundations and expansive possibilities to the American settlers, the Illinois site conveyed a sense of optimism and opportunity for physicists in the mid-1960s. With its wide open spaces and skies, it offered Wilson a blank canvas upon which he would be free to design the accelerator. The cornfields and the windswept, untamed prairie evoked for him a vision of the western frontier. However, initially this hinterland in northeastern Illinois presented a dilemma: how could he persuade the top scientists of the world to come and work with him in this undeveloped wilderness?

¹⁷R. R. Wilson, "Particles, Accelerators and Society," 1968 Richtmyer Lecture, *American Journal of Physics* 36, June 1968, 490-95.

Weston was a wilderness compared to other major American laboratories – it had no metropolitan or university setting like the laboratories at Berkeley or Stanford. He phrased his invitations to prospective employees with references to the frontiers of physics. Together they would have the chance to survey, experiment, and build with abundant natural resources. Like those 19th-century immigrants who left established cultural centers seeking freedom and self-realization in the unknown frontier, these settlers would start anew, and like the “Field of Dreams,” if he built it, they would come.

Wilson saw in this midwestern milieu an environment that could nurture creativity, originality, and bold individualism in the study of particle physics; an adventurous opportunity to devise and design imaginatively the machine that would push back the frontiers of physics and reveal the basic constituents of matter. The same “Westward Ho” attitude of American explorers, pioneers, and settlers, fired Robert Wilson’s determination to conquer the physical unknown. It may be hard for us, with our current day image of DuPage County, to realize just how much of a wilderness this area was in 1966. The most cultivation it had had was as farmland. Oak Brook was about as far as Chicago’s suburban sprawl extended then and the I-88 tollway was only a two-lane road out toward the western communities. Weston was as remote then as Waxahachie, Texas is for physicists moving now to the Superconducting Super Collider (SSC).

Intent on preserving the Weston site’s natural simplicity while building the world’s foremost scientific instrument, and its community, Wilson bargained with the AEC for control over the complete cultivation of his laboratory. To serve as his partner, Wilson asked Edwin L. Goldwasser, a gifted physicist-diplomat and administrator from the University of Illinois, Urbana to join the laboratory as Deputy Director. Goldwasser was to be the generator of many of Fermilab’s early activities reaching beyond the scientific community.¹⁸ The two were a powerful team; Wilson dreaming up fantasies of what might be and Goldwasser carrying out their realization. They complemented one another and the project materialized. And their wives, Jane Wilson and Liza Goldwasser, were equally as indispensable and essential as frontier women had been, in lending ideas and support to the creative process. Without the united contributions of all, the community would not have come together.

¹⁸Edwin L. Goldwasser, “Science and Man: Breaking New Ground at Batavia,” *The Bulletin of the Atomic Scientists*, October 1969, 7-10.

President Johnson had granted to Wilson, through the AEC's consent, that this laboratory would be *The National Accelerator Laboratory*. Wilson, Goldwasser and Ramsey intended to create Lederman's ideal – the truly national laboratory – democratically managed and accessible to all. Quality of the research rather than institutional affiliation would determine whether a proposal secured approval. Turner's "free lands" were like Fermilab's experimental areas: open and available, allowing socially and politically-egalitarian exploration and settling of the frontiers of physics.

The tranquil yet stimulating environment appealed to Wilson as he considered the prospects of this opportunity far from campus life. In these wide open spaces on the prairie he could leave his artistic mark in shaping a frontier program of national relevance and international need. Like Lewis and Clark, he and Goldwasser had direct access to government leaders. They hoped to bring peaceful ideas into the development of the site, both aesthetically and experimentally, and build a new "Science City,"¹⁹ to redeem somehow what Los Alamos had wrought upon the world. This would be a free frontier without fences, fear or security clearances.

Simple elegance, in both the physics program and the physical layout of the new laboratory, was a priority. Prairie values – protection of the land, maintaining the integrity of the site, and preserving its natural habitat – were all of critical importance to both Wilson and Goldwasser. Their philosophy was a sensitive perspective for a national laboratory to possess in 1967: maintain the natural beauty and use what is provided with minimal disturbance, nature's delicate balance will not be upset and what belongs will fit. Preserving the prairie setting was also a good way of assuring the local communities that this government installation would not impact their quiet lives. The vision to protect resources without depleting them was novel in those controversial times as the ecology movement was just beginning to take root.

The entire 6800 acre site was transferred from the state of Illinois to the US government in 1968. The residents of Weston and the farmers, with their legacy of family commitment to the land, moved on allowing the farm sites and the village houses to become, between 1968-72, a premier facility for frontier physics research. Jobs and equality were part of this economic development enhancing national prestige. The

¹⁹"Utopia on the Prairie," Wall Street Journal, 11 February 1983.

laboratory's policy on human rights, drafted in the turbulent year of 1968, was: "to seek the achievement of its scientific goals within a framework of equal employment opportunity and of a deep dedication to the fundamental tenets of human rights and dignity." The document emphasized that "prejudice has no place in the pursuit of knowledge," and that "it is essential that the Laboratory provide an environment in which both its staff and its visitors can live and work with pride and dignity."²⁰

Turner's ideals of equality, democracy and individualism, were preserved throughout Fermilab's evolution. On this frontier site, physical and technical conditions had to be accepted and these hardships were overcome. Social conditions were democratically reformed. Without these adjustments the laboratory would not have survived. Wilson said, "...in the course of giving a very large acceleration to our particles, let us hope that we can contribute at least a small acceleration to society."²¹ As the site transformed, Wilson's stamp of authority and contagious enthusiasm stimulated the desire to create the mammoth new tool to explore the frontier in the soaring and inspiring sense of the Renaissance. Goldwasser and Lederman then extended this exciting quest to the experimental users, the staff, and the communities beyond.

As Turner said in 1893, "Since the days when the fleet of Columbus sailed into the waters of the New World, America has been another name for opportunity...and American energy will continually demand a wider field for its exercise." He said "the inherited ways of doing things are also there; and yet, in spite of custom, each frontier did indeed furnish a new field of opportunity, a gate of escape from the bondage of the past; and freshness, and confidence, and scorn of older society, impatience of its restraints and its ideas, and indifference to its lessons have accompanied the frontier." Turner concluded his address saying, "the frontier has gone, and with its going has closed the first period of American history." Like Chicago's legendary symbol of rebirth in 1893's Columbian Exposition, a phoenix rising from the ashes of the 1871 fire, the frontier was reborn here in 1942, with Enrico Fermi's chain reaction, communicated to Washington officials as "the Italian navigator has landed in the New World." Vannevar Bush's endless frontier of scientific exploration in the nation's research universities, was supported by Washington and opened in 1950 with the creation of the National Science Foundation for those new frontiersmen blazing

²⁰"Policy Statement on Human Rights," National Accelerator Laboratory, March 15, 1968.

²¹R. R. Wilson, "Particles, Accelerators and Society," 1968 Richtmyer Lecture, *American Journal of Physics* 36, June 1968, 490-95.

the trail to discovery in the unknown wilderness. John Kennedy summoned us to “the New Frontier” in 1960. In 1972, the National Accelerator Laboratory, Fermilab, with all of Turner’s frontier attributes, looked upon the next American frontier, from the highest energy domain ever achieved.

Today, just as the cathedral of Chartres towers over its surrounding village and fields on the French countryside, having put its community to work dedicated to a single purpose, so do the twin towers of the Fermilab “Highrise” look out over the DuPage and Kane landscape, to inspire and attract the senses of all passersby. Its frontier beckons our entrance.