THREE MILE ISLAND

PEOPLE • POWER • PRIDE

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PEOPLE POWER • PRIDE

Thank you for investing your time to learn more about TMI, who we are, and how we generate electricity using nuclear fuel.

We want to share a story about how we've changed since 1979 when a nuclear accident at Three Mile Island made world headlines.

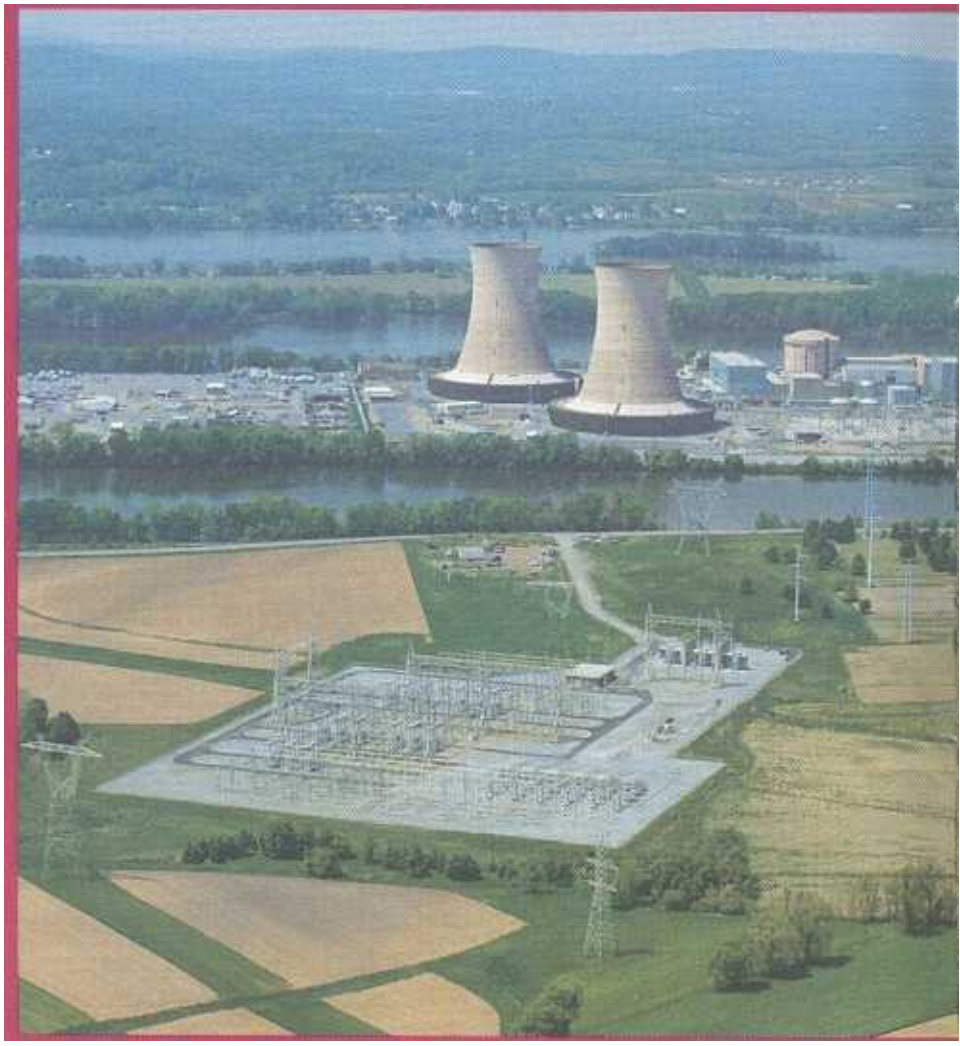
The lessons gained from years of studying what happened during the accident have made the nuclear industry safer, and we've worked hard to apply those lessons in the safe operation of TMI's other nuclear plant, TMI-1.

Nuclear energy is a vital part of the nation's energy supply because it offers an alternative to fossil fuels. Fossil fuels coal, oil and natural gas provide a finite source of power and will one day be exhausted. And while the sun and wind are seemingly endless sources of energy, technologies haven't yet been developed to make them able to meet the huge demand.

At TMI, we hope we're helping to renew faith in nuclear energy as a viable option by turning in strong safety performances year after year.

In the years since the accident, thousands of visitors have come to TMI seeking more information. Ours is an interesting business and people want to know more about it. This book touches on a number of the areas people have asked about over the last decade.


GPU
LESSON PLAN



THREE MILE ISLAND

You've probably heard a lot. about Three Mile island - about our people and our electric generating stations.

But now there's a new chapter in the Three Mile Island story.

One of our plants, TMI-1, is among the most efficient nuclear generating stations in the world, and has an outstanding record of operational safety and reliability.

You maybe wondering, `How can TMI be the home of a world leader in nuclear energy? Wasn't there an accident there in March 1979'?'

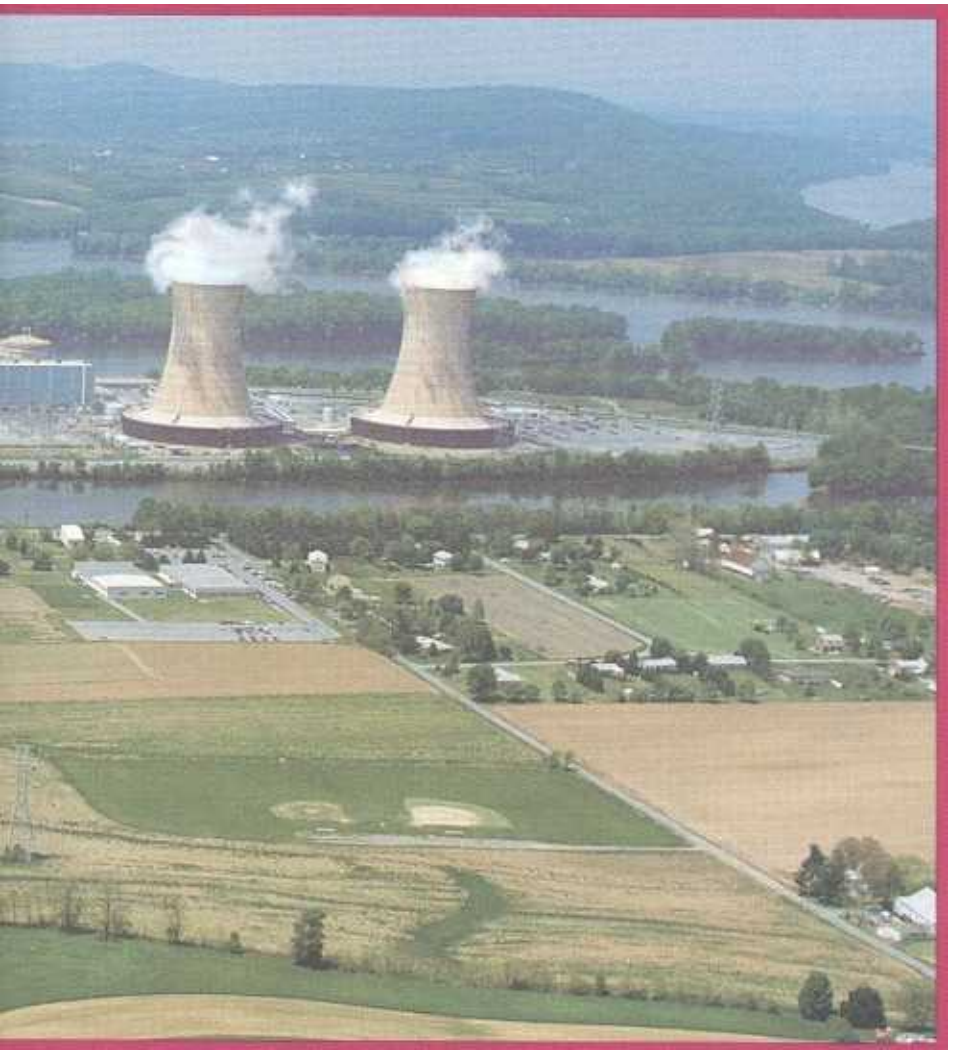
Well, Three Mile island is home to two generating stations TMI-1 and TMI-2. The accident was in the TMI-2 plant, which is now closed.

TMI-1 had logged. five years of successful, efficient operation before the accident at TMI-2. When the accident happened, TMI-1 was shut down for refueling and maintenance and was getting ready to start up again. The federal government ordered TMI-1 to remain shut down until the lessons of the accident were understood and applied.

MAJOR CHALLENGES CONFRONTED US

Before we would be permitted to operate TMI-1 again, we knew we had to regain the confidence and trust of federal, state and local officials, as well as of our neighbors.

In the six years TMI-1 was shut down, there were major changes in the training of operators, in maintenance programs, and in the plant's operating procedures. We, at TMI-1, all focused on one goal - operating a safe and reliable plant.



A NEW CHAPTER

Nuclear technology was being redefined, and we became its most dedicated and tireless students.

It was a matter of **people** doing what needed to be done.

It was a matter of producing safe, reliable **power.**

It became a matter of **pride.**

LET THE RECORD SHOW

In 1985, TNII-1 received permission to restart, and we pledged not only to operate the plant safely and efficiently but to make TMI-1 a leader in the industry.

We did that, and more, building an operating record that represents a standard of excellence for the nuclear industry.

- In 1989, the efficiency rating for TMI-1 topped every other nuclear plant in the world.
- In 1991, the plant achieved the longest continuous operating run of any nuclear plant in the world.
- Also in 1991, the NRC named TMI-1 one of the four safest nuclear plants in the country.
- From November 15, 1991 through September 10, 1993, the plant operated for 669 days out of a possible 674 days, shutting clown for only 111 hours.

More than numbers for a record hook, these accomplishments measure our commitment to safety and reliability.

This is a success story we're proud to share. But success doesn't come without a lot of hard work. We think you'll find it interesting to know more about the people who have been behind it all.

GUARDIANS OF TMI
SPECIAL BUT FAMILIAR

Operating a nuclear plant requires a lot from the people who have been entrusted with the job. But in many ways our jobs are similar to those you'd find in any small community.

We have our own cafeterias, our own gas pumps and auto repair shops, our own construction and snow removal equipment, a printing shop, a mailroom, a library, a weekly newspaper for employees, laundry facilities and even a sewage treatment system, with qualified sanitation engineers to run it.

There's a security force of officers trained and qualified under the same rigors as the state police. Several crews are trained and qualified as fire fighters, and they also help train local fire departments. There's a full medical staff to provide physicals for employees and respond to injuries or illnesses.

There are teachers and classrooms to train our work force, and other educators who go out to schools and local organizations teaching about electricity and nuclear power.

There are chemists, electricians, carpenters, data entry operators, computer programmers, mechanics, environmental scientists, and even a weatherman who keeps tabs on how weather

Welders, security officers and engineers are some of the familiar jobs at TMI.

patterns might affect the plant.

While much of this work is familiar, it still takes special people with special training to meet the high standards GPU Nuclear sets for its work force.

MEETING HIGH STANDARDS

Every one of us, before being hired, takes a psychological exam supervised by a psychologist, and undergoes a background investigation by the FBI. We must pass an annual test on plant safety regulations in order to maintain access to the site.

All of us, from our company president on down, are subject to random testing for drugs and alcohol, and risk losing our jobs for violations.

Employees are recruited locally and nationally. Our technical staff comes from top colleges and universities, as well as from the Navy Nuclear Program and other branches of the military.

Our company is firmly committed to diversity and seeks out men and women from all races and ethnic backgrounds.

The result is a group of about 900 men and women at TMI-1 who are as diverse as the jobs they perform. They bring many thousands of years of training and experience to the safe operation of the plant.

While we recruit exceptional people for even the traditional work, we also hire teams of specialists who concentrate on running and maintaining the plant, protecting the environment, communicating plant activities and preparing emergency procedures. These people are experts in their fields - first round draft picks, so to speak. They're people we're proud to have on our TMI team.

THE NUCLEAF PROFESSIONALS

Nuclear plant operators, engineers, chemists, and maintenance technicians are specialists who focus their efforts on keeping the plant operating safely and at peak performance.

Every day they must follow detailed operating guidelines that are approved and strictly enforced by the L . S. Nuclear Regulatory Commission (NRC).

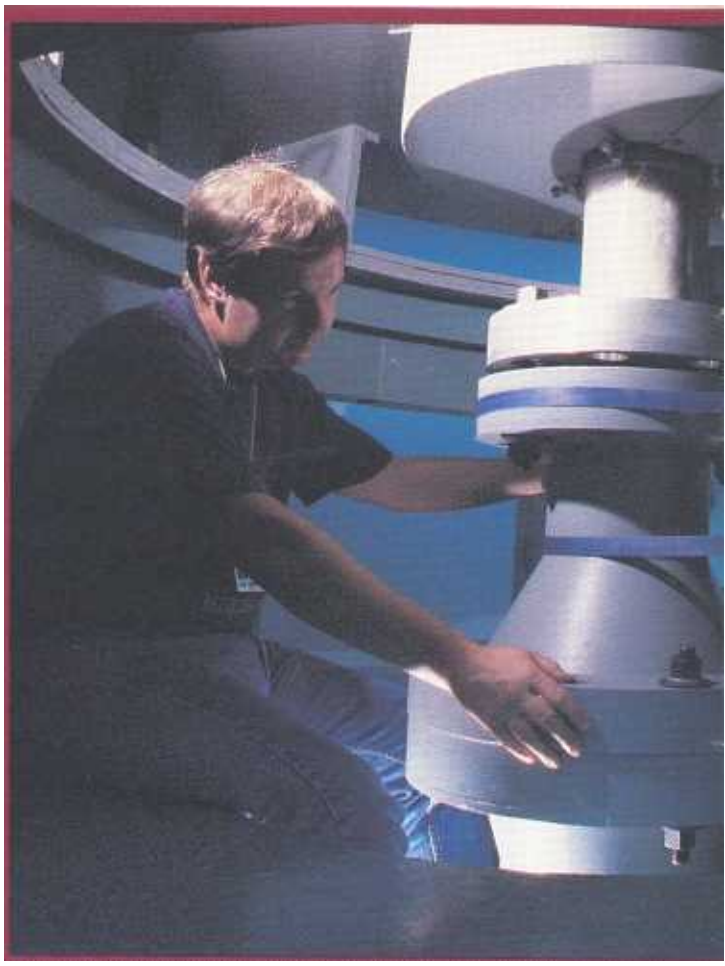
Operators monitor the plant's performance from the control room, where sophisticated instruments and computers log second-by-second changes in temperatures, pump speeds, water flow, and other conditions in the plant.

The operators talk by radio to a team of auxiliary operators who are out in the plant recording their visual inspections of equipment. This goes on 24 hours a day, seven days a week. Senior officials are notified any time of the day or night if an unusual operating condition arises.

Our TMI-1 engineers, like many doctors, are specialists in a variety of areas. Some are assigned to carefully monitor plant equipment and systems, prescribing routine tests and periodic maintenance to keep them in top operating condition.

Other engineers analyze the performance of the plant, looking for ways to improve efficiency in each component.

"Core engineers," for example, design special patterns for arranging nuclear fuel in the reactor for optimum performance.



Specialists in other support groups also help carry out the commitment to safety and excellence.

Quality Assurance inspectors ensure materials and parts meet the strict standards required. They check maintenance and other work in progress to make sure each step of the work and all guidelines are followed to the letter.

Our environmental scientists monitor conditions in the nearby Susquehanna River, and. they sample and analyze air, crops and milk from local farms to ensure there's no impact from the plant.

One department is dedicated to preparing our work force for emergencies. Emergency planners provide training and drills to test readiness. They also train community organizations and volunteers to handle emergencies in their communities.

A full-time staff of professional communicators maintains close contact with, and provides accurate, timely information to the media, government officials, and community groups.

TMI's control room operators, left, spend one week out of six in training. Maintenance crews, center, train on a reactorcoolantpump model, and electrical maintenance crews, above, train in sophisticated classrooms.

TRAINING – OUR NEVER ENDING STORY

Training is part of the job for everyone at TMI. There is more training for control room operators than any other plant occupation. Operators spend one week of every six learning in the classroom or working through abnormal operating conditions in the full-scale, computerized replica simulator.

The simulator is an exact model of the plant's control room. Veiy powerful computers enable the simulated control room instruments to respond just as they would if the plant was connected to them. This realistic practice is similar to the simulator training airplane pilots receive.

Each year, our operators undergo an exam given by the company with NRC oversight. Operators are tested by the NRC every sixth year. Very few professions require passing an annual exam to maintain a certification.

Auxiliary operators, radiological controls technicians, chemists and many support staff also spend one of every six weeks in training. Special training also is required for security officers and others with unique skills.

Beyond the training offered to enhance occupational skills, coaching is offered in teamwork and leadership, the Edwards Deming principles on quality, process re-engineering techniques and other professional skills improvement programs.

BRINGING REWARDS TO OUR CUSTOMERS

TMI-1's performance has been cited by Metropolitan Edison as one of the main reasons for lowering customers' electric bills. But that's not the only contribution we make to the community. An equally important, if less obvious one, is the contribution of our community volunteers.

WORK IN THE COMMUNITY IS REWARDING

Although we at TMI-1, as at any business, measure success by how safe, productive and cost effective we are being good neighbors also is very important to us.

We are encouraged to volunteer our skills and energy in the community. On our own and through professional relationships, we have developed extensive connections with schools, emergency response organizations, public agencies, local and national charities, service organizations and. businesses in the community.

A Quality Assurance inspector, who lost an arm in an industrial accident before beginning his career at TMI, devotes much of his personal time to people who are physically challenged. His favorite outing with them is to the ski slopes, where he dresses up as Confidence Bear to encourage disabled people to try skiing.

Disadvantaged, Spanish-speaking children in the Harrisburg area have a friend in a TMI Radiological Controls Manager who tutors and coaches them to excel in school.

For more than eight years a TMI Emergency Planner has been providing local residents free Red Cross classes in First Aid and Cardiopulmonary Resuscitation (CPR).

Volunteerism and community outreach programs take man yforms: (from left) emergency medicine, education, scouting and firefghting.

Under a school outreach program, TMI employees are being paired with students in two local school districts for academic tutoring and mentoring. We are helping students to gain self-confidence and to prepare for future careers.

GPU Nuclear also provides funding and training to local organizations that respond to emergencies such as fires, hurricanes, train derailments, floods, tornadoes, hazardous material spills or an incident at TMI. Local ambulance crews found a new group of responders joining their rosters, thanks to TMI-sponsored, state-certified Emergency Medical Technician training courses.

RECOGNIZING OUR UNSUNG HEROES

As employee volunteers, we are recognized for our unpaid community service at a company luncheon each year. A committee of other employees selects the three most outstanding volunteers, who are rewarded with financial donations to their non-profit organizations. This program called RECEV (Recognizing Employee Community Efforts in Volunteerism) — became a model for other area businesses that want to recognize their employees' volunteer work.

We are proud of our employee volunteers.

OURS IS A "POWER-FULL" BUSINESS

When electric power lines serving your neighborhood are knocked out in a storm, your house can go dark until repair crews arrive. But when a giant electrical generating station shuts down, the lights don't even flicker.

You're not likely to notice any effect from a plant shutdown because electric companies across the country created a network of "power pools" to back each other up and provide reliable service in times of shortages or emergencies.

Three Mile island is part of one such "power pool," called the PJM Interconnection. It is a large distribution center that manages electricity for Pennsylvania, New Jersey, Maryland, Delaware and the District of Columbia.

As electricity leaves TMI, it flows like a river into the huge PJM pool. At full power, TMI-1 is one of the largest suppliers to the "pool," contributing more than 870 million watts of electricity. That's enough to supply 10 cities the size of Harrisburg, Pa. with electricity.

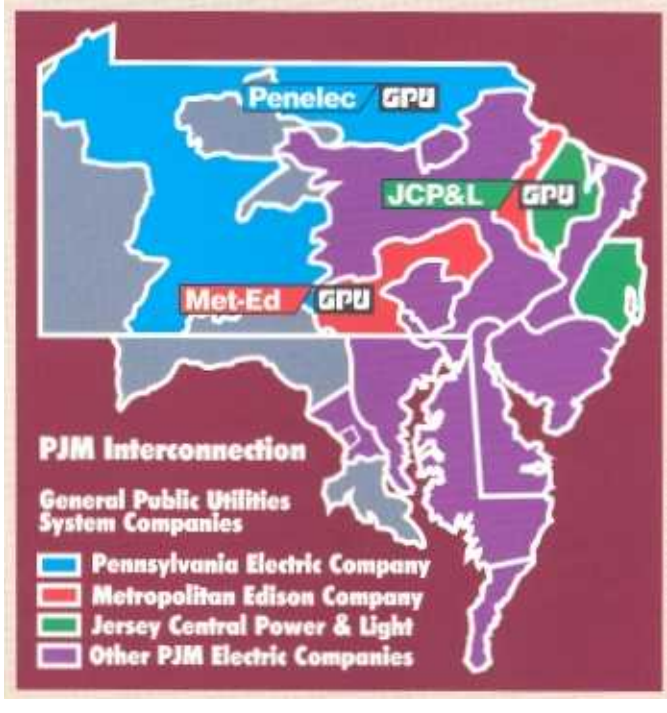
SENDING THE POWER WNERE IT'S NEEDED

Dispatchers operating the PJM command center near Philadelphia direct the power from TMI-1 and other plants to where it's needed, using the least expensive energy first to meet the day's demand. Plant owners get credit for sending the least expensive power to the pool, and in turn, pass the savings on to their customers.

When air conditioners drive up demand on a hot summer day, dispatchers may ask utilities to start up their more expensive plants to get more electricity into the pool.

Not counting the small amounts of electricity from hydroelectric plants, TMI-1 produces the lowest cost power of any of the 25 plants owned by General Public Utilities (GPU), the parent company of three utilities: Metropolitan Edison Company (Met-Ed) in Reading, PA; Pennsylvania Electric Company (Penelec) injohnstown, PA; and Jersey Central Power & Light Company in Morristown, NJ. These three companies share ownership in TMI-1 and all benefit from the power it produces.

Because of its low-cost power, the PJM expects TMI-1 to operate at full power, 24 hours a day, 365 days a year, until TMI-1 shuts down for maintenance and refueling, which is about every two years.



GPU line crews keep power flowing for homes, businesses and recreation. The York Fair is pictured above.

INFREQUENT, BRIEF PIT STOPS CALLED

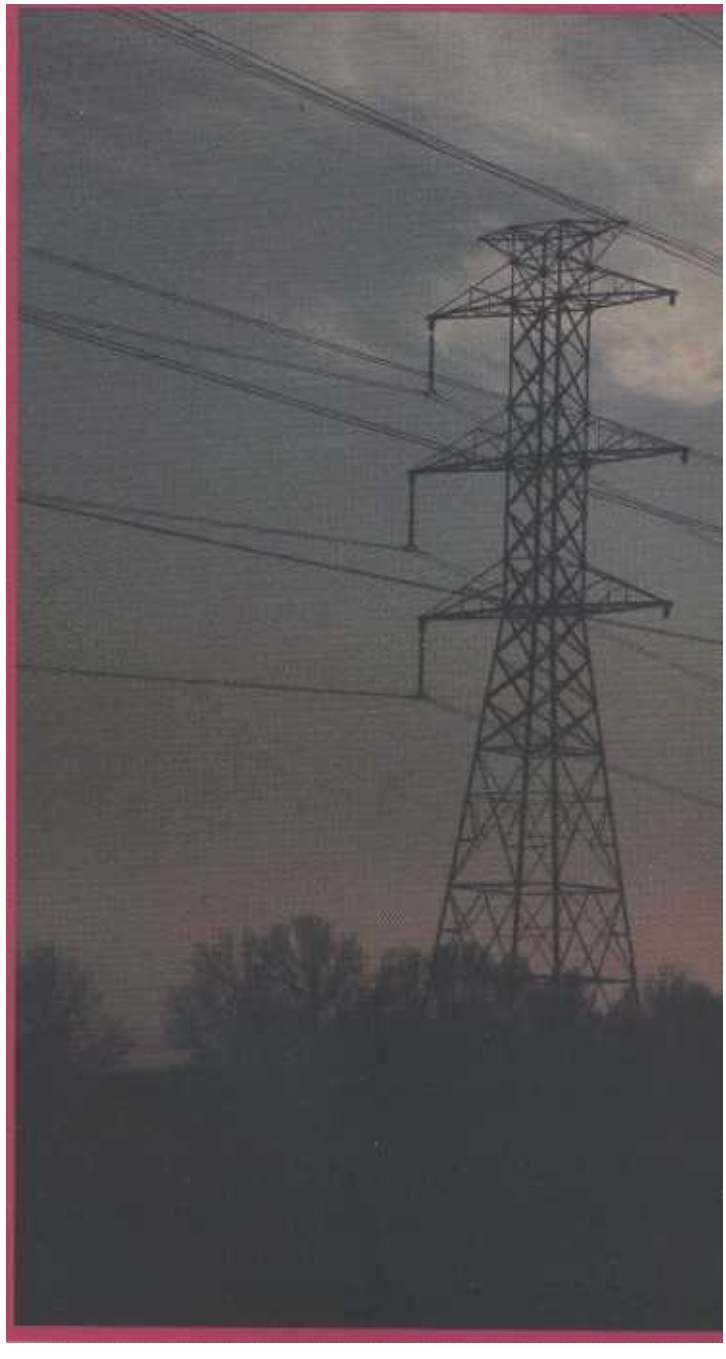
OUTAGES

When the plant shuts down for a refueling outage or tune-up work believe it or not - that's our busiest time,

The regular plant staff works extra hours and hundreds of contractors are hired. In a recent outage, 2,100 workers (900 employees and 1,200 contractors) completed 213,000 hours of work.

The people working at TMI know how important electricity is to our lives, and consider it a matter of pride to get the plant up and running as soon as possible - to resume making electric power.

TMI employees monitor the operation of our turbine generator which contains the giant turbine blades pictured above.



How Do WE MAKE ELECTRICITY.

Nuclear energy technology - harnessing energy from uranium atoms to produce electricity - is a complex, demanding technology. But to understand how it works, first consider these basics that apply to power plants:

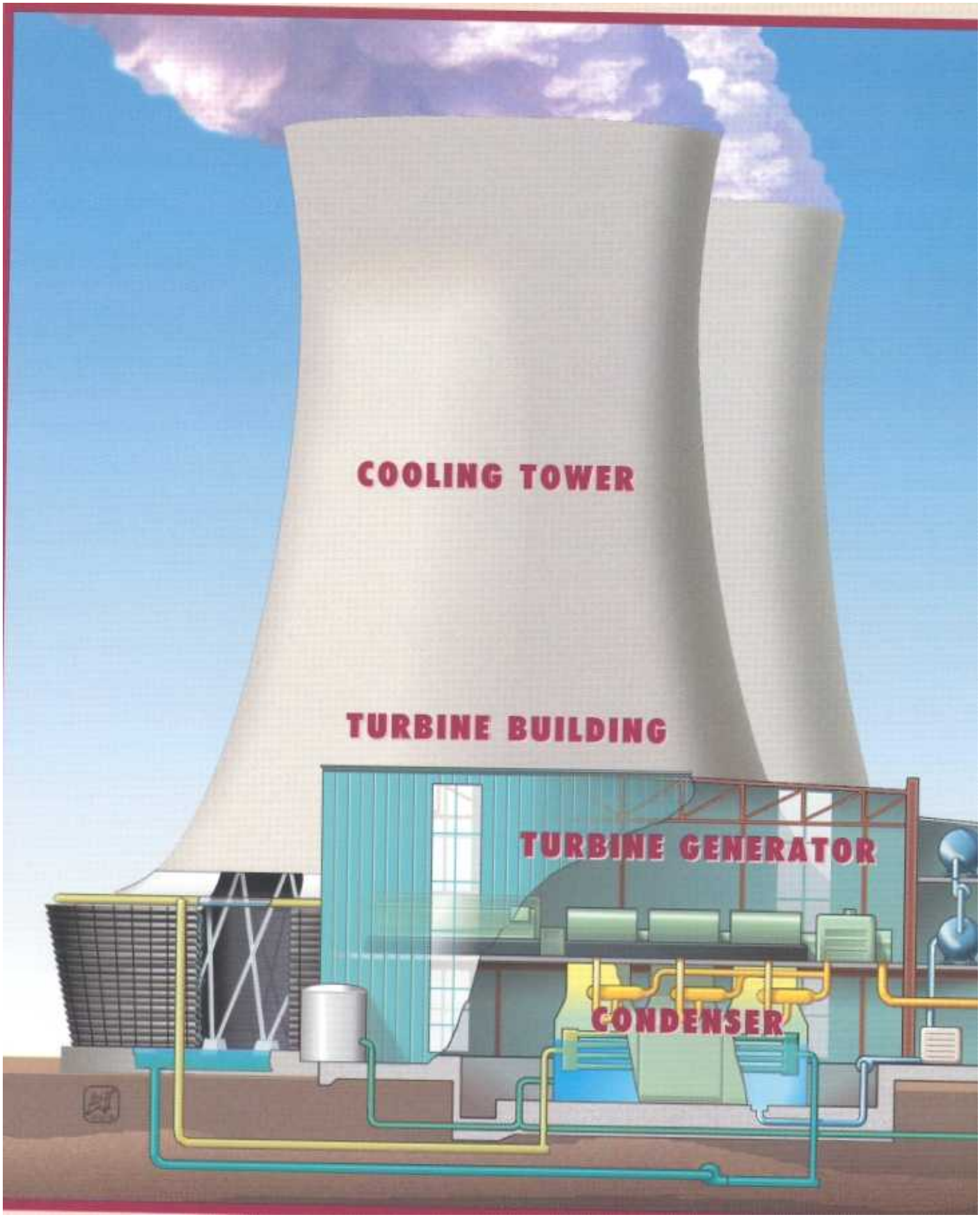
In some plants that produce electricity, a fuel, such as coal, oil or natural gas, is burned to make heat for a boiler that changes thousands of gallons of water per minute into steam.

The volume of steam, with its tremendous force, races through pipes to huge turbines. The turbines, each the size of a double-wide mobile home, contain giant fan blades that spin as the steam hits them. The spinning blades turn a huge

shaft connected to a generator.

Magnets inside the spinning generator create positive and negative forces; and copper coils convert the forces to electricity. The electricity travels on wires from the generator to huge transformers that boost it off to the regional power grid (the PJM discussed on the previous page).

After the steam has traveled through the turbines, it must be turned back into water. The steam is drawn from the turbine into a condenser, flowing over tubes filled with cold water. As the steam hits the surface of the cold tubes, it condenses back to water to be returned to the boiler for more heat, repeating the whole process.


COOLING TOWER
TURBINE BUILDING
TURBINE GENERATOR
CONDENSER

Electricity is made the same way in a nuclear power plant as it is in any other plant except for how the heat is produced.

In a nuclear plant, heat is created in a "reactor."

The reactor uses enriched uranium fuel that is packaged into thumbnail-size pellets. The pellets are loaded into long slender rods about 12 feet tall and grouped. into bundles called "fuel assemblies." There are 177 fuel assemblies in the TMI-1 reactor.

In a reactor, heat is released when atoms of uranium are struck by tiny particles called neutrons. This process, called fission, results in uranium atoms releasing great amounts of heat. But there aren't any flames or burning. In fact, when the fuel is used up, the fuel assembly looks the same as before, except that it is highly radioactive. TMII-1 depletes only nine pounds of uranium a day.

Water that's heated in the reactor is kept separate from water that's converted to steam. The heat merely passes from one system of water to the other through metal tubes, like the principle behind a car radiator. The water systems remain separate. That's how radiation is contained within the reactor and auxiliary buildings.

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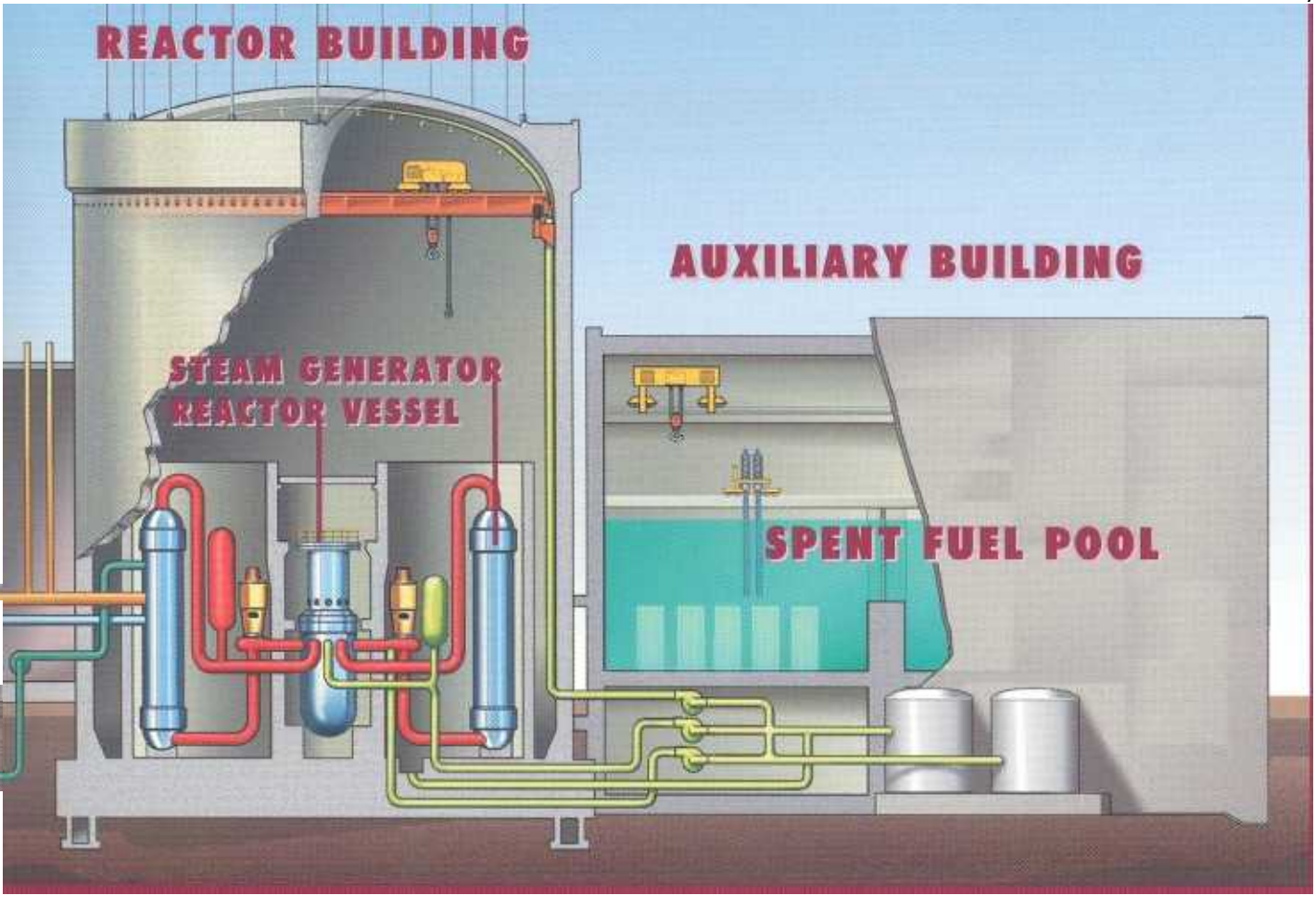
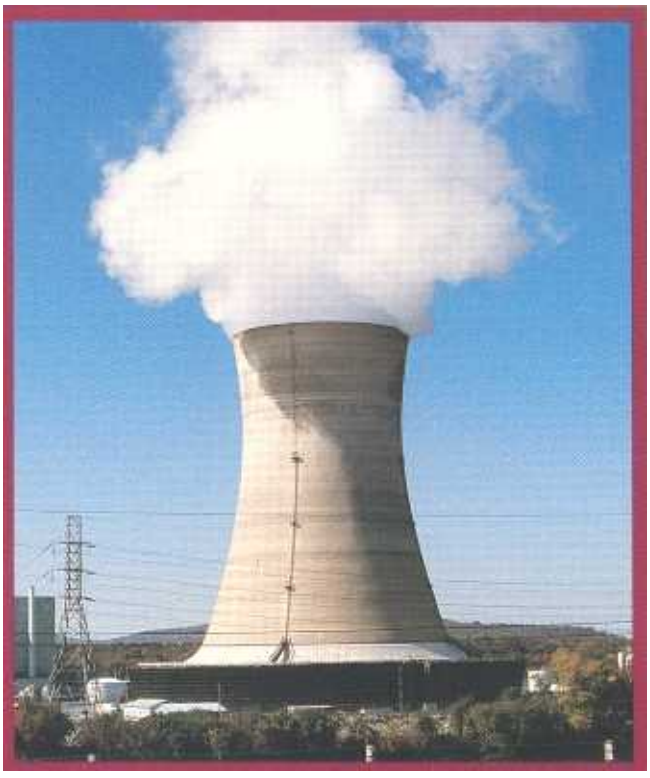




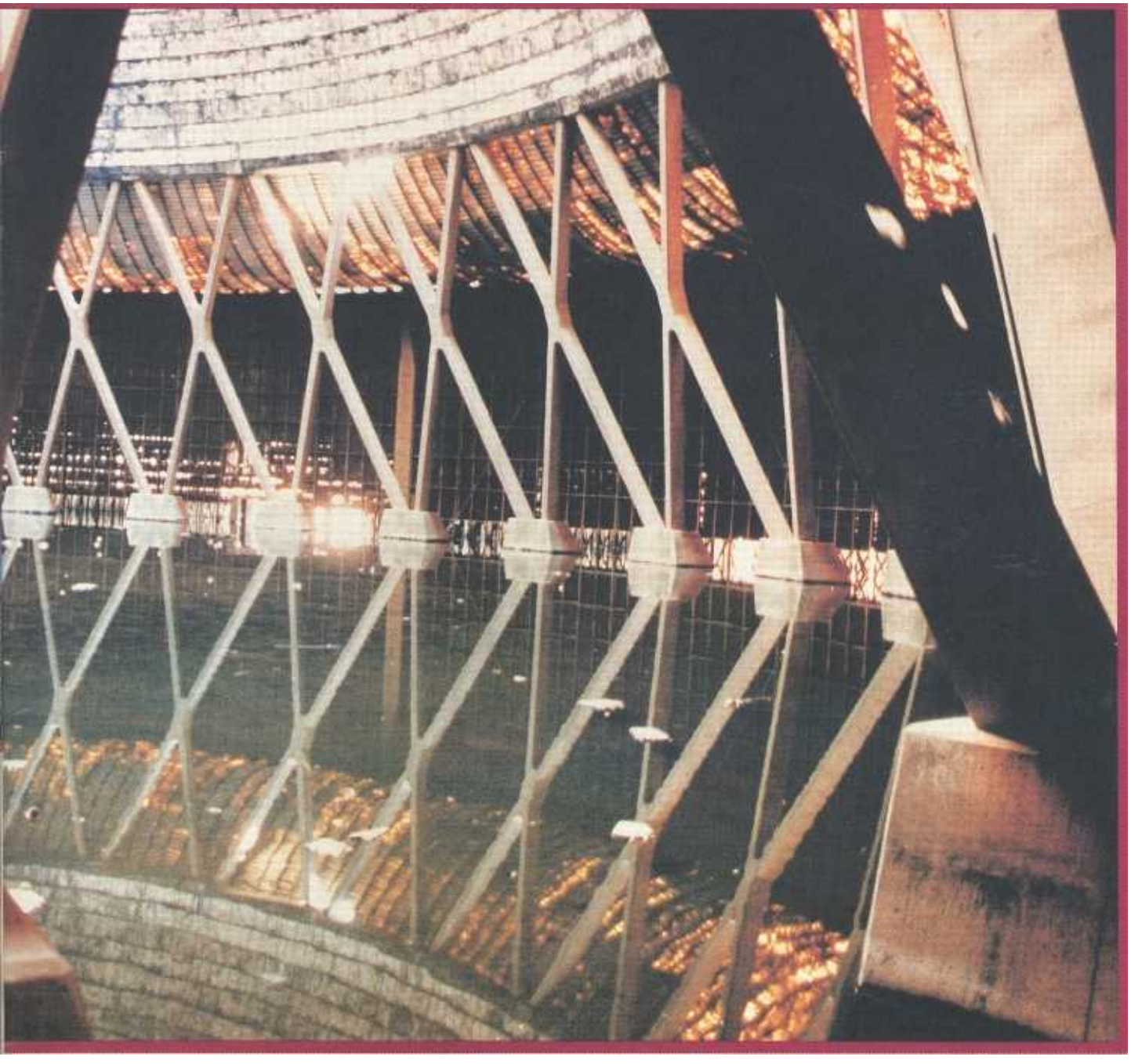
Inside TMI's landmark cooling towers is nothing but water, from the Susquehanna River.

THE MISUNDERSTOOD COMPONENT

Notice that TMI's famous 372-foot-high cooling towers have not been mentioned yet. That's because they don't play a direct role in making electricity.

Remember how cold water flows inside tubes in the condenser to change steam back into water. That water comes from the Susquehanna River. The steam slightly heats the water and it must be cooled before being reused.

So, the water is pumped out to the cooling towers, and up to the top of wooden slats about 40 feet high. The water cascades down the slats, as the huge chimney-shaped towers draw in air to cool it. When the water reaches the bottom, it is cool and returns to the condenser to cool more steam.

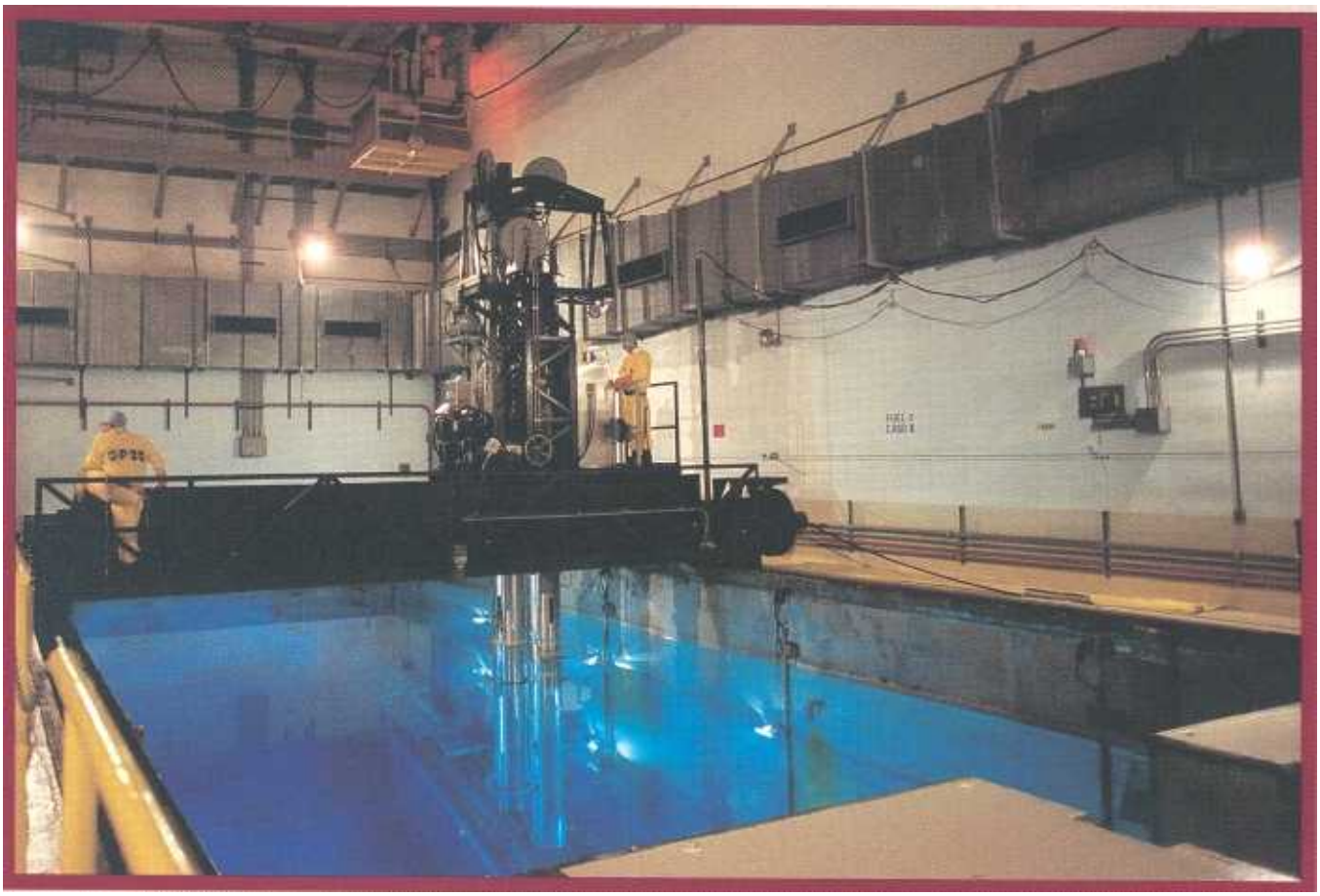


The air in the tower picks up some of the heat that was in the water. And when that air hits the top of the tower, the same effect occurs as when you breathe into the air on a winter day. It forms a cloud of water vapor, which many people mistake for smoke.

The job of the cooling tower is simply to cool warm water so that it can be reused. Lots of manufacturing plants, even some large hospitals, use cooling towers.

Cooling tower water is kept separate from the steam and from water flowing through the reactor. So the cooling towers are not a radiation area.

In fact, most of our work is done in non-radiological areas.



OUR WORK ENVIRONMENT

Guests at TMI's Visitors Center often ask, "What is it like to wear a yellow radiation suit at work everyday?"

Actually, very few people at TMI wear yellow protective clothing, because only workers who need to enter contaminated areas of the plant wear them. Contaminated areas are places in the plant where dust and particles have come in contact with radioactive material.

A worker's protective clothing is comparable to the "scrubs" and masks physicians wear into an operating room. Doctors are careful not to spread invisible germs from one place to another, or one patient to another. It's the same for invisible radioactive contamination.

Protective clothing keeps radioactive dust and particles from being carried to other non-radiological areas of the plant, and keeps them from a worker's skin.

The clothing is not a shield against radiation, only a protection against picking it up in the form of particles.

RADIATION IN A NUCLEAR PLANT AND EVERYWHERE EL

Radioactivity is a naturally occurring phenomenon. It is sometimes a by-product of producing electricity, performing medical treatments, and from some research and industrial processes.

The Earth is radioactive. Radioactivity is

Workers in some parts of TMI, such as the spent fuel pooh far left and the reactor building, above and right, must wear protective clothing to guard against contamination from radioactive materials.

generated by the sun. It's even part of the human body because we all have radioactive potassium in us. Less than 20 percent of radiation is man-made; nuclear power produces less than one tenth of one percent of the Earth's radiation.

Most people receive about 300 millirems of radiation exposure each year from natural sources. A millirem is a unit of exposure to radiation. If you fly across the country, you get about five millirems. For each chest X-ray you receive in a year, you get an additional 8 millirems. If you live in a brick house or smoke, you are exposing your body to more radiation. Special medical treatments can expose a patient to thousands of millirems of radiation in a concentrated spot on the body.

KEEPING EXPOSURES WITHIN LIMITS

The federal and state governments set exposure guidelines for nuclear plant workers, hospital technicians, dental lab assistants and anyone else who is exposed to radiation on the job: as much as 5,000 millirems over a year's time.

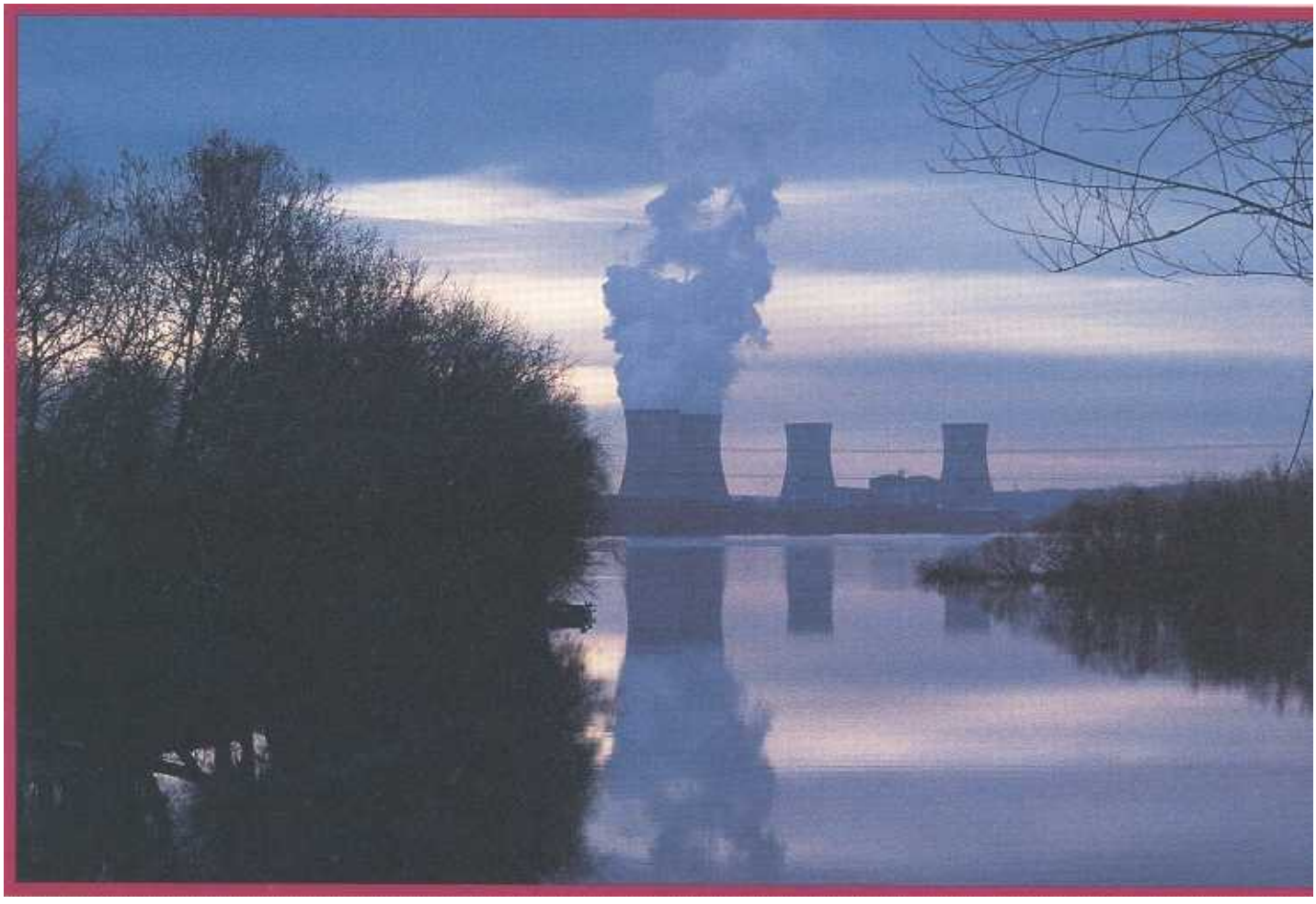
GPU Nuclear reduced the limit for its workers to 3,000 millirems during a work year. Our radiation exposure at TMI is very carefully monitored, recorded and reported to us regularly.

USING COMMON SENSE

In addition to careful monitoring, we use common sense to keep radiation exposure low. Think about how the x-ray technician at the dentist's office works. A lead blanket is placed on the patient and the assistant steps behind a wall. We practice similar principles.

Those careful practices and the attention of well-trained employees have kept TMI-1's worker radiation exposure far below federal limits.

We're careful to keep the by-products of our business away from ourselves, our neighbors and the environment.



TMI IS EASY ON THE ENVIRONMENT

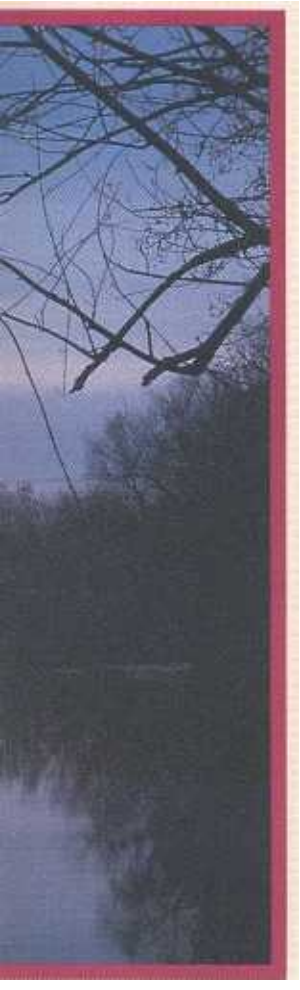
The environmental impact from TMI-1 is minimal. A very small amount of radioactive gas generated during normal operations is vented to the atmosphere, and traces of radiation just slightly higher than the naturally occurring radiation in water, are discharged to the river.

These releases are kept far below limits set by state and federal regulations - so low that they are often barely detectable on the most sensitive instruments.

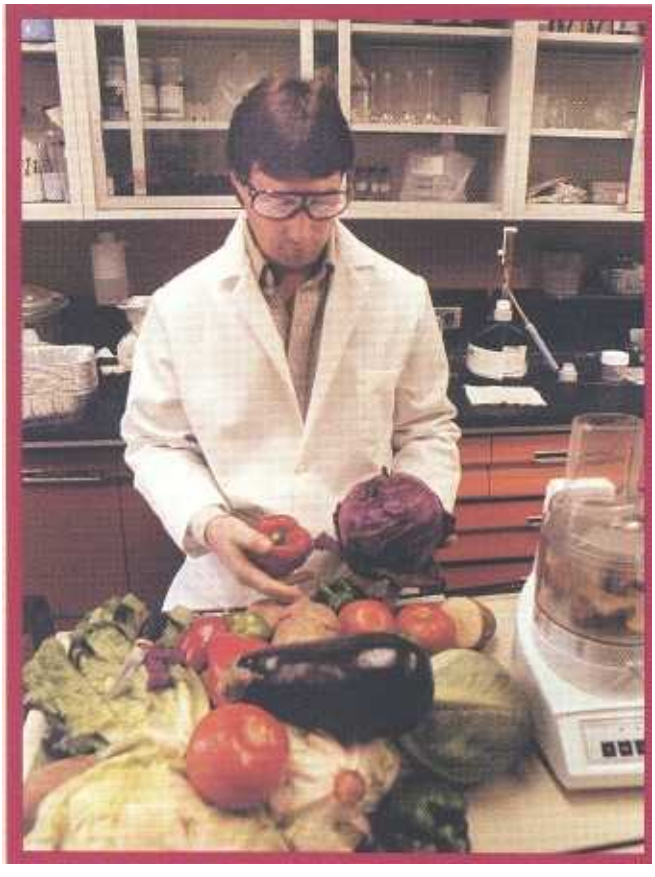
Instrumentation at TMI-1 continuously monitors these minute releases of radiation, and would automatically shut down equipment in order to seal off a release if radiation levels were to come anywhere close to the limits. Operators also can shut down equipment from the control room, should it ever become necessary.

In reality, less than one-tenth of one percent of the radiation exposure to the general public from all the sources in the environment comes from nuclear generating plants.

Nuclear energy is a clean technology. The plant does not emit any smoke or noxious fumes or greenhouse gases. Nor are any chemicals generated.



TMI's environmental scientists test thousands of ***samples ofplants, air, soil and water each year.***



E ARE CAREFUL WATCHDOGS

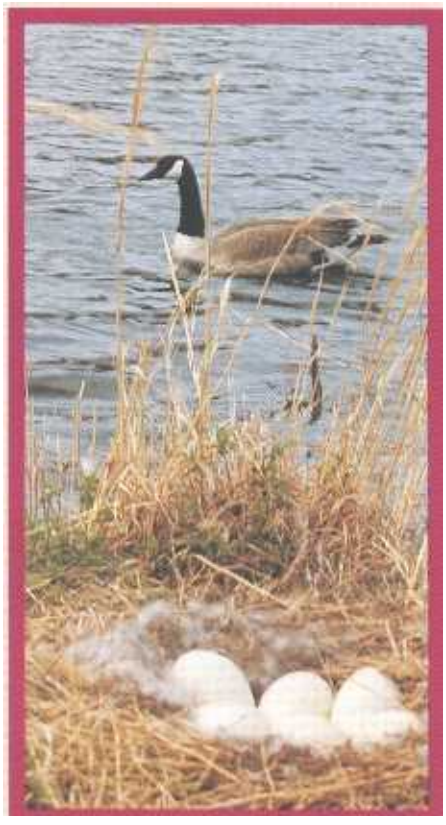
TMI-I's Environmental Controls Department reports results of continual sampling programs to state and federal governments and the public. Our scientists perform over 3,900 analyses annually on soil, air, rain water, vegetables, meat, milk and fish.

Backing up this sampling in our area, are 16 radiation monitors that continuously report data to the TMI Environmental Laboratory and to the Lancaster County courthouse, for public access. Another 100 devices that measure cumulative radiation are located in the area and are checked quarterly. An annual report compiles all of the monitoring results for government agencies and the public.

OUR owe WILDLIFE REFUG'

Driving on the southern end of Three Mile Island is like traveling through a wildlife refuge. Hundreds of deer, ducks and other wild animals make it their home.

It's used as an outdoor classroom for school groups and is a favorite stop on our scheduled bus tours around the plant site. Children and adults are awed by families of white-tailed deer casually grazing along the



On TMI's south end there is a protected bounty of plant life, wetlands and wildlife.

roadside. It's a special treat when a deer is spotted swimming across the river to TMI from other islands.

Wildlife organizations and school groups come to the wetlands on TMI's south end to study the inhabitants. Volunteers from Waterfowl, U.S.A. constructed duck boxes, and planted nourishing grasses in our marsh, to create a breeding ground for mallards and other duck species.

All this wildlife thrives in the shadow of a complex, modern technology because our company puts the highest priority on protecting the environment and protecting the people around us.

We hope you've enjoyed meeting our **people** who are committed to making reliable **power** and who take **pride** in our record of public and worker safety, and protecting the environment.

FACTS AND FIGURES ABOUT TMI-1

LOCATION:
- On a 382-acre island on the Susquehanna River in Londonderry Township, Dauphin County, about 10 miles south of Harrisburg, PA.

CONSTRUCTION:
- Began: 1968
- Concrete: 190,000 cubic yards or 21,000 truck loads
- Steel: 24,000 tons
- Wire: 740 miles

COMMERCIAL OPERATION:
- Began September 2, 1974

ELECTRICAL OUTPUT:
- 870,000 kilowatts (870 megawatts)

TOTAL COST:
- $400 million

REACTOR CONTAINMENT BUILDING
- Height: 200 feet
- Wall thickness: 4 feet, reinforced concrete, steel lined
- Building can withstand a strike by a 200,000 pound aircraft and earthquakes up to 6.5 on the Richter scale

REACTOR SYSTEM MANUFACTURER:
- Babcock and Wilcox

TYPE OF REACTOR:
- Pressurized Water Reactor with three water loops:
  - Primary (nuclear)
  - Secondary (non-nuclear)
  - Circulating Water (cooling towers)

PRIMARY OR NUCLEAR SYSTEM COMPONENTS:
- Reactor Vessel - 43 feet high, 16 feet around, weight of 400 tons
- Fuel: Consumes 9 pounds of uranium daily
- Capacity: 100 tons of fuel in reactor vessel
- Steam Generators: Two once-through steam generators, 72 feet high, 15,500 tubes in each steam generator, each tube is 0.6 inches in diameter and 56 feet high

SECONDARY OR NON-NUCLEAR SYSTEM COMPONENTS:
- Manufacturer - GE
- Turbines - 1 high-pressure and 3 low-pressure turbines
- Generator - Turns mechanical energy - 1,800 revolutions per minute (rpm) - into electrical energy - 870,000 kilowatts
- Condenser - 66,000 tubes, change steam back to crater for use in the steam generators

COOLING TOWER WATER SYSTEM COMPONENTS:
- Water - 222,000 gallons per minute per cooling tower
- River Water Used - 3,500 to 5,000 gallons per minute per cooling tower

Below are several views of TMI-Is construction

COOLING TOWERS

- Circulating Water Pumps - Six, 2,000 horse power pumps
- Cooling Towers - 372 feet high, 100 yards across the base

FOR MORE INFORMATION WRITE OR CALL:

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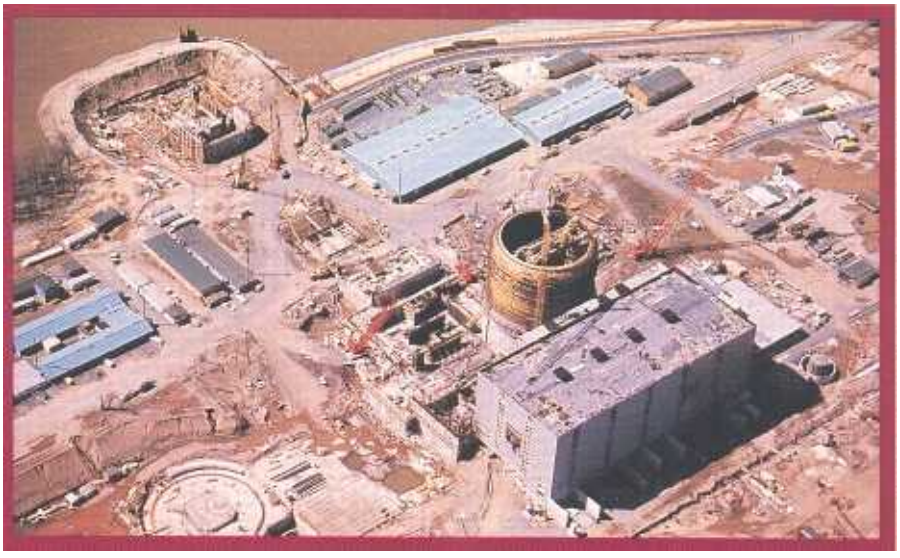

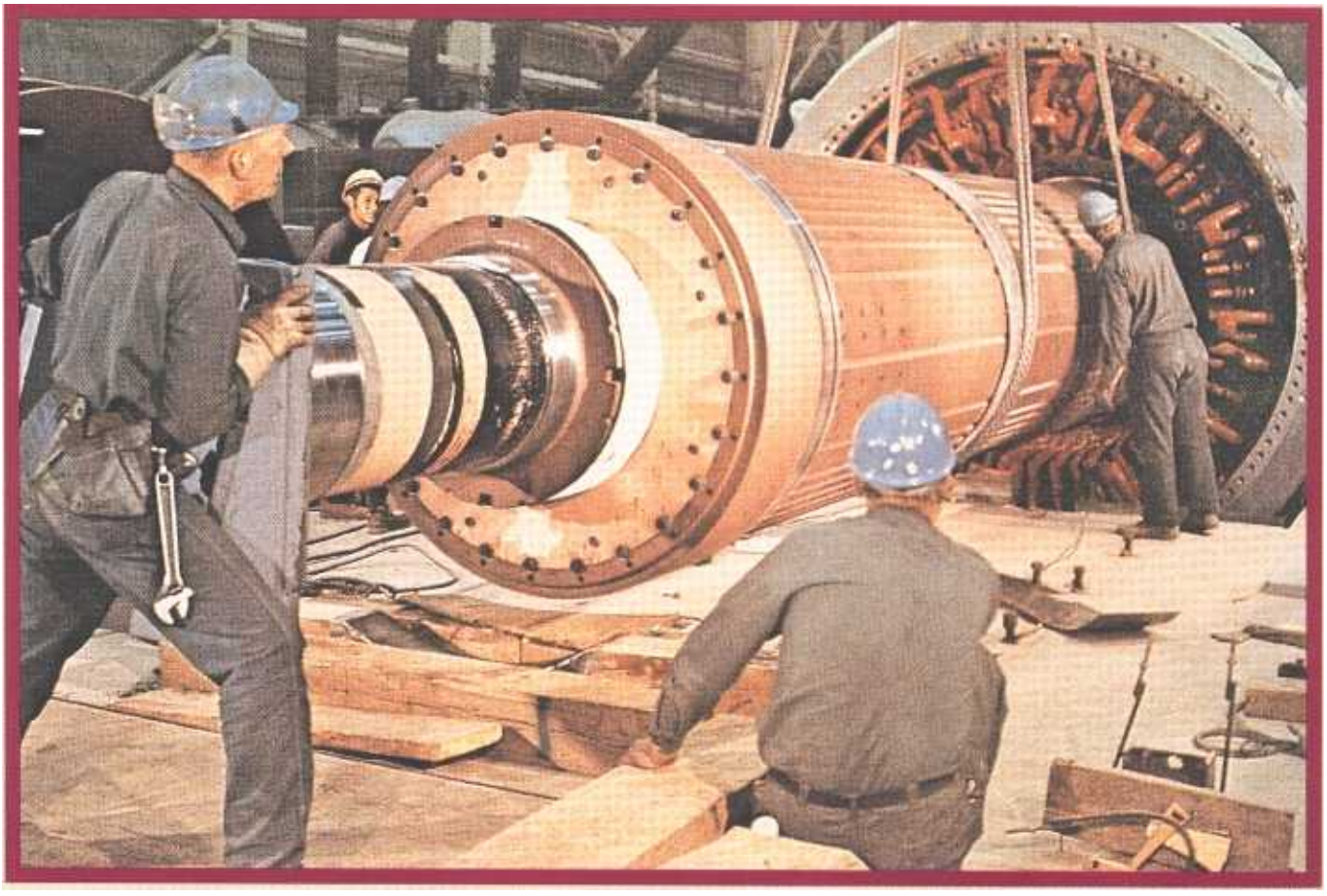

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