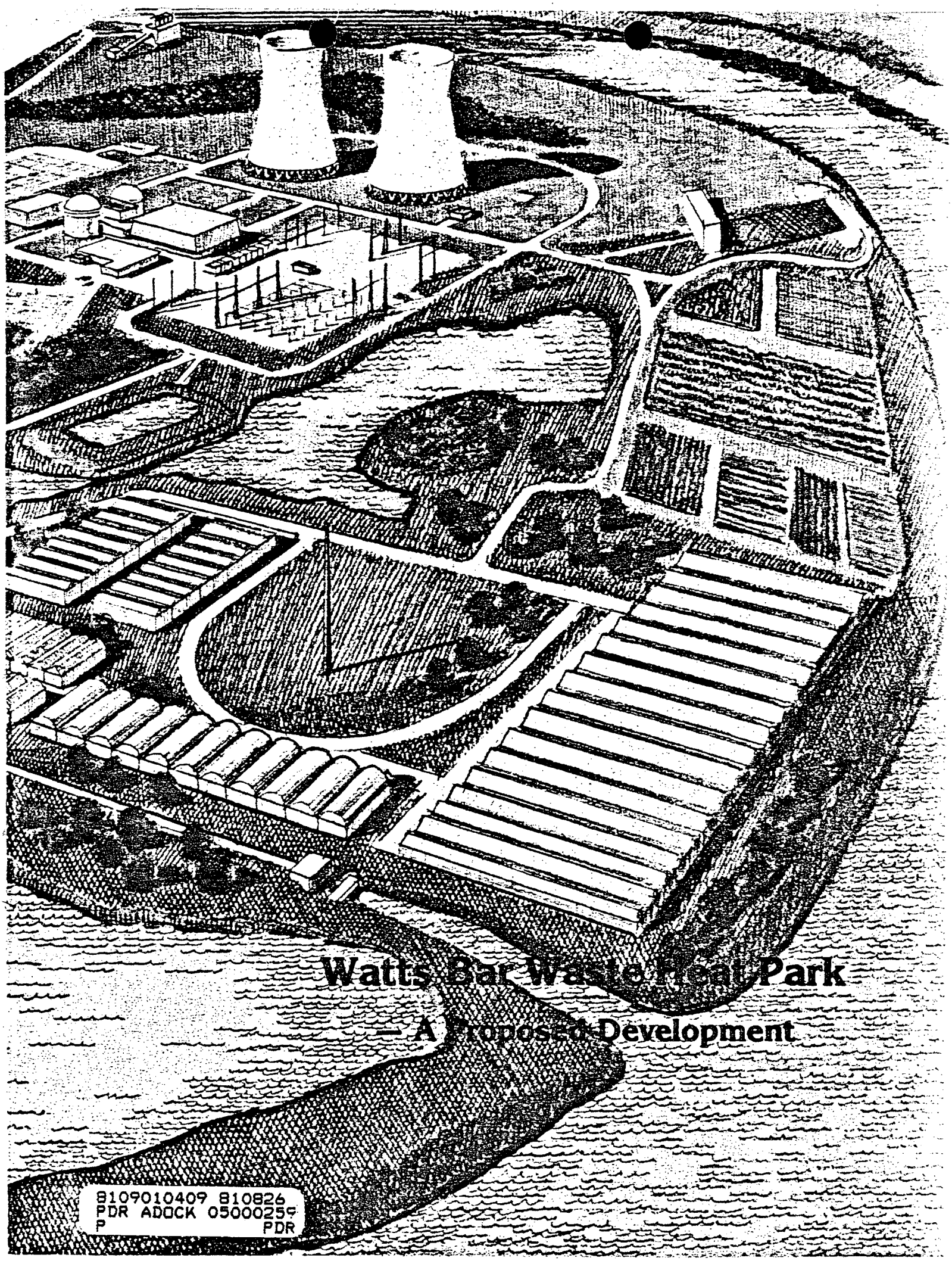

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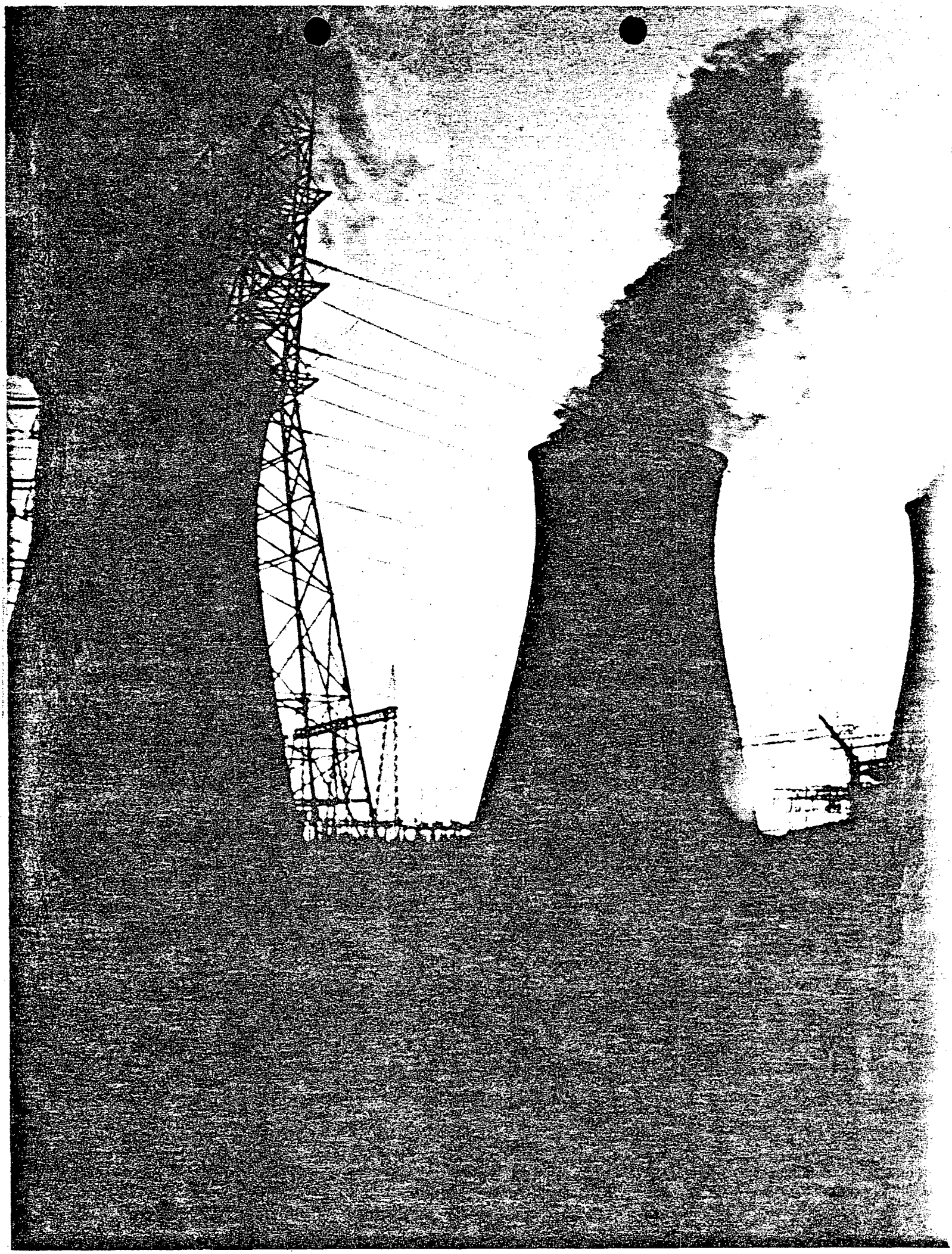
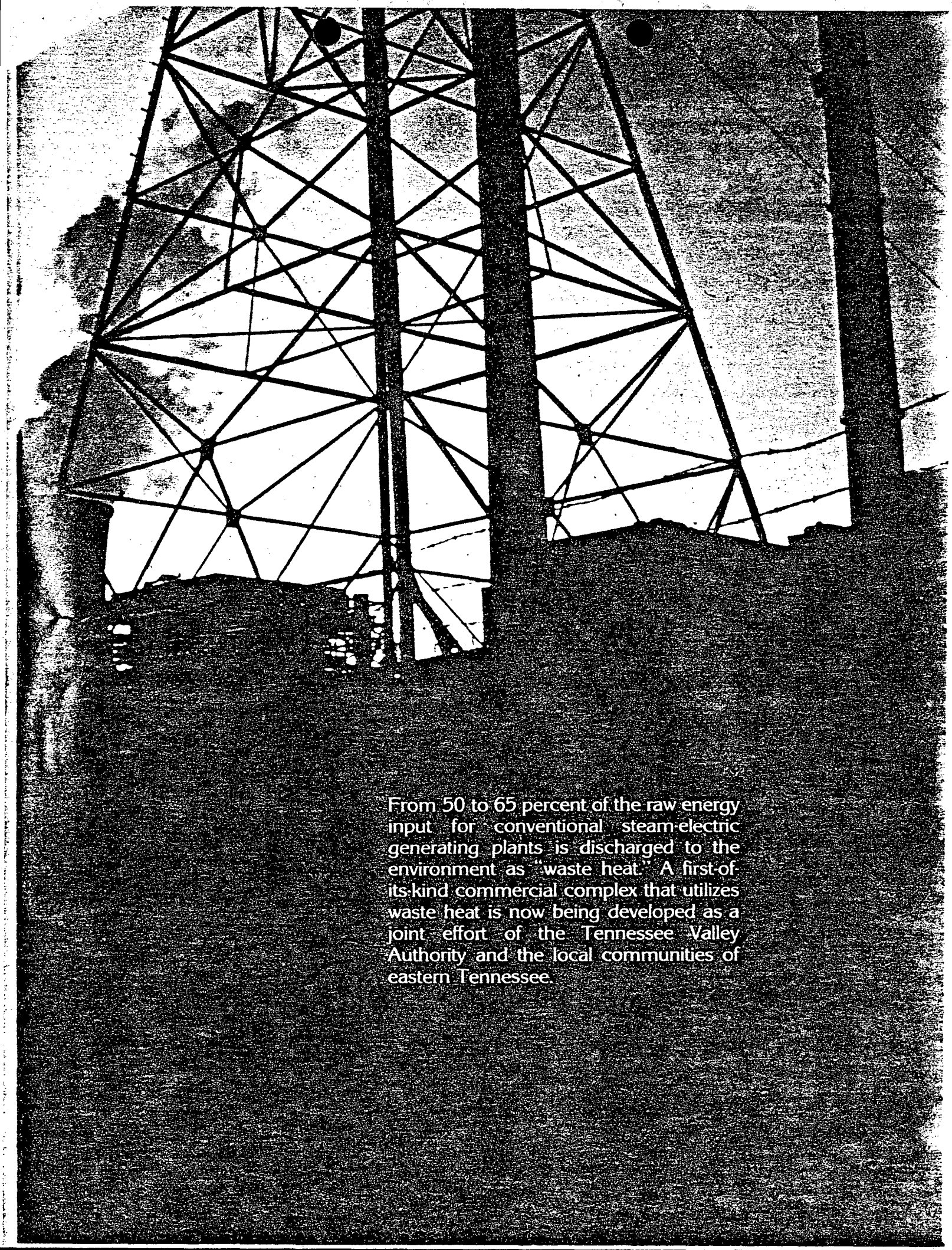




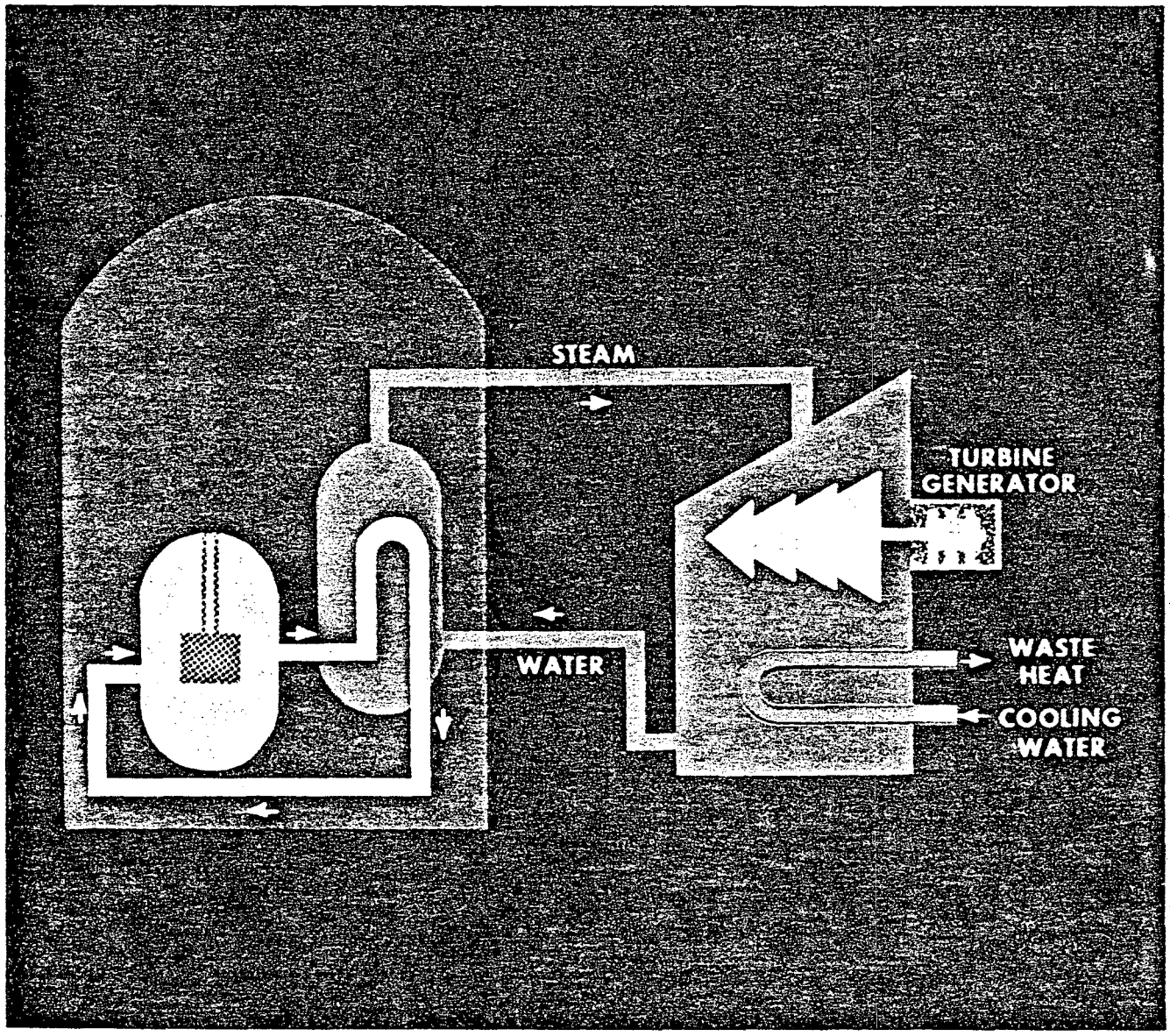
From 50 to 65 percent of the raw energy input for conventional steam-electric generating plants is discharged to the environment as "waste heat." A first-of-its-kind commercial complex that utilizes waste heat is now being developed as a joint effort of the Tennessee Valley Authority and the local communities of eastern Tennessee.

WASTE HEAT TODAY

A steam power plant is a means for converting the potential chemical energy of raw fuel into electrical energy. In its simplest form such a plant consists of a steam generator and a turbine driving an electric generator. The efficiency of this simple system is increased by a condenser where steam is converted back to a liquid so it can be recycled to the boiler. However, even in the most efficient of modern power plants, over half of the energy contained in the fuel is carried away by the condenser cooling water, as a high volume, low grade waste heat.

Typically the waste heat energy is dissipated to the environment by returning the cooling water to its source - usually a river or impoundment - or by releasing its heat to the atmosphere with cooling towers.

Waste heat produced in the United States by power generating plants is equivalent to approximately 15 percent of all energy currently used in the U. S. If one-tenth of the nations waste heat were put to use, an energy equivalent savings of more than 250 million barrels of crude oil could be realized annually.



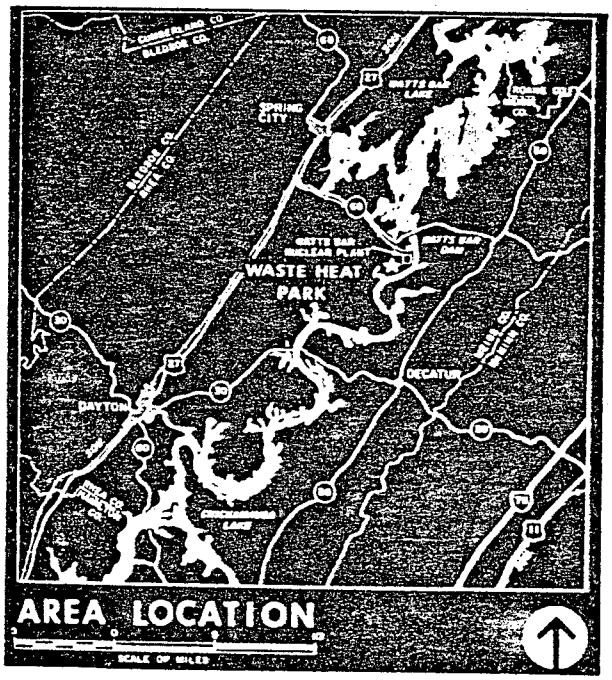
Watts Bar Nuclear Plant Steam Cycle Schematic

A large, well planned waste heat park provides an economy of scale which results in lower costs to individual users.

WHY WATTS BAR?

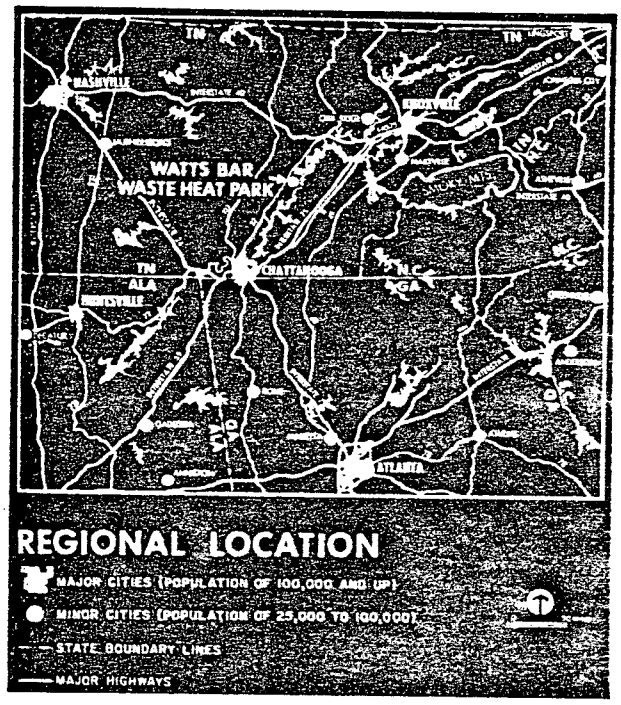
The Watts Bar Nuclear Plant, a two unit (1,270 Megawatts [MW] each) nuclear fueled steam-electric generating plant located near Spring City, Tennessee, was chosen as the first site for a waste heat park because of the following:

1. The completion of construction for plant start-up coincides with projected commercial waste heat utilization dates (early 1980's).
2. The temperatures available are among the highest in the TVA system (95° — 120°F).
3. The plant has easily accessible piping for tie-in and a reliable 100,000 gallons per minute (g.p.m.) flow of heated water.
4. There is prime land available adjacent to the plant site.



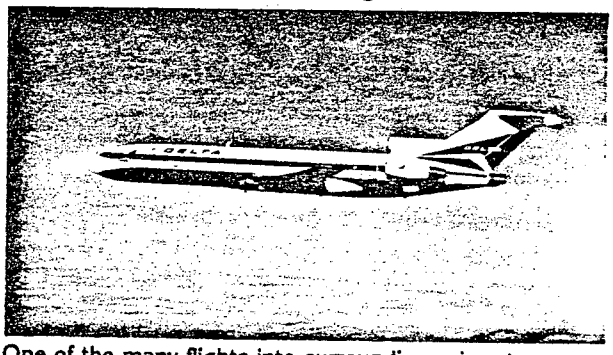
LOCATION

Surrounded by mountains, reservoirs, and major market centers, the site is located in the Great Valley of East Tennessee. Conveniently, the services and facilities provided by the metropolitan areas of Atlanta, Nashville, Knoxville, and Chattanooga are within a two-hour drive from Watts Bar.



TRANSPORTATION

The park is readily accessible to the interstate highway system and is tied-in directly to the national railway network. A waterway of the Interconnected Inland Waterway System runs adjacent to the park making barge transportation available. And likewise, commercial airports are suitably located nearby in Knoxville and Chattanooga.

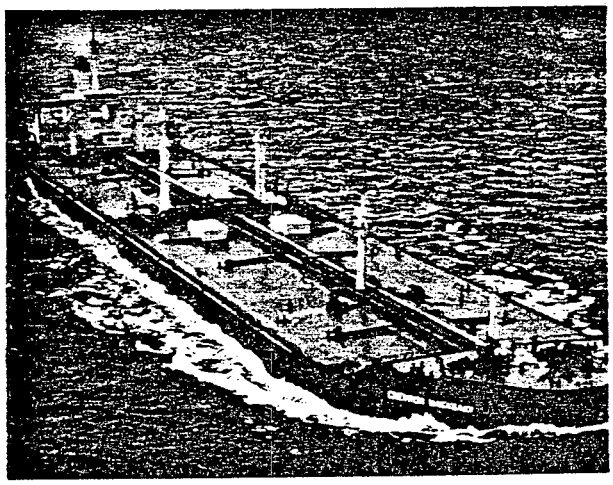


One of the many flights into surroundings airports

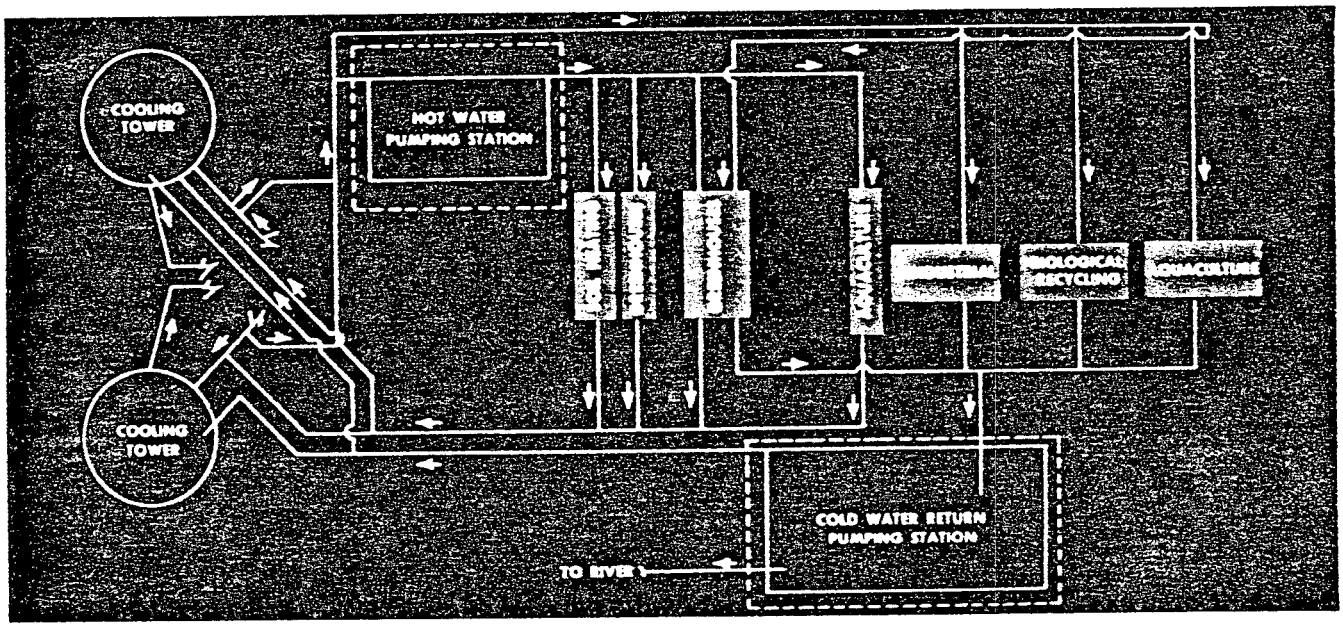
POPULATION AND LABOR

In this East Tennessee area of Rhea County and nearby Meigs County there

To achieve the national goal of cutting our dependence on foreign oil in half by the end of the next decade, both government and industry must search for ways to conserve all forms of fuel and energy. OPEC oil now costs the U. S. about $48 billion per year. Such massive exports of U. S. dollars result in inflation, a balance-of-trade deficit, dollar devaluation, and other economic concerns for the U. S. Therefore, conservation and increased efficiency in the use of existing energy resources are genuinely in the national interest. Consequently, utilization of waste heat would greatly conserve and improve the efficiency of existing energy resources.



Oil Tanker



Projected Waste Heat Utilization Schematic

WASTE HEAT TOMORROW

The development of waste heat utilization has reached the stage of being practical. Since the late 1960's, utilities, private enterprise, and government agencies have been involved in the development of waste heat utilization technologies. Recent feasibility studies, research and development projects as well as simulation models have addressed possibilities for incorporating waste heat uses with power plant operations. These studies indicate that waste heat utilization offers economic benefits for numerous industries.

NOW A WASTE HEAT PARK

This effort is focused on pursuing a balance of waste heat uses — including agricultural, aquacultural, and industrial applications — and developing power plant systems which will adequately handle large-scale complexes of users.

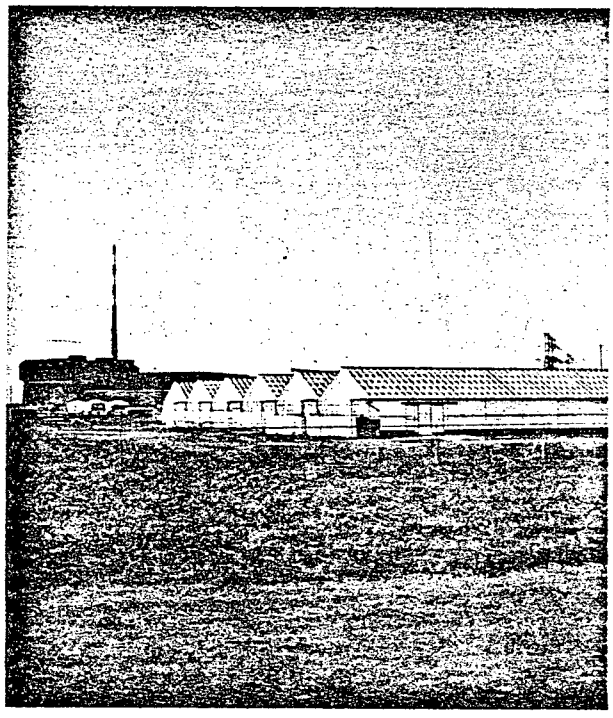
Multiple-use commercial "waste heat parks" offer a variety of advantages and applications. They provide the opportunity for waste heat to become a significant energy source, and integrate waste heat uses to achieve more efficient utilization of that source.

Architectural rendering of Watts Bar Waste Heat Park

Agricultural Uses

Control of greenhouse temperatures using power plant waste heat reduces production costs. Pilot and demonstration-scale projects have provided the technology for operating greenhouses using low-temperature waste heat systems.

In soil heating, waste heat serves as a production resource by extending the growing season and thereby increasing crop yields. Site development allows a subsurface network of heat exchangers for commercial-scale soil heating use.



Power plant waste heat greenhouse in operation at TVA's Brown's Ferry Nuclear Plant – Decatur, Alabama

are 28,300 people. Their labor force is principally engaged in manufacturing, services, and agriculture.

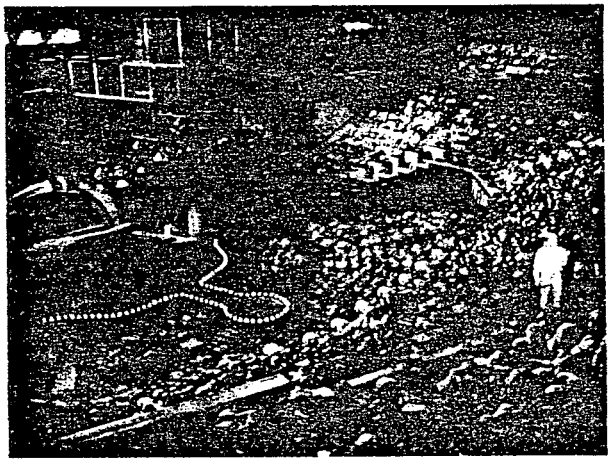
RECREATIONAL AND CULTURAL ATTRACTIONS

The park's employees and their families will find an endless variety of year-round recreational and cultural attractions in the region. Hiking, camping, and snow skiing are popular in the area while nearby reservoirs provide excellent opportunities for fishing, swimming, and boating.

View of the nearby Great Smoky Mountains National Park

There are many local points of interest including: The Great Smoky Mountains National Park, Oak Ridge National Laboratory, American Museum of Science and Energy and the Grand Ole Opry.

In addition to the University of Tennessee at Knoxville and at Chattanooga, there are many small colleges convenient to the area. Also available are numerous professional, technical, and trade schools.

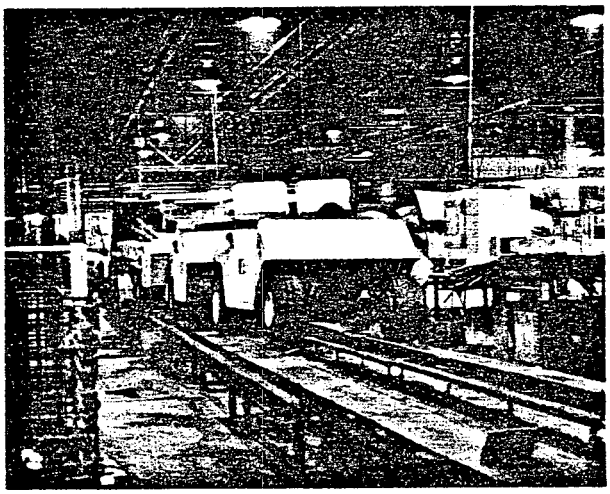


An evening at the Grand Ole Opry

These features, together with a low cost of living, southern hospitality, and an aesthetically pleasing environment provide an enjoyable life style.

INSIDE THE PARK

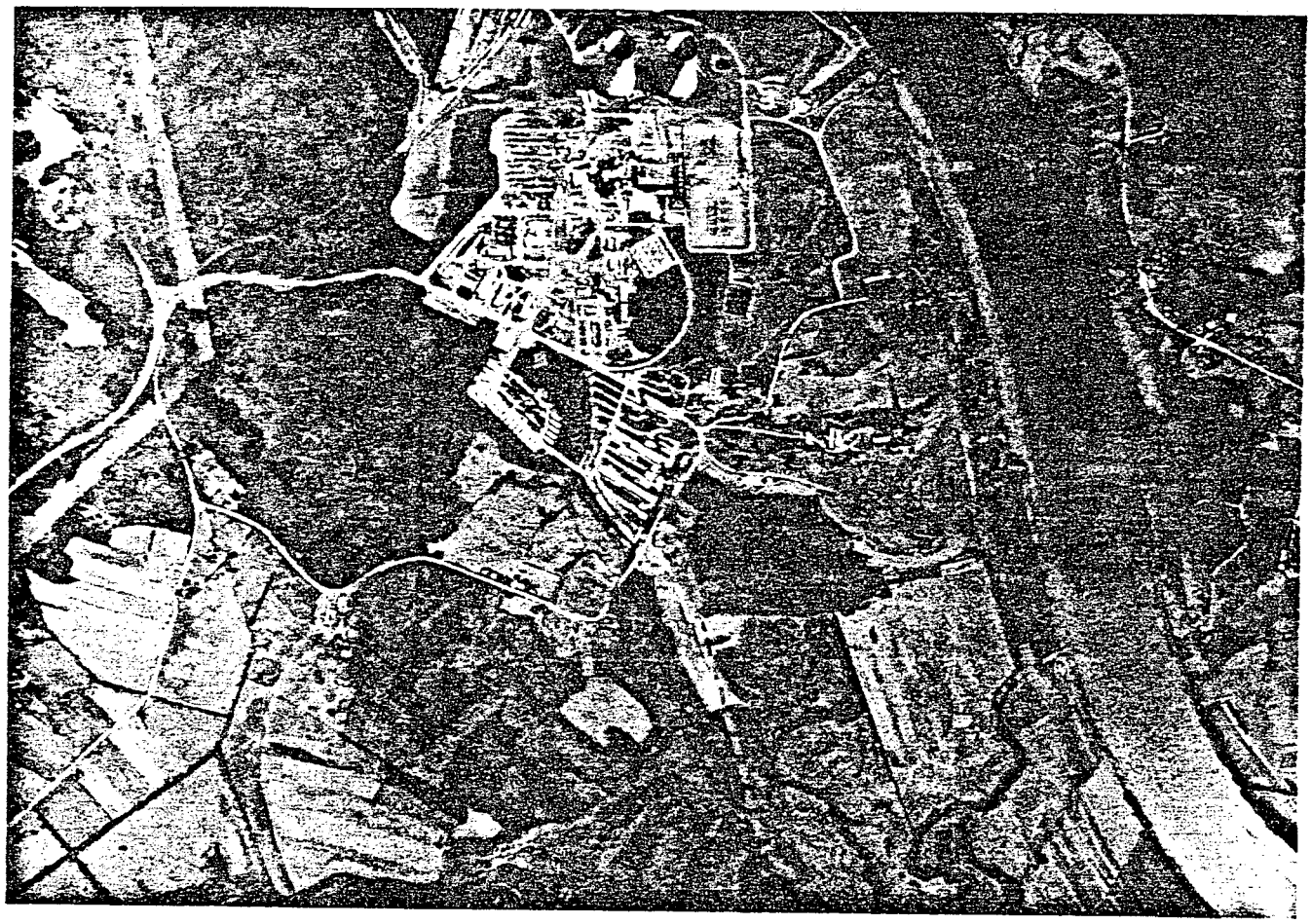
The initial phase of the park will make available several hundred acres of land for development that will incorporate the latest concepts in energy conservation and efficiency. Industrial, agricultural, aquacultural, and other types of facilities will occupy the park. Promising applications have been identified by research and development including greenhouses, soil heating, biological recycling, fish production, comfort conditioning of buildings, and process fluid heating. A description of these activities follows:



Possible industrial waste heat application

Industrial Uses

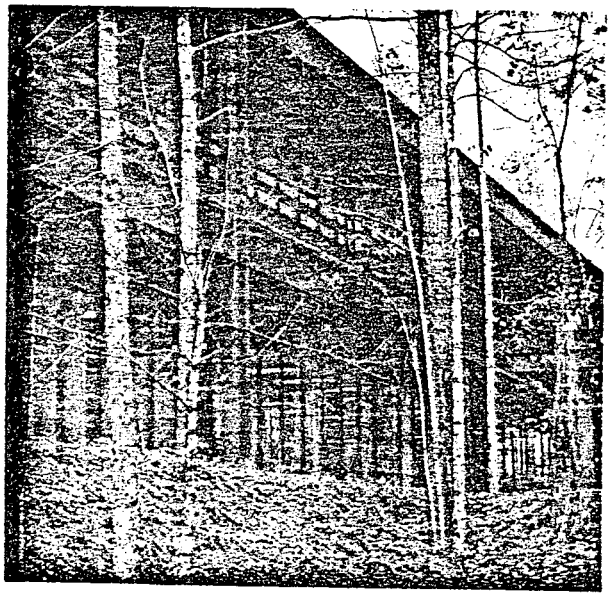
Preliminary studies are underway to identify industries that will find it advantageous to locate in the park. Companies will be able to use heated condenser water routed to the industrial sector of the park. Industrial candidates include manufacturers requiring process heat for boiling, sterilizing, drying, and evaporating.



Aerial view of Watts Bar — dotted line indicates park location

Other Uses

Heat exchange systems are available to provide comfort conditioning to any building. (Technical manuals describing these systems will be available from TVA.)

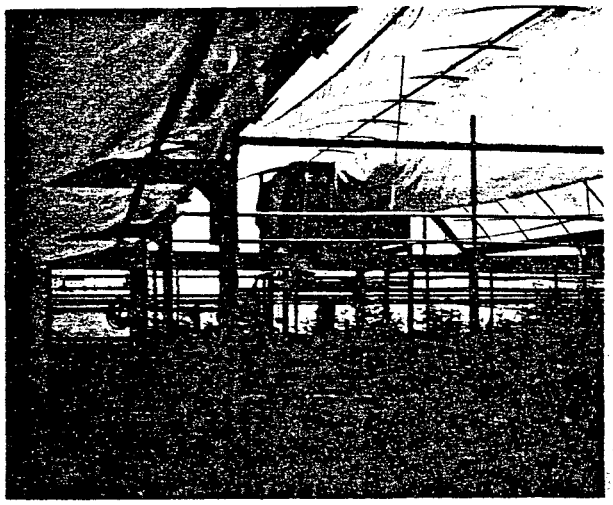


YOU AND WATTS BAR

In today's market, commercial and industrial investors will take advantage of opportunities to reduce operating and investment costs. In the Watts Bar Waste Heat Park, low-cost energy will be available. This, together with the opportunity for efficient development means that Watts Bar may be the answer to your company's location problems. If you are interested in receiving additional information, please fill out and return the attached business reply card or contact:

Watts Bar Waste Heat Park
Area Representative
Rhea County Courthouse
Dayton, TN 37321

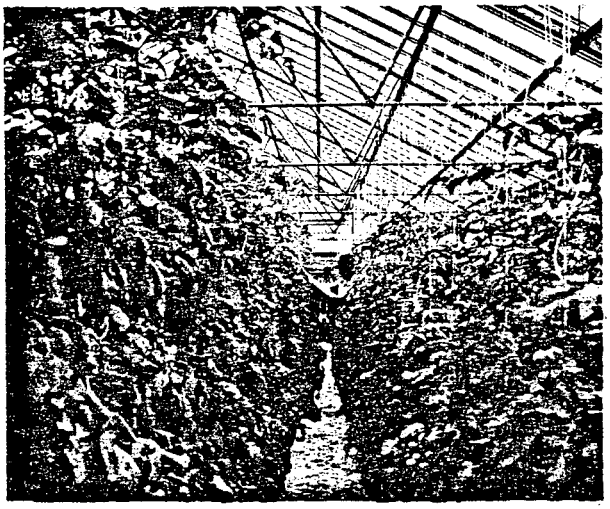
We welcome your inquiries. Why not contact us today?



— Minneapolis, Minnesota

— Muscle Shoals, Alabama

Heat exchangers extend the growing season of ornamentals such as roses (top) and poinsettias (center) as well as tomatoes (below) and other crops.



— Decatur, Alabama

Aquacultural Uses

Options for fish production facilities include commercial production of seed-stock and edible size fish as well as fish hatcheries. Extended growing seasons and favorable temperatures for growth are the advantages of waste heat to fish farming.

Waste heat in fish farming — Gallatin, Tennessee

By biologically recycling the waste runoff from livestock feedlots into fish lagoons warmed by waste heat, algal productivity and herbivorus fish productivity can be accelerated. Fish can be harvested and sold or recycled into livestock feed. In addition, fish wastes can be used to fertilize water-purifying crops.

Enhancement of algae growth with waste heat

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Information Request

I would like to know more about the use of waste heat from power plants as an energy source, and the proposed Watts Bar Waste Heat Park.

I would like more specific information in the following areas:
(Please specify):

_____

_____

_____

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Name _____

Affiliation _____ Phone _____

Mailing Address _____

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City _____ State _____ Zip _____

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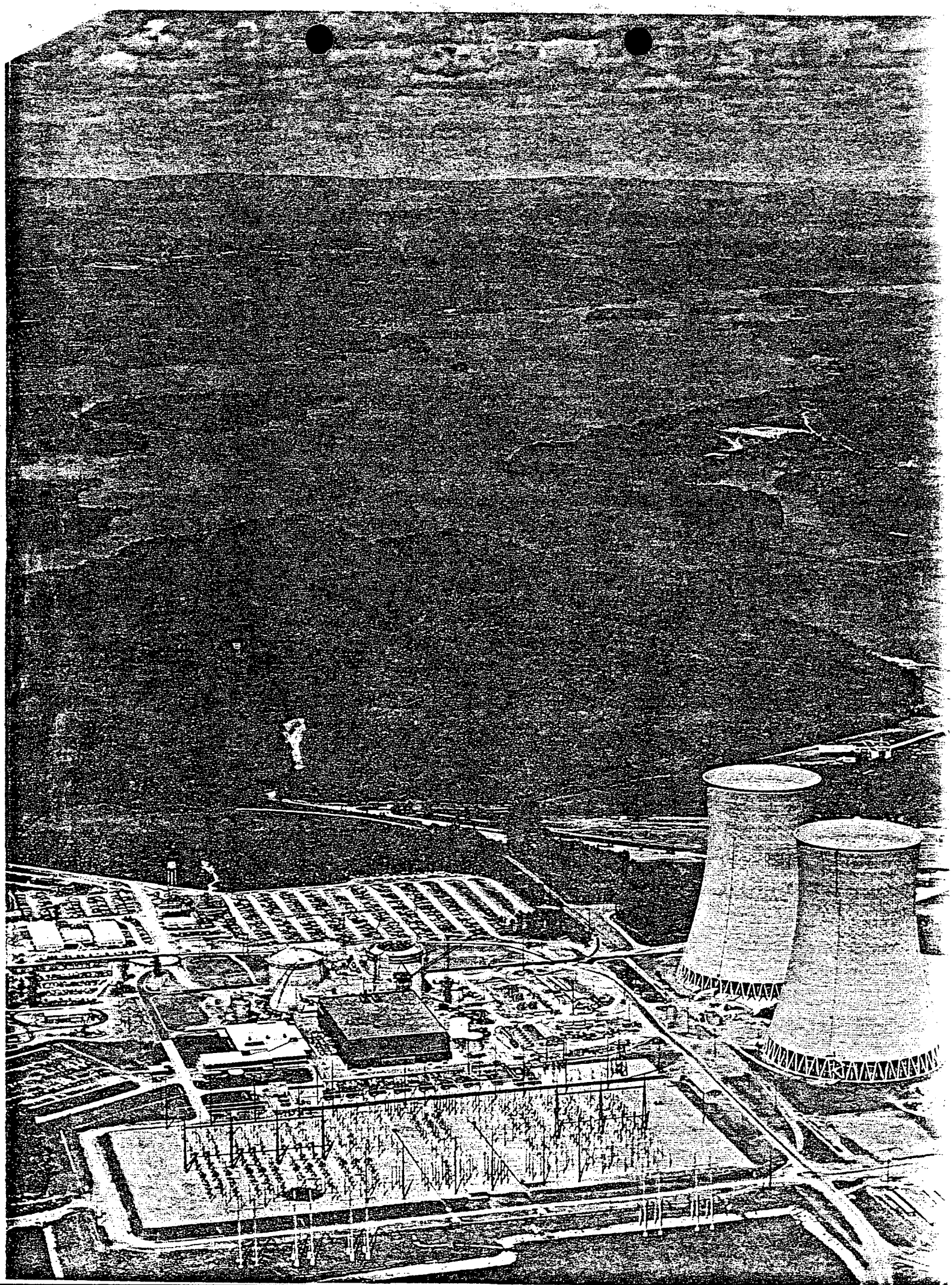

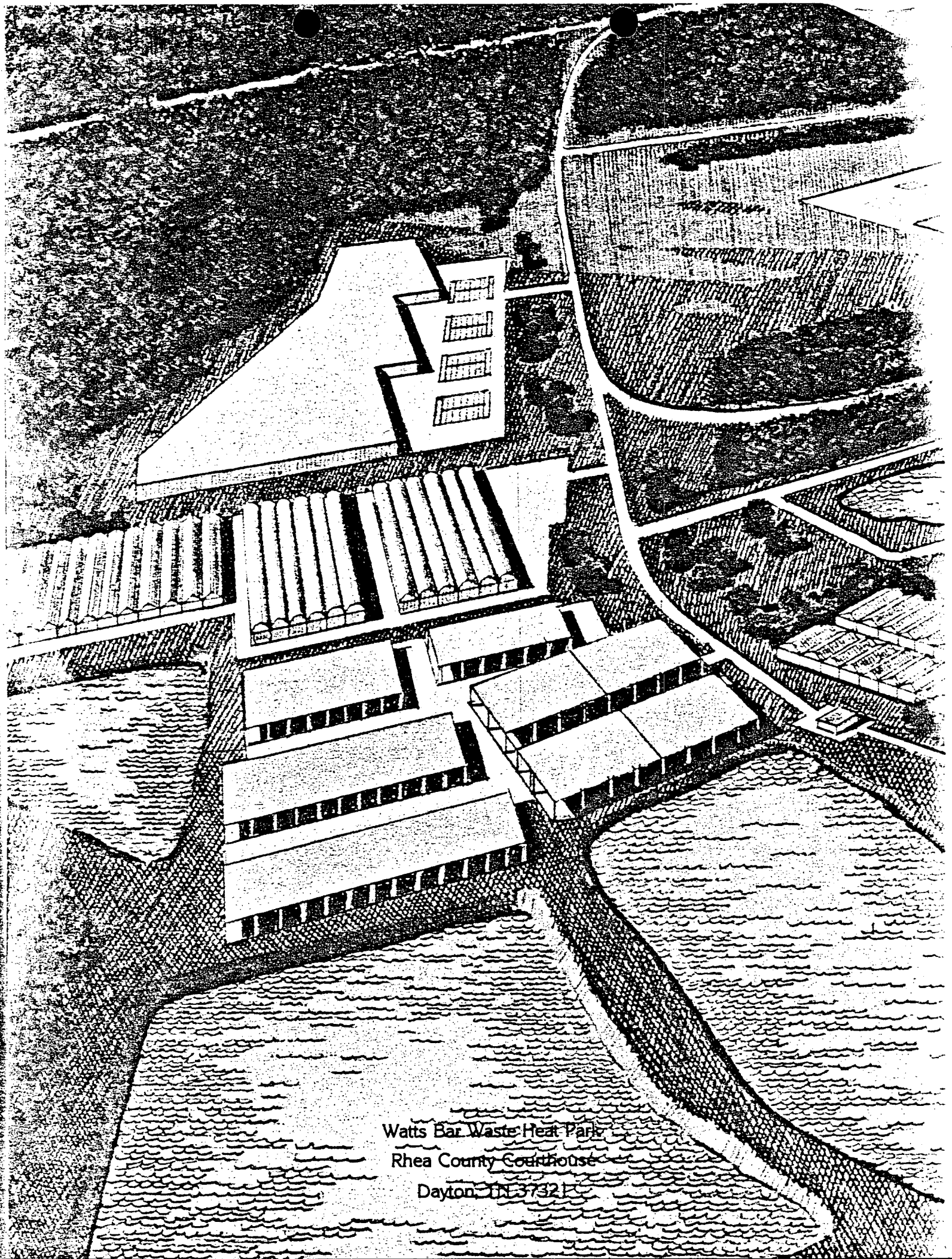
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