IS NARORA SAFE?

The Narora Atomic Power Plant (NAPP) in the Bulandshahr district of Uttar Pradesh, about 125 km. from Delhi, became operational on March 17, 1989. The plant has raised several controversies, from the location to the design and equipment. 

Commissioned in 1974, the plant was expected to become operational in 1981. Eight years behind schedule, only one of its two 250 mW reactors has become operational. So far, Rs. 520 crores have been spent on this plant. The Department of Atomic Energy ascribes the massive cost overrun to engineering design changes necessitated to meet the safety requirements, and upgradation of the safety system. Does this mean that the safety system in other atomic power plants in the country are not up to the mark and need design modifications? One of the senior officers of the DAE has admitted a 30 percent deformation in the engineering value. The defects, he claims are due to construction and not design and have been caused by sub-standard construction material and delay in the delivery of equipment. These flaws have been very well brought out in the latest report on the NAPP by the Comptroller and Auditor General of India. In this report, the Auditor General has indicted the DAE for locating the Narora plant in a quake-prone zone. It is very well established that the NAPP is located right on top of a geological fault line that makes it a potential earthquake zone. A major earthquake of intensity above 7 on the Richter Scale can tear apart this structure. In such an eventuality, over 80 tonnes of radioactive fuel could be thrown into the environment depending on the weather conditions, and can easily be carried on to large parts of the subcontinent causing immeasurable number of direct and indirect deaths.

The designed life of the plant is 25 years. During its operation it will produce thousands of tons of low, intermediate and high level radioactive waste which will remain hazardous for thousands of years. The activists and scientists are raising serious questions to this problem of waste disposal. So far, the authorities have made no arrangements for the disposal of waste. One does not know whether these wastes will be stored in the space, or in the sandy soil of the river Ganges. And for how many hundreds of years? And at what cost? Has the Government made adequate financial allotment and made arrangements for the so-called safe keeping of the hazardous waste? How the question is, is it possible to store this waste safely, no matter what the cost? Many western countries are facing this problem of storage, and countries like USA are dumping their radioactive waste in third world countries for storage.

Perhaps, the NAPP is the only operational atomic power project in the world without the mandatory 1.6 km. protective fencing. More than 3000 people are still living in the 5 villages falling within this high-risk safety zone. Here the question is not only of what will happen to those living in those villages, but also what about those workers who have to work within this high-risk area limit? This is a violation of the safety zone rules framed by the DAE itself which prohibits any human habitation within 1.6 km. of the plant site.

Besides, Narora is surrounded by a dozen major towns and cities and is close to the Himalayas—the source of river Ganges, Yamuna and Brahmaputra. So far, it authorities have made no arrangements for public safety and evacuation in the case of an accident. No efforts are being made to educate the general public on radiation risks. This is also a violation of the recent mandate made by the International Atomic Energy Authorities (IAEA). Vienna that all nuclear power station should educate the general public on radiation risks. So far, the DAE has not issued rules and procedures for civil defence general evacuation of the population, as are required under the IAEA resolutions concern public safety. The fire-fighting systems and health services in the adjoining areas have not been upgraded to meet the eventualities of an accident.

Apart from educating the public, there any information being given to the workers of the plant? One does not know whether workers have been provided with information regarding health hazards at the dangers they are working with. Are workers being trained about protective against Radiactivity, and its long term health hazards?

(Society for Participatory Research in Asia)
Fire is actually a violent exothermic (heat) chemical reaction between any substance and oxygen. On an average, fires and explosion of combustible material, that is material capable of burning, cause about 6 per cent of all factory fatalities. Most of the deaths and injuries due to fire do not occur in large scale fires in buildings; they result mainly from small scale flame ups and explosions arising out of process work—the sort of incident which can enfold a worker in flames before he has time to get clear.

What Produces Fire?

Flames and incandescent materials produce fire. When a solid is exposed to a flame, its temperature rises and fire may take place. Fire can be caused in the following ways:

(a) Radiation: Physical contact is not needed for fire, but when electromagnets encounter any obstacle, they transfer their energy to the obstacle which is then converted to heat. As and when the body reaches combustion temperature it will ignite. One of the best examples of this is children burning a piece of paper by concentrating sunrays through concave lens.

(b) Explosion of gas or vapors: Any mixture of combustible gas or vapor with air will flare up when in contact with an incandescent body and the resultant flame will spread if the core of gas or vapor lies within flammable or explosive limits.

(c) Dust explosion: Any combustible solid material, in finely divided form can give rise to a dust explosion hazard. The hazard of dust explosion is posed with number of substances of natural origin (flour, sugar, coal, wood etc.), light metals (like aluminum, magnesium etc.), inorganic chemicals like sulfur and plastics and organic chemicals.

(d) Spark: A spark of sufficiently high temperature may ignite a flammable mixture of gas, vapor or dust and air.

Fire can also be caused by spontaneous combustion in the following ways:

(a) Chemical Reactions: Certain chemical reactions generate sufficient heat to cause fire e.g. yellow phosphorus very rapidly ignites on contact with air, or nitric acid coming into contact with organic materials may ignite these materials.

(b) Combustion: Complete combustion means availability of such an amount of oxygen for complete transformation of fuel into oxide. Where air supply is inadequate only a part of the substance is oxidized while remaining decompose to give off smoke. This produces carbon monoxide. Smoke contains solid or liquid particles which remain in suspension in combustion gases. Substances with decomposition products that contain a large proportion of heavy residues give off dense smoke. This smoke hides fire fighting by reducing visibility or producing a toxic atmosphere where firemen have difficulty in breathing. Fire is not the major killer, but smoke, fumes and gas produced due to fire pose greater risk than fire itself.

Prevention

Rather than extinguishing fire, steps for prevention of fire must be taken. The prevention of fire depends upon five fundamental principles:

1. Prevention of personal injuries resulting from fire.
2. Fire protection engineering.

The fire fighter is exposed to and expected to operate in all types of hazardous condition. Because of this, the injury rate for fire fighters are among the highest of all occupations. Mainly their injuries include strain, sprains, exhaustion, smoke inhalation, laceration, cuts, abrasions and burns. Diseases of cardiovascular and respiratory systems are the main occupational diseases of fire fighters. Repeated exposure to various fumes, gases, smoke leads to non-specific respiratory disease and ischemic heart disease. Hearing loss is also possible.

To reduce the incidence of injury and disease, apart from good training, firemen must be provided with safe and efficient tools, apparatus, equipment and clothing.

ILO encyclopedia notes: "The basic tools, equipments, clothing and extinguishing methods of the fire services have remained unchanged for many decades. At present the industry does not show any interest in the needs of fire fighter, because there is general ignorance about what those needs, in fact are."
3. Regular, periodic inspection.
4. Early detection and extinction.
5. Damage control to limit the damage resulting from fire and fire extinction.

The design of plant structures and buildings should provide for fire resistance in accordance with the severity of the hazard involved. Provision for fire extinction materials should be made. Where a danger of explosion is present, the building design should provide for explosion venting by means of light roof construction or explosion relief panels to prevent an excessive build up of pressure and thus resulting damage. Forced air ventilation systems will also help to prevent the formation of flammable vapor-air mixtures. Wherever flammable vapors are continuously released direct vapor removal systems are necessary. Water sprays or sprinkler systems are often required to prevent damage or to extinguish fire when it occurs.

The Royal Society for Prevention of Accident writes: "Basic fire prevention entails continuous alertness to details." Many fires start when the premises are empty so that the fire gets a hold before it is discovered. Records show that the peak time for fires in workplaces is between 8 pm and 3 am and not during working hours. The cause of most of these fires was some earlier neglect, very often when leaving work. It is important to avoid leaving accumulation of flammable waste of units and other scrap materials in dangerous places. Fire can smolder (burn with smoke but without flames) in sawdust hours before breaking out. Piles of waste paper, cotton waste and oily rags can smolder and ignite spontaneously. Piles of foam plastics can be a cause of rapid and severe fire spread. Nitrates, Chlorates and Peroxides left near sacking or almost any combustible material can cause fierce fires and may ignite by very slight heat.

Fire-alarms

Two types of fire alarms are available, viz. manual and automatic. In manual system person needing help has to operate switch manually. While in automatic system detection of fire and sounding of alarm is done without human intervention.

Inspection

Only regular periodic inspection can assure the full value of fire protection.

First Aid

To remove the clothing from an injured body, cut off the clothes rather than pulling them away. Let the blisters remain as they are, and do not use any techniques to break them. Cover the wound with a clean cloth.

A recent trend in first aid of superficial burns is to immerse the burn in iced or cold water for 10-15 minutes, or application of ice as soon as possible after the accident. This will immediately cool the wound and limit ensuing oedema. Cold water also removes acids and bases.

If the burn is above 5% cent, immediate hospitalization is necessary. Take care that victims are not given any liquids to drink except in the case of electrical burns.

Storage of Flammable Material

Flammable materials should be stored in places which are cool enough to prevent accidental ignition of vapor with air. The storage area should be situated away from the source of heat or fire hazard. Highly flammable substances should be kept apart from powerful oxidising agents or from materials which are susceptible to spontaneous combustion. When highly volatile liquids are stored, any electrical light fittings or apparatus should be certified flame-proof, and no open light or flames should be permitted in or near the storage place.

The storage rooms installations should be electrically grounded and periodically inspected, equipped with automatic smoke or fire detection devices. Pipeline and storage tanks should be painted with distinctive safety colours. Tanks should be placed on ground sloping away from the main building. Provision should be made for ventilation facilities.

Inspection should look into proper housekeeping, storage of flammable materials, smoking violations, excessive accumulation of dust or flammable material, defective electrical equipment etc. It should also cover fire detection and alarm systems, fire fighting equipment, emergency lighting and escape ways.

Protection

Fire protection equipment includes water equipment such as water sprinklers, hydrants, standpipes, hoses, waterspray fixed system and special pipe system for dry chemicals, carbon dioxide, halogenated extinguishing agents or foam, etc. Special pipe system is useful where fire potential is high and water is ineffective like storage tanks of flammable liquids. Fixed system must be supplemented by portable fire extinguishers.

Different extinguishing agents have different applicability but sometimes the limitations are not known. The Encyclopedia notes that carbon dioxide, as an extinguishing agent, if discharged in large quantity to extinguish fire, may prove hazardous to personnel. Carbon Dioxide in the discharge may seriously interfere with visibility during and immediately after the discharge period. In addition, the noise of the discharge may frighten people who are not used to it.
Fire Control

A type fire: Fire in ordinary combustible materials eg, wood, textiles, paper, rubber etc.
Water or (Soda acid) water type extinguisher are suitable to control fire.

B type fire: Fire in flammable liquids eg, oil, gasolines, solvent, petroleum, paints etc.
Keep oxygen away from fire by carbon dioxide, dry chemicals, sodium bicarbonate, foam or vaporizing liquid type extinguisher.

C type fire: Fire in gaseous substances under pressure.
Dry chemicals powder extinguisher can be used.

- Actuation of the extinguisher, and
- Application of the extinguishing agent on fire.

Fire-fighting Systems

Fire hydrants should be placed at strategic points throughout the plant, so that water is available at all times even when repairs to the line are being carried out. For plants located in the vicinity of a town with fire equipment available, the threads on the fire trucks should adapt to the hydrants in the plant. Metal boxes should be placed on and around the process area and the housing area of fog nozzle and foam nozzle. Portable extinguishers should be in addition to this facility.

In the bypass system some device has to be provided for safely venting flammable gases or for ensuring that they bypass the plant. This is generally done by installing automatic valves in the gas lines into and out of the plant. These valves are connected to a separate system of electric or pneumatic switches located at key spots.

Shut down systems are used to eliminate, minimize or control damage to the plant, personnel, property only after all other types of prevention action have failed.

Investigation

All incidents of fires must be fully investigated as soon as possible after the event. Reports, interviews and discussion with staff involved, as well as use of any specialists should be aimed at:
- establishing the cause;
- evaluating the total cost of damage;
- identifying the need to change any material, process or equipment or the handling methods;
- identifying any need for better training or fire fighting systems.

(Acknowledgement: This article was prepared by Jagdish Patel, Baroda.)
Five persons were killed, including a nine-year-old girl, and nine others injured when a huge sewage treatment digester caved in at the water supply and sewage disposal plant in Ribahi village near Rohtak on Friday.

Three labourers were admitted to a nearby nursing home with serious head injuries, the firemen said.

According to eyewitnesses, one of the labourers was doing some welding work on a railing step the dome. The accumulated methane gas, collected in a huge pipe at the centre of the dome, could have come in contact with a few sparks resulting in the explosion. This, according to the engineer, had created a vacuum.

Some labourers who were returning from tea at around 10:30 am, saw the labourers on top of the dome being thrown up in the air. "There was a deafening sound and the next thing we knew was that the whole place was surrounded with sewage and mud", said a labourer, Sahinder Kumar. The 25 metre wide base of the 40 Mgd digester had broken off from the concrete and had contracted.

Sewage and waste material collected in the dome was forced out. The impact of this was so large that it had broken two concrete walls, thrown a pumping machine 15 feet away, and smashed several railings located at the site. Stairs leading to the dome had broken into pieces and everything was in a state of pell-mell.

Nine-year-old Suneeeta who was playing near the site of the accident was carried with the force of the dirty water which gushed out and smashed a concrete wall. She died on the spot.

Another labourer, Ram Vilas, 25, who was on top of the dome was thrown up some 10 feet in the air before he landed on the ground. He too died before he was taken to the hospital.

Susheel Gupta, 25, of Bihar died after he was admitted.

The entire area was filled with an overpowering stench. Entry was difficult and firemen feared that two of the labourers, Ramachander and Tolu, who were untraceable, were dead. "It is going to be difficult to extricate them", said an official. Till 7.15 pm they were still busy.

Police said that the casualty list would have been higher had a few labourers who decided to have a tea-break at 10 am stayed back. "We asked Susheel to come along for tea but he said he would come later", said Suresh Yadav, a labourer.

All eyewitnesses declared that the force of the sewage water which erupted from the dome was like the bursting of a dam.

Suneeeta's mother, Champta, 35, who was admitted to Balaji Nursing Home with chest injuries, said she was tossed around several times before she landed at the base of a wall.

The others who were injured were, Subash Mandal, Suvinder Mandal, Bhurendi, Ram Dayya, Lakhwinder, Mangal Ram, Sarbjit Kumar Mukhia and Raja Mandal.

The police in the meantime have arrested four persons of Bhanji Associates Private Limited, the contractors. They are the resident engineer, Mr. Dwaraka Nath, Mr. M.L. Gulaati, the vice-president of the company, Indrjit Bhasin, the vice-president, and Sakhpal Singh, the subcontractor who had hired the labourers. They have been arrested under charges of causing death due to negligence.

Source: India Express

The body of a person who was killed when a sewage water treatment plant under construction collapsed in Ribahi village near Rohtak.

The Municipal Commissioner, Mr. Ganga Dass, said an enquiry would be ordered to investigate the cause of the accident. Ex-gratia payment to the next of kin of those killed and injured would be given, he said.

MCDOfficials, however, stated that the digester which was under hydraulic test developed a leakage. Water then gushed out causing a vacuum in the dome which contracted.

An official of the Delhi Water Supply and Sewage Disposal Undertaking (DWSDDU) said under the contract agreement, the contractor would be liable for any casualty or accident at the site of operations. He would have to pay compensation to those injured or killed during work.
On 2nd February, 1989, a disastrous fire took place in the LAB (Linear Alkyl Benzene) plant of IPCL, Baroda. Earlier on 11th January and 14th January (twice in a day) there had been a fire in the LAB plant. On 15th January, the shift in-charge of the 1st shift recorded in the report book that the heater operation was unsafe. The union claims that LAB plant was responsible for the fire on 9th January. In a memorandum presented to the Chairman, the union claim that “to bring back the plant to normal operation and production again, the safety norms and requirements were bypassed and the base plate was mounted on pipe supports whereas the routine standard prescribes for a joint welding to avoid any back fire and prevent the flames from coming out to the atmosphere”. Union had also demanded earlier to discuss IPCL emergency and disaster plans but nothing was done.

About 12 workers fell unconscious when gas leaked from a tank in a chemical factory in Sahibabad in Ghaziabad district on May 1, 1989. Police said the incident occurred when the workers were cleaning the tank. Further investigations are on. (Source: Indian Express, New Delhi, May 2, 1989.)

The Labour Commissioner of Punjab visited industrial units at Bhankarpur from where alleged “gas leak” took place yesterday. As a preventive measure, the closure of the three big units were ordered until a special enquiry into all aspects of the “leak” was completed.

The Department of Environment and Pollution Control Board may be asked to visit the industrial units near Dera Bassi to study the precautionary measures taken by them in controlling their effluents into the atmosphere. (Source: The Tribune, Chandigarh, May 3, 1989.)

Over 1,500 persons, including 850 students, were taken ill following a massive leakage of ammonia from an ice factory in Hyderabad, in Sind, on May 22, 1989. The massive elakage reportedly occurred around 4.45 p.m. Many students of high schools located close to the ice factory fell unconscious as the gas hit their classrooms. (Source: The Hindustan Times, New Delhi, May 24, 1989.)
The National Safety Council organized a specialised training programme on "Safety in the Construction Industry" from 27th to 30th June 1989. This was the ninth course in the series conducted by the Council.

An insecticides manufacturing unit of Sangrur (Punish), M/S National Insecticide and Chemicals Limited, which has started the production of a deadly insecticide (Monocrotophos), poses a grave threat of pollution in the area. If production continues without destroying highly toxic waste.

The people of Sangrur are greatly agitated that the continuance of production of highly toxic waste without proper measures to destroy them could repeat the tragic history of Union Carbide in this area. (Indian Express, 2nd May 1989)

Two victims of the Bhopal gas tragedy and one representative each of the Bhopal Group for Information and Action and Texans United, an environmental group, were arrested in the lobby of a Houston hotel where the Union Carbide Corporation was about to hold its annual stockholders meeting on April 27, 1989.

All four were charged with criminal trespass and misdemeanour, and were held temporarily in lieu of $500 bail each. The Bhopal victims are on a 27-day tour of the US. Their trip, which is being sponsored by several US environmental groups and which began in New York on April 17, is to protest against the $470 million settlement worked out between Union Carbide and the Indian Government.

Volhko Ltd., a joint venture of Voltas and French chemical giant Rhone-Poulenc, has been operating in Palancheru (30 km from Hyderbad in Medak district) for a few years, manufacturing organo phosphoric pesticides. However, present anxieties centre around the fact that the firm is known to have sought a licence to manufacture a new pesticide under the trade name Sevin for which the cheapest and most common raw material is Methyl Isoscyanate (MIC). The firm's claim that it would manufacture Sevin from other materials than MIC is treated with scepticism by environmental groups. (Source: Tribune, Chandigarh, 30 April, 1989.)

(Contd. from page 1)

It is a pity that no independent agency exists in the country which can oversee public safety and enforce international safety standards at the Narora plant.

In the wake of the Chernobyl disaster, many countries have reviewed their nuclear policies. In Brazil, six of eight planned plants have been cancelled in 1986, and the other two are being delayed. Austria has decided to dismantle its sole nuclear plant. West Germany has imposed a 10-year moratorium on new plants. Similarly, in many countries, public information hearings are required before the selection of the site of an atomic plant. To our dismay, the authorities here are suppressing any information about the hazards and construction of the NAPP. In the country, very little information is available about the condition of the crippled reactors at the Rajasthan and Madras atomic power projects. All the information is being kept secret under the Atomic Energy Act, 1962.

This Act bans the free exchange of information related to health and safety and environmental protection. When the country is going ahead with new atomic power projects (Kaiga in Karnataka and Koodagalam in Tamil Nadu are in the offing) the time has come for a free exchange of information and open debate and discussion between citizens, workers in the plants and authorities on this subject, and to reshape our future energy policies.
Hazardous Materials Dictionary

This new reference book contains more than 2600 concise, expert definitions of words, phrases, abbreviations and acronyms relating to hazardous materials.

Available from: Technomic Publishing Co., 1507 North 56th Street, Mundelein, IL 60060-1494, USA.

Women on the Global Assembly Line

This book deals with the issue of high technology and problems faced by women. It is produced by a Canadian organization, Participatory Research Group. This is the second booklet in their series 'Short Circuit'. The first was 'Women in Automated Offices'.

For more information, contact: Participatory Research Group, 394 Euclid Ave., Suite 308, Toronto, Ontario, Canada M6G 259.

Working for Your Life: A Woman's Guide to Job Hazards

The purpose of this guide is to educate women workers about hazards and discrimination that they face in their jobs. This report primarily deals with jobs which employ women in large numbers, and is specific to USA, but the issues covered are common worldwide.


Pests and Pesticides

VFAI, Delhi, has prepared a worker's kit on 'Pests and Pesticides'. This is a complete kit giving information about various pests and pesticides along with Indian Regulations, Hazards and Alternatives.

Contact: Voluntary Health Association of India, 40 Institutional Area, South of I.I.T., New Delhi - 110 016.
Checklist for Fire and Explosion Risk

- Are flammable materials present in smallest possible amount?
- Is any material liable to spontaneous combustion?
- Would spilled liquids run into other areas?
- Is waste material cleared up and removed regularly?
- Does any machine run hot?
- Is there anything to cause fire in risk area like spark, flame, excessive heat?
- Can you get out quickly?
- Can all escape doors be opened from inside?
- Are all gangways, staircases, escapeways clean and in good condition and open?
- Has everyone been instructed in precaution about flammable material in escape drill?
- Can you raise the alarm easily?
- Has the fire alarm been tested recently?
- Can you hear it everywhere, even in toilets?
- Is there a telephone near by?
- Are there enough fire extinguishers?
- Are extinguishers checked regularly and maintained?
- Are fire alarms working?