Form No. 10-300 (Rev. 10-74)

UNITED STATES DEPARTMENT OF THE INTERIOR
NATIONAL PARK SERVICE

NATIONAL REGISTER OF HISTORIC PLACES INVENTORY -- NOMINATION FORM

PH0667319 DATA SHEET

FOR NPS USE ONLY
RECEIVED APR 19 1978
DATE ENTERED AUG 10 1978

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

1 NAME

HISTORIC
ALCOA EDGEWATER WORKS

AND/OR COMMON
Alcoa Edgewater, Alcoa Shadyside, "The Plant"

LOCATION

STREET & NUMBER
700 River Road — NOT FOR PUBLICATION

CITY, TOWN
Borough of Edgewater — VICINITY OF

CONGRESSIONAL DISTRICT
9th

STATE	CODE	COUNTY	CODE
New Jersey	34	Bergen	003

CLASSIFICATION

CATEGORY	OWNERSHIP	STATUS	PRESENT USE	
__DISTRICT	__PUBLIC	__OCCUPIED	__AGRICULTURE	__MUSEUM
X BUILDING(S)	X PRIVATE	X UNOCCUPIED	X COMMERCIAL	__PARK
__STRUCTURE	__BOTH	__WORK IN PROGRESS	__EDUCATIONAL	__PRIVATE RESIDENCE
__SITE	**PUBLIC ACQUISITION**	**ACCESSIBLE**	__ENTERTAINMENT	__RELIGIOUS
__OBJECT	__IN PROCESS	X YES: RESTRICTED	__GOVERNMENT	__SCIENTIFIC
	__BEING CONSIDERED	__YES: UNRESTRICTED	__INDUSTRIAL	__TRANSPORTATION
		__NO	__MILITARY	X OTHER: Vacant

OWNER OF PROPERTY

NAME
Tri-Terminal Corp

STREET & NUMBER
1465 Broadway

CITY, TOWN
New York, New York 10036 — VICINITY OF Manhattan

STATE
New York

LOCATION OF LEGAL DESCRIPTION

COURTHOUSE, REGISTRY OF DEEDS, ETC.
Bergen County Clerk's Office

STREET & NUMBER
The Courthouse

CITY, TOWN
Hackensack

STATE
N.J.

6 REPRESENTATION IN EXISTING SURVEYS

TITLE
New Jersey Historic Sites Inventory (#994.2)

DATE
1977 — __FEDERAL X STATE __COUNTY __LOCAL

DEPOSITORY FOR SURVEY RECORDS
Office of Historic Preservation, Dept. of Environ. Protec.

CITY, TOWN
Trenton

STATE
New Jersey

7 DESCRIPTION

CONDITION		CHECK ONE	CHECK ONE
_EXCELLENT	X DETERIORATED	X UNALTERED	X ORIGINAL SITE
_GOOD	_RUINS	_ALTERED	_MOVED DATE_____
_FAIR	_UNEXPOSED		

DESCRIBE THE PRESENT AND ORIGINAL (IF KNOWN) PHYSICAL APPEARANCE

The tract of land which comprises the borough of Edgewater was granted to Michael Jansen Vreeland in the seventeenth century by the Queen of the Netherlands. Between the years 1914 and 1925 the United States Aluminum Company acquired the land on which the Edgewater Works now stands. The Site is bounded on the North by Russell Avenue, on the South by Vreeland Terrace, on the East by River Road, and on the West by Undercliff Avenue. The Edgewater Cemetery, a 1.34 acre interior property, which is impacted in the super-block site was dedicated by Vreeland who was interred there in 1663.

ALCOA EDGEWATER WORKS

In the year 1914, the United States Aluminum Company drafted a Master Plan and Design for a "heavy manufacturing skyscraper" complex containing 1,600,000 square feet of heavy manufacturing and storage space, which was to be constructed in Edgewater, New Jersey. It was to be the largest of its kind in the World. The final plant realized contained 1,100,000 square feet of space.

In the year 1916, 17% of the ultimate plant was constructed; this consisted of the first three stories that form the East leg of the present "L" shaped primary structure, the South half of buildings 3,3A,5,7,7A and the Power Plant (demolished) with its connections to Building 1 and 2.

In the year 1919, Turner Construction Company of New York City, under a contract with the United States Aluminum Company, agreed to furnish Engineering Design and construct the next stage of the original Master Plan Design. This construction, completed in 1920, brought the Plant to 72% of its present size. It consisted of the completion, to its present 160 foot height, buildings 1,2,4,6 and 8 which comprise 85% of the primary "L" shaped structure, and the balance of buildings 3,3A,5,7, 7A and 7B. The plant at this time consisted of 765,000 square feet of heavy manufacturing and storage space. The balance of the Plant was completed in two subsequent stages; one in 1939 and one in 1940. At that time the Plant achieved its present size of 1,100,000 square feet.

8 SIGNIFICANCE

PERIOD	AREAS OF SIGNIFICANCE -- CHECK AND JUSTIFY BELOW				
__PREHISTORIC	__ARCHEOLOGY-PREHISTORIC	__COMMUNITY PLANNING	__LANDSCAPE ARCHITECTURE	__RELIGION
__1400-1499	__ARCHEOLOGY-HISTORIC	__CONSERVATION	__LAW	__SCIENCE
__1500-1599	__AGRICULTURE	__ECONOMICS	__LITERATURE	__SCULPTURE
__1600-1699	X ARCHITECTURE	__EDUCATION	__MILITARY	__SOCIAL/HUMANITARIAN
__1700-1799	__ART	X ENGINEERING	__MUSIC	__THEATER
__1800-1899	__COMMERCE	__EXPLORATION/SETTLEMENT	__PHILOSOPHY	__TRANSPORTATION
X 1900-	__COMMUNICATIONS	X INDUSTRY	__POLITICS/GOVERNMENT	__OTHER (SPECIFY)
		__INVENTION		

SPECIFIC DATES 1916-20, 1939-40 BUILDER/ARCHITECT Edwin Stanton Fickes, Engineer
Turner Construction Co. Builders

STATEMENT OF SIGNIFICANCE

The ALCOA Edgewater Works represent an important extant example of the use, on an impressive scale, of the mushroom flat slab system. It may well prove to be one of the missing links in establishing details of one of the uses of the modern mushroom flat slab, in this country, amid counter claims from overseas.

-Emery Kemp, Professor of
Civil Engineering, University
of West Virginia

Architecture/Engineering.

During the 20th century concrete has become the world's most widely used structural material despite the fact that it arrived rather late upon the scene as a building material. To understand its current uses and future possibilities one must examine the formative period of its use in this country from Ransome's first patents in the 1880s to the early 1920s. This period is characterized by intense competition by promoters of various patented reinforcement systems and a noteworthy improvement of analytical design methods and a corresponding improvement and reliability in the properties of concrete. Because of the proprietary nature of this early development of structural concrete, it has been difficult for historians of technology to unravel all of the details of the astonishingly rapid growth of this industry.

As in the case of earlier structural materials, concrete was employed as a substitute for timber, iron and stone, and thus used each of their unique forms which developed before the advent of reinforced concrete. The really significant development which established reinforced concrete as a unique building material is the flat slab reinforced in two directions and without beams of any kind. This novel structural form can be attributed to W. Norcross and C.A.P. Turner in the United States, and it was somewhat later utilized by Robert Maillard in Switzerland. These early systems developed rapidly and by the beginning of the 1920s the modern flat slab floor was fully developed and has been very widely used, almost unchanged, for more than fifty years.

9 MAJOR BIBLIOGRAPHICAL REFERENCES

Please refer to the Bibliography attached.

10 GEOGRAPHICAL DATA

ACREAGE OF NOMINATED PROPERTY 9.0 Acres

UTM REFERENCES

	ZONE	EASTING	NORTHING
A	18	586050	4519240
B	18	586200	4519120
C	18	586170	4519020
D	18	586050	4518890

VERBAL BOUNDARY DESCRIPTION E 18 585910 4518980

That block of the Borough of Edgewater whose northern perimeter is Russell Avenue, whose eastern perimeter is River Road, whose southern perimeter is Vreeland Terrace, and whose western perimeter is Undercliff Avenue.

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 (Terry Karschner, Office of Historic Preservation, Trenton, 609-292-2023)

ORGANIZATION Urban Recycle One Associates

DATE October 1977

STREET & NUMBER c/o Carl Berger & Associates, Architects

TELEPHONE (212) 255-2450

CITY OR TOWN 170 Fifth Avenue

STATE N.Y.

New York, New York 10010

12 STATE HISTORIC PRESERVATION OFFICER CERTIFICATION

THE EVALUATED SIGNIFICANCE OF THIS PROPERTY WITHIN THE STATE IS:

NATIONAL ___ STATE X 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 Deputy

TITLE Deputy Commissioner, Dept. of Environ. Protec.

DATE 4-6-78

FOR NPS USE ONLY

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

~~DIRECTOR, OFFICE OF ARCHEOLOGY AND HISTORIC PRESERVATION~~ KEEPER OF THE NATIONAL REGISTER

DATE 8/10/78

ATTEST: ~~KEEPER OF THE NATIONAL REGISTER~~

DATE 8.9.78

GPO 892-453

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NATIONAL PARK SERVICE

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Alcoa Edgewater Works
Edgewater
Bergen County
New Jersey 034

DESCRIPTION

Publications at the time of construction in 1916 reported:

"Another development of interest is the large rolling mill and stamping plant which the Aluminum Company of America is erecting on the Hudson River in Edgewater, New Jersey, just opposite Grant's Tomb. The buildings as seen from the New York side already show the large scope of this enterprise which will, when completed, be the largest mill of this kind owned by the Aluminum Company of America and, in fact, will be the largest of its kind in the World". (Aluminum Man: The Metal Industry Journal, Volume 14-1, January 1916).

"The large rolling and stamping mill which the company is erecting on the Hudson River at Edgewater, New Jersey will not only be the largest mill owned by the Aluminum Company of America, but the largest mill of its kind in the world". (Aluminum Man, Volume 14-9 September, 1916).

"During the year 1916 a large addition to the existing fabricating capacity for aluminum was made by the completion and bringing into operation of the large metal working plant at Edgewater, New Jersey, containing as a portion of it the most modern rolling mill plant in existence for rolling aluminum. The plant is now taking care of a large portion of the demand for fabricated aluminum from the middle and eastern states". (Aluminum Man, Volume 15-10, October, 1917).

DESCRIPTION AND ANALYSIS OF THE PHYSICAL STRUCTURES

From a distance, the Edgewater Works, and the town of Edgewater itself, is identified by the 160 foot high, 940 foot long reinforced concrete frontspiece which is the primary structure of the Plant.

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DESCRIPTION

The 1920 vintage primary "L" shaped structure is a classic neat reinforced concrete design. It consists of eight loft stories (17'0" to 18' high) resting on a two story plinth. The floor construction is of two-way flat-slab design supported by circular reinforced concrete mushroom columns with dropped panels forming 19'-5" x 16'-0" structural bays. The Building (1,2-4,6,8,10) envelope is composed of "giant order" steel factory sash with wire glass fenestration and concrete surrounds. This building contained the great stamping machinery, some of which weighed two million pounds, and many ancillary manufacturing, assembly, treatment and storage operations. The top floor housed the administrative offices.

The early rolling mills (buildings 3 and 7) are long-span steel structures which housed giant suspended moving cranes, and are steel and glass butterfly roofed structures that bathe the 100 foot interior column free space they enclose with profuse sunlight. The forging operation (building 9) was similarly constructed space with the exception of the roof design which reflected the roofing preference of its time, - the saw-tooth North skylight. The rolling mill (buildings 3 and 7) when constructed in 1916 was reported as "the most modern rolling mill plant in existence for rolling aluminum". These buildings were to be somewhat eclipsed by the construction, in 1938-1940, of the hot rolling mill (buildings 11,11A,12).

The hot rolling mill is a structural steel skeleton with brick masonry panel walls and piers expressing the structural bay module. Its 158 foot width is spanned by long-span steel trusses forming two equal 79 foot bays. The steel columns also carry the burden of the giant overhead moving cranes that traverse the long bays.

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SIGNIFICANCE

As lack of sufficient studies exist of the history of the science, it is difficult to effectively judge the ALCOA Edgewater Works as to its relative significance when considering other reinforced concrete buildings. The plant is definitely a regional landmark, but possibly has national importance in the development of the mushroom column.

The art noveau, in architecture at least, had its roots in the tradition of iron construction. At the beginning of the century, when the movement was spreading from Brussels, there appeared a new building material which achieved a surprisingly rapid influence on architecture: ferro-concrete. It was at this time that architecture tore itself loose from the prejudices which had held it back for so long, and had absorbed the new methods that had grown out of the period itself. It was this that promoted the use of ferro-concrete. Hardly to the point where mills, silos and reservoirs could be made from concrete than it was employed for more purely architectural purposes. Between 1910 and 1920 it became almost the trademark of the new architecture.

By 1910 concrete construction had become extremely popular in the United States. It was an exciting novelty, an enthusiasm for it paralleled the earlier passion for cast iron. The leading engineers and builders at the turn of the century were Ernest Ransome of San Francisco, Julius Kahn of Detroit, Schmidt and Martin in Chicago, and the various branches of the Ferro-concrete Construction Company. The reinforcing techniques they used were variations of those developed by Hyatt, Ransome, Wayss, and Hennebique in the previous century: bars were densely set in zone of tension, and various shapes of bent and diagonal bars and J-shaped pieces known as stirrups were placed in the regions of shearing stress. These techniques were satisfactory enough with high safety factors, and they prompted bold experiments.

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SIGNIFICANCE

The first skyscraper of reinforced concrete came at the beginning of the century with the sixteen story Ingalls Building in Cincinnati (1902-1903). The reinforcing system was based on Ransome's patents for fully developed reinforcing against tension and shear. The Kahn system was used in the frame of the fifteen story Marlborough Hotel in Atlantic City, New Jersey, built between 1905 and 1906. This was the largest concrete building in the world at the time. A more sober work for industrial purposes but with similar reinforcing is the factory of the Brown-Lipe Chapin Company at Syracuse, New York, built in 1908 as one of Kahn's early essays in concrete architecture.

Beamless Flooring - The Mushroom Floor:

Maillart's experiments with beamless flooring date from 1908...beams disappeared, their function being resolved into the floor itself...the peculiarity of the system resides neither in the formation of the shafts nor in the extruded corbeling of the capitals that crown them, but wholly in the forces in the ceiling above, which do not meet the eye...the latent possibilities of mushroom slab construction can only find vindication in buildings which are flooded with daylight from all sides.

C.A.P. Turner had been experimenting with the slab a year before Maillart.

Turner, an American engineer, patented his invention of flat-slab construction in 1908. The essential feature of this new construction was the formation of the so-called mushroom at the top of each column, by extending its reinforcing rods laterally, some four feet or more out into the slab in a radial direction and supporting on these ring rods, which in turn carry the lighter reinforcement for the slab construction.

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Pioneering Reinforced Concrete Design at the Edgewater Works:

At this point we must explore some of the definitive descriptions of the engineering achievements cited in the above texts, focus more adequately on some of the generalizations implied therein, and secure for the Edgewater Works its deserving place in the historic development of reinforced concrete design.

The pioneering mushroom-slab achievements of C.A.P. Turner of the United States in 1908 and Robert Maillart of France in 1910 were general statements that have not endured to the present except in a general sense with regard to crude principle and general external form. Neither the C.A.P. Turner system nor the Maillart system represented nor was to become representative of the high state of the art for the mushroom slab system. In this regard, the achievement in mushroom-slab design embodied in the Edgewater Works has endured, and its existence is evidence of that achievement.

The reinforcing rods were arranged lengthwise and crosswise, parallel to the bays, not diagonally as in the earlier C.A.P. Turner system. The dropped panel at each column is a constituent element in the design, and served to reduce the slab span, deflection, and the critical shearing stress which was so critical in a building with heavy live load burden. It is the hallmark of the American Mushroom-slab solution to flat slab reinforced concrete design.

Architectural Heritage in the Edgewater Works:

The ALCOA Works is an extremely handsome and impressive example of the great age of reinforced concrete factory design. The Design for Edgewater Works, executed in the year 1919 by Turner Construction Company, is a constituent element in the transition from the crude American reinforced concrete work executed previous to 1910 to the full exploitation of the

SIGNIFICANCE

design medium realized in 1927-1928 at the Van Nelle Factory at Rotterdam by van der Vlugt, which, it should be noted, exhibits the "American mushroom-slab invention". ALCOA Edgewater is a testament to the mushroom columns enduring validity, and secures for the American system, its place in the history of reinforced concrete development.

The design of the concrete tower facade is derivative of "the Chicago school" functionalists, with one major exception; it was executed in reinforced concrete, and, to knowledge, is the best preserved, surviving example, of its genre.

Industry

The largest aluminum plant of its kind during the formative years of that industry, the ALCOA Edgewater Works was equipped with the most advanced industrial technology and pioneered in several important manufacturing processes.

Resultant from the export embargo by France and Germany during World War I, ALCOA had become the only "pig aluminum" producer for North American consumption and was the largest fabricator on the continent. By 1917, when Germany was consuming enormous quantities of aluminum, and was leading the Allies in War applications, ALCOA was forced to increase her capacity from 109 to 152 million lbs. in the two year period 1915 to 1917. Of this, 100 millions pounds were shipped to England, France and Italy.

The extent of this pressure and of Edgewater's wartime importance can be seen by the fact that while planned as a fabrication plant, its power-producing capacity was designed to do smelting as well. Its first order was for five million pounds of ingot for export. By 1917, the new plant was placed into the fabrication role for which it was designed, for the most part sheet and cooking utensils, including mess kits for the Cooking Utensil Company, an ALCOA subsidary using the brand name "Wearever".

In 1921 ALCOA pioneered the manufacture of collapsible tubes for toothpaste and other uses at its Edgewater Plant.

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The development of 17S alloy rod made possible another first at the Edgewater Works in 1922: Screw machine products whose light weight and resistance to corrosion made important contributions to American industry. This same tough alloy was later to make possible the strong sheet which was to cover American aircraft in World War II.

In the 1920's impact extrusion was pioneered at the Edgewater Works, and to this day remains a major fabricating method for the container industry.

The pioneering, at the Edgewater Works, of the reversing hot-rolling mill resulted in the plant expansion of 1937-1940. The knowledge acquired from these operations was a chief aid to the industry in meeting aircraft needs in World War II. Other firsts at Edgewater Works were press forgings and specialty developments for aluminum foil, such as texturing and anti-radar chaff. This last expansion, completed in 1940, was to witness one year after its completion, 3500 employees working in shift cycles 24 hours per day for the creation of material for the flying fortress, Tomahawks and Air Cobras for the United States Air Force.

The industry phased out of World War II with a major expansion into consumer products. A slow but constant decline in profit and production thereafter intimated the eventual vacating of ALCOA Edgewater. Aircraft production for the Korean War obscured what was later to become clear - one story plant construction on 50 to 100 acre tracts outclassed high-rise manufacturing plants. Abandonment was inevitable because of obsolete plant design features. As early as 1953, screw and rivet production was moved to Lancaster, Pennsylvania. Milling was de-emphasized in favor of expansion in Davenport, Iowa. Cleveland Works' forte became forging. Edgewater Works could no longer compete with the rest of Alcoa. By 1965, Alcoa management perceived that there were no available design techniques in plant design that could alter the economic obsolescence of the Edgewater Works.

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Alcoa Wrap and reduced sheet metal operations sustained the Edgewater Works from 1956 to 1965. Ingot casting was also preserved as a token operation but transportational logistics of rail and water had deteriorated to the point where the Edgewater Works could not be sustained.

Upon closing operations in 1965, Edgewater Works Manager, Lee Arbegast, said:

"For twenty years, the company has devoted a tremendous amount of thought and effort to the problem of how to make the plant more competitive. We examined the possibility of reversing the product lines. We considered dozens of engineering changes. But after much pain, we came to the only possible conclusion, - problems were just insurmountable. The thing we really need is 100 acres of land at the plant site, and it is not available."

The Alcoa Edgewater Plant has remained virtually vacant from the mid-1960's until today. Using tax incentives made available through the Tax Reform Law of 1976, there are proposals for converting this mamouth structure into apartments and a shopping mall.

BIOGRAPHICAL INFORMATION ON DESIGNING ENGINEERS

A copy of the Turner Construction Company contract file lists E. S. Fickes as the engineer in charge of the 1919 expansion of the ALCOA Plant, the major expansion and construction of the entire complex. Edwin Stanton Fickes was a member of the American Society of Civil Engineers from 1898 to 1943. In 1931 and 1937 he was listed in Who's Who in Engineering, as a vice-president of the Alcoa Company of Pittsburgh, Pennsylvania. He was a graduate of Rensselaer Polytechnical Institute and worked for Alcoa since 1899, rising to take charge of engineering and construction of new works.

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Myron Washington Hanson who was responsible for the hot rolling mill design of 1937 was a member of the American Society of Civil Engineers from 1930 to 1951. His name appeared on drawings of the Alcoa Edgewater Works as early as 1916. According to the American Society of Consulting Engineers yearbooks, he was the Chief Designing Engineer in Alcoa's Structural Department.

Other engineers who played a major role in the design of the complex, but about whom nothing more is known, are C.A. Kain, D.P. Maxwell, and J.W. Schreiber. This information suggests that the project was largely, if not entirely within the Alcoa Company, and that the Foundation Construction Company and the Turner Construction Company acted as construction contractors only.

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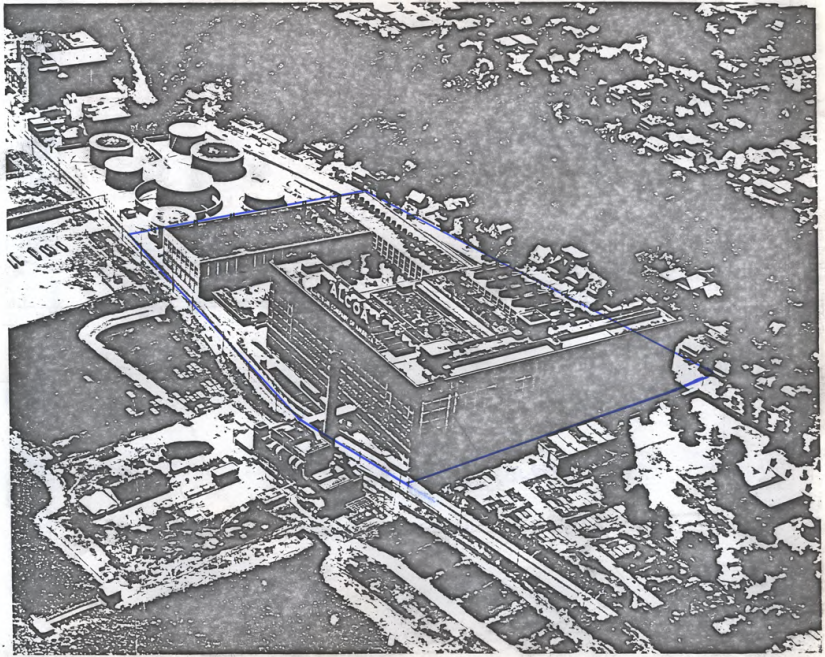
(photo)



Aerial View of Project
Looking Southwest from
Hudson River

Alcoa Edgewater Works
Edgewater
Bergen County
New Jersey 034

APR 19 1978

— BOUNDARY
NOMINATION