

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

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**NATIONAL REGISTER OF HISTORIC PLACES
INVENTORY -- NOMINATION FORM**

SEE INSTRUCTIONS IN *HOW TO COMPLETE NATIONAL REGISTER FORMS*
TYPE ALL ENTRIES -- COMPLETE APPLICABLE SECTIONS

1 NAME

HISTORIC
First Self-Sustaining Nuclear Reaction Site

AND/OR COMMON
The Enrico Fermi Memorial

2 LOCATION

STREET & NUMBER
East side of South Ellis Avenue, between East 56th Street

NOT FOR PUBLICATION

CITY, TOWN

CONGRESSIONAL DISTRICT

VICINITY OF

STATE

ILLINOIS

CODE
17

COUNTY
Cook

CODE
031

3 CLASSIFICATION

CATEGORY	OWNERSHIP	STATUS	PRESENT USE	
<input type="checkbox"/> DISTRICT	<input checked="" type="checkbox"/> PUBLIC	<input checked="" type="checkbox"/> OCCUPIED	<input type="checkbox"/> AGRICULTURE	<input type="checkbox"/> MUSEUM
<input type="checkbox"/> BUILDING(S)	<input type="checkbox"/> PRIVATE	<input type="checkbox"/> UNOCCUPIED	<input type="checkbox"/> COMMERCIAL	<input checked="" type="checkbox"/> PARK
<input type="checkbox"/> STRUCTURE	<input type="checkbox"/> BOTH	<input type="checkbox"/> WORK IN PROGRESS	<input type="checkbox"/> EDUCATIONAL	<input type="checkbox"/> PRIVATE RESIDENCE
<input checked="" type="checkbox"/> SITE	PUBLIC ACQUISITION	ACCESSIBLE	<input type="checkbox"/> ENTERTAINMENT	<input type="checkbox"/> RELIGIOUS
<input type="checkbox"/> OBJECT	<input type="checkbox"/> IN PROCESS	<input checked="" type="checkbox"/> YES: RESTRICTED	<input type="checkbox"/> GOVERNMENT	<input type="checkbox"/> SCIENTIFIC
	<input type="checkbox"/> BEING CONSIDERED	<input type="checkbox"/> YES: UNRESTRICTED	<input type="checkbox"/> INDUSTRIAL	<input type="checkbox"/> TRANSPORTATION
		<input type="checkbox"/> NO	<input type="checkbox"/> MILITARY	<input type="checkbox"/> OTHER:

4 OWNER OF PROPERTY

NAME
The University of Chicago (Office of Special Events, Administration Building)

STREET & NUMBER
5801 Ellis Avenue

CITY, TOWN
Chicago

VICINITY OF

STATE
Illinois

5 LOCATION OF LEGAL DESCRIPTION

COURTHOUSE,
REGISTRY OF DEEDS, ETC. Cook County Recorder and Registrar of Titles

STREET & NUMBER
118 North Clark

CITY, TOWN
Chicago

STATE
Illinois

6 REPRESENTATION IN EXISTING SURVEYS

TITLE
none known

DATE

FEDERAL STATE COUNTY LOCAL

DEPOSITORY FOR
SURVEY RECORDS

CITY, TOWN

STATE

7 DESCRIPTION

CONDITION

EXCELLENT
 GOOD
 FAIR

DETERIORATED
 RUINS
 UNEXPOSED

CHECK ONE

UNALTERED
 ALTERED

CHECK ONE

ORIGINAL SITE
 MOVED DATE _____

DESCRIBE THE PRESENT AND ORIGINAL (IF KNOWN) PHYSICAL APPEARANCE

The first self-sustaining nuclear reactor was housed in a converted squash-rackets court, a 30 by 60 foot room with a balcony on the north end, raised about ten feet from the floor, from which the scientist directed and observed experiments on the "Chicago Pile." The court was located under the West Stands at Chicago University's old Stagg Field. The West Stands was a vine-covered fortress-style structure with round crenellated towers on both ends, a square central pavilion, lancet windows on the second story, and battlements along the top of the wall. The West Stands structure occupied nearly the entire length of the block of Ellis Avenue between East 56th and 57th Streets.

The West Stands were torn down in 1958 because of radiation in the building and the structure's generally unsound condition. At the time of the national historic landmark designation, a grassy plot between two tennis courts was identified as the site of the demolished squash-rackets court.

The new limestone Joseph Regenstein Library now occupies most of the block where the old Stagg Field stood. To commemorate the twenty-fifth anniversary of the first controlled generation of nuclear power in the experiment by Enrico Fermi and his colleagues, the B. F. Ferguson Monument Fund commissioned Henry Moore to build an appropriate sculpture to be the focal point of the Enrico Fermi Memorial on the original experiment site. December 2, 1967 they presented to the citizens of Chicago the twelve foot high, three ton Moore sculpture which is mounted on a base of black polished granite on a wide stone platform three steps above grade. A few feet from the sculpture is a slab of granite on which four plaques are mounted--one of them identifying the site as a national historic landmark.

Of his bronze "Nuclear Energy" Moore said: I prefer to let my work speak for itself, but sometimes it is possible to give a hint or a clue of what was in one's mind in making the sculpture. In this, the upper part is very much connected with the mushroom cloud of an atomic explosion, but also, it has the shape and eye sockets of a skull. The lower half of the sculpture is architectural and in the arched cavities and domed interiors, I had reminiscences, in my mind, of the inside of a church or cathedral. The whole sculpture was meant to have a contained power and force.

8 SIGNIFICANCE

PERIOD	AREAS OF SIGNIFICANCE -- CHECK AND JUSTIFY BELOW			
<input type="checkbox"/> PREHISTORIC	<input type="checkbox"/> ARCHEOLOGY-PREHISTORIC	<input type="checkbox"/> COMMUNITY PLANNING	<input type="checkbox"/> LANDSCAPE ARCHITECTURE	<input type="checkbox"/> RELIGION
<input type="checkbox"/> 1400-1499	<input type="checkbox"/> ARCHEOLOGY-HISTORIC	<input type="checkbox"/> CONSERVATION	<input type="checkbox"/> LAW	<input checked="" type="checkbox"/> SCIENCE
<input type="checkbox"/> 1500-1599	<input type="checkbox"/> AGRICULTURE	<input type="checkbox"/> ECONOMICS	<input type="checkbox"/> LITERATURE	<input type="checkbox"/> SCULPTURE
<input type="checkbox"/> 1600-1699	<input type="checkbox"/> ARCHITECTURE	<input type="checkbox"/> EDUCATION	<input type="checkbox"/> MILITARY	<input type="checkbox"/> SOCIAL/HUMANITARIAN
<input type="checkbox"/> 1700-1799	<input type="checkbox"/> ART	<input type="checkbox"/> ENGINEERING	<input type="checkbox"/> MUSIC	<input type="checkbox"/> THEATER
<input type="checkbox"/> 1800-1899	<input type="checkbox"/> COMMERCE	<input type="checkbox"/> EXPLORATION/SETTLEMENT	<input type="checkbox"/> PHILOSOPHY	<input type="checkbox"/> TRANSPORTATION
<input checked="" type="checkbox"/> 1900-	<input type="checkbox"/> COMMUNICATIONS	<input type="checkbox"/> INDUSTRY	<input type="checkbox"/> POLITICS/GOVERNMENT	<input type="checkbox"/> OTHER (SPECIFY)
		<input type="checkbox"/> INVENTION		

SPECIFIC DATES December 2, 1942

~~UNIVERSITY OF CHICAGO~~ Henry Moore
Sculptor

STATEMENT OF SIGNIFICANCE

Scientists at the University of Chicago achieved the controlled release of nuclear energy for the first time on December 2, 1942. Guided in their efforts by knowledge gained from experiments in nuclear physics throughout the world prior to 1939 and spurred on by Germany's efforts to release the atom, the small group of scientists who first initiated a self-sustaining chain reaction that day in the West Stands at the University of Chicago placed in man's hands the ultimate means of determining his own destiny.

When America undertook the effort to obtain a self-sustaining chain reaction, her overall purpose was to produce an atomic bomb to help secure her own future. By the spring of 1940, scientists at several locations in the country were working on atomic matters. At Columbia University in New York, Dr. Enrico Fermi, a native of Italy, and Dr. Walter H. Zinn, Canadian born, endeavored to design a uranium chain reactor. Among others helping them in the project was Dr. Leo Szilard, a Hungarian.

A major problem in designing the reactor concerned the speed of the neutrons in a chain reaction. Fermi and his associates knew that the bombardment of a uranium atom by neutrons fissioned, or split, the atom, causing the emission of additional neutrons. They also realized that those neutrons fissioned other uranium atoms, which made possible a chain reaction in a sufficiently large mass of uranium. But the neutrons had to be slowed down for a self-sustaining reaction to occur. Fermi finally decided that a good moderator would be pure carbon graphite because it would cause the neutrons to lose energy as they passed through it and be more likely of fissioning the next uranium atoms they hit after leaving the carbon. Proceeding on that theory, the Columbia group experimented with a "lattice pile," which measured three feet by three feet by eight feet. This was a pile of graphite bricks, in which, at regular spaces, uranium was placed. Success in using it proved vital for the maturing atomic project.

Early in 1942, the Columbia group moved to the University of Chicago, where it established a so-called "Metallurgical Laboratory" in the West Stands at Stagg Field. While concurrent work progressed elsewhere, Fermi and his colleagues furthered their work concerning the development of the pile. Lack of uranium-oxide and pure graphite prohibited the construction of a large lattice-pile, but while strenuous efforts were made to produce those materials, about thirty experiments with small piles were made in Chicago. By July, 1942, those experiments had indicated a design for a pile of critical size, i. e. one in which a self-sustaining chain reaction could be obtained.

9 MAJOR BIBLIOGRAPHICAL REFERENCES

- Corbin Allardice and Edward R. Trapnell, The First Pile, reprint of AEC report TID-292, March 1955 (Argonne, Ill., 1961).
 Selig Hecht, Explaining the Atom (New York, 1947).
 Ralph E. Lapp, Roads to Discovery (New York, 1960).
 Henry DeWolf Smyth, Atomic Energy for Military Purposes (Princeton, N.J., 1945).
 Larry Wolters, "Birth, Life and Death--Shaped in Bronze," from Chicago Tribune Sunday Magazine, November 28, 1965.

10 GEOGRAPHICAL DATA

ACREAGE OF NOMINATED PROPERTY less than one acre

UTM REFERENCES

A	16	450060	4626690	B			
	ZONE	EASTING	NORTHING		ZONE	EASTING	NORTHING
C				D			

VERBAL BOUNDARY DESCRIPTION

As seen on the enclosed xeroxed section of the University of Chicago Campus Map, the boundary of the landmark site is the area once covered by the West Stands of the now-destroyed Stagg Field, and presently the site of the Enrico Fermi Memorial, plus a stretch of lawn on both sides. The boundary runs southerly along the east curb of Ellis Avenue from East 56th to East 57th Streets; then easterly for about 90 feet along the north curb of East 57th Street; then due north, paralleling

LIST ALL STATES AND COUNTIES FOR PROPERTIES OVERLAPPING STATE OR COUNTY BOUNDARIES

STATE	CODE	COUNTY	CODE
STATE	CODE	COUNTY	CODE

11 FORM PREPARED BY

NAME / TITLE

Blanche Higgins Schroer, Landmark Review Project; S. Sydney Bradford, 1964

ORGANIZATION

Historic Sites Survey, National Park Service

DATE

202/523-5464

STREET & NUMBER

1100 L Street NW., Room 5213

TELEPHONE

CITY OR TOWN

Washington

STATE

D.C.

12 STATE HISTORIC PRESERVATION OFFICER CERTIFICATION

THE EVALUATED SIGNIFICANCE OF THIS PROPERTY WITHIN THE STATE IS:

NATIONAL

STATE

LOCAL

As the designated State Historic Preservation Officer for the National Historic Preservation Act of 1966 (Public Law 89-665), I hereby nominate this property for inclusion in the National Register and certify that it has been evaluated according to the criteria and procedures set forth by the National Park Service.

STATE HISTORIC PRESERVATION OFFICER SIGNATURE

TITLE

DATE

FOR NPS USE ONLY

I HEREBY CERTIFY THAT THIS PROPERTY IS INCLUDED IN THE NATIONAL REGISTER

DATE

9/8/83

ATTEST:

DATE

KEEPER OF THE NATIONAL REGISTER

(NATIONAL HISTORIC
LANDMARKS)

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A fascinating aspect of the entire undertaking is that a gigantic program had been set in motion before a chain reaction had occurred. The scientists had to rely solely on their calculations in all their work. Dr. Zinn in Chicago, for example, had to design the dies for the uranium oxide before they could be tested, and the entire construction of the pile depended upon the shape and size of the uranium pieces. Those pieces, fortunately, met the requirements for the pile.

The construction of the main pile began in November, 1942. As graphite bricks were machined in the West Stands, Fermi directed the building of the pile in the squash-rackets court in the same structure. The pile consisted of alternate layers of graphite bricks and pressed uranium oxide, and it grew daily, with all of the scientists involved realizing that the climax was approaching for their work. A little after 4:00 p.m. on December 1, the last layers of graphite and uranium oxide were put into place. All told, six tons of uranium oxide lay in the pile.

To avoid the possibility of a runaway chain reaction, the builders of the pile had inserted three cadmium rods into it. Cadmium gobbles up neutrons, and if mischance required it, two of the three rods could be pushed into the pile in order to absorb the neutrons and halt the reaction. The cadmium rod closest to the bottom of the pile had been calibrated so that it could be gradually pulled out from the pile as the experiment progressed, releasing more and more neutrons as it was withdrawn from the pile.

At 8:30 a.m. on December 2, an expectant group began to assemble in the squash-rackets court. Standing on a balcony at the north end of the court, Fermi at 9:45, had an electrically controlled set of rods removed. Then, just after 10:00, he directed that "Zip," a manually operated safety rod, be withdrawn. Counters on the balcony for counting neutrons had already begun to operate when, at 10:37, Fermi began the withdrawal of the vernier control rod. In successive steps, it was pulled to thirteen feet, and the counters clicked with increasing rapidity. Fermi then had it pulled some additional lengths. Fully confident of success, he then ordered the reaction stopped in order to check everything. And then, just after the experiment had been renewed, the automatic safety rod was activated and halted the reaction. A quick check showed that its safety point had been set too low. Yet, the accident gave Fermi a good chance to halt the experiment in order to eat, which he and his colleagues did.

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The group had reassembled by 2:00 p.m. Once again, the vernier control rod was withdrawn at Fermi's direction; and just after having had it withdrawn another six inches at 3:25, Fermi said

This is going to do it. Now it will become self-sustaining.

It did and for the next twenty-eight minutes, the group watched the pile, until the reaction was halted at 3:53 p.m. Someone had brought along a bottle of Chianti wine, and the scientists ended their moment in history by drinking to success out of paper cups.

Subsequently, the official government report on the development of the atomic bomb stated in section 6, paragraph 29,

The pile was first operated as a self-sustaining system on December 2, 1942. So far as we know, this was the first time that human beings ever initiated a self-sustaining nuclear chain reaction.

History from the original report by S. Sydney Bradford, 1964.

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Press release on "Nuclear Energy" from University of Chicago, Office of Special Events, 1975.

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CONTINUATION SHEET

Boundary

ITEM NUMBER 10

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the curb of Ellis Avenue, to the south curb of East 56th Street, then westerly along this curb for about 90 feet, to the beginning point.