December 1, 1983

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UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION
Before the Atomic Safety and Licensing Board

OFFICE OF SECRETARY
DOCKETING & SERVICE
BRANCH

| | | |
|---|---|---|
| In the Matter of | ) | Docket Nos. 50-440-OL |
| | | 50-441-OL |
| CLEVELAND ELECTRIC ILLUMINATING COMPANY, et. al. | ) | |
| | ) | |
| (Perry Nuclear Power Plant, Units 1 and 2) | ) | |
| | ) | |

SUNFLOWER ALLIANCE'S SUPPLEMENTAL DISCOVERY RESPONSE

Now comes intervenor Sunflower Alliance, by and through counsel, and seasonably updates the discovery requests of Applicant and Staff by transmittal herewith a copy of "Status Report: Planning for an Accident at the Perry Nuclear Power Plant", by the Perry Legal Defense Fund, to each individual named on the Attached "Service List."

Terry J. Lodge
Counsel for Sunflower Alliance

CERTIFICATION

I hereby certify that a copy of the foregoing "Supplemental Discovery Response" and its accompanying document were served upon each of the parties named on the Attached "Service List" this 5th day of December, 1983 via regular U.S. Mail, postage prepaid.

Terry J. Lodge



DS03

Status Report:

# PLANNING FOR AN ACCIDENT AT THE PERRY NUCLEAR POWER PLANT

BY THE

PERRY LEGAL DEFENSE FUND

1983

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## FACTS AND FIGURES

## I. INTRODUCTION

The radioactivity in a nuclear power plant such as Perry poses a constant threat to the health and safety of people and animals living in the vicinity of the plant. If this radiation was released to the environment by means of an inadvertent release or by an accident, the power plant operators and surrounding communities must be equipped to respond. The havoc at Three-Mile Island in 1979 underscored the necessity of having a workable, well-designed plan to respond to such emergencies.

Since the TMI accident, regulations have been enacted which attempt to set up guidelines for local community response to a radiological emergency. For the Perry Nuclear Power Plant draft plans have been developed for Ashtabula, Geauga, and Lake Counties, as well as the Power Plant itself. This report will analyze those plans, as well as explore the fundamental precepts of emergency planning. Although this is a cursory view of the emergency plans it provides a basis for further questions as to the "Nuclear Future" with which we may be forced to live.

## II. CONCEPT OF EMERGENCY PREPAREDNESS

Emergency planning is known as the last layer of the defense in depth concept which keeps radiation in the nuclear plant from escaping to the environment. In laypersons' terms, it is the last action which can be taken to assure that exposure to radiation will be minimized. When all the redundant safety systems of the plant fail, it is imperative that emergency preparations work to keep the residents within a 50-mile radius from the plant from direct exposure to the radiation. Ideally, emergency plans should keep exposure to a minimum.

Hazards of the Perry Plant which emergency plans seek to avoid are the result of the radioactive uranium fuel used in nuclear power. The fuel is

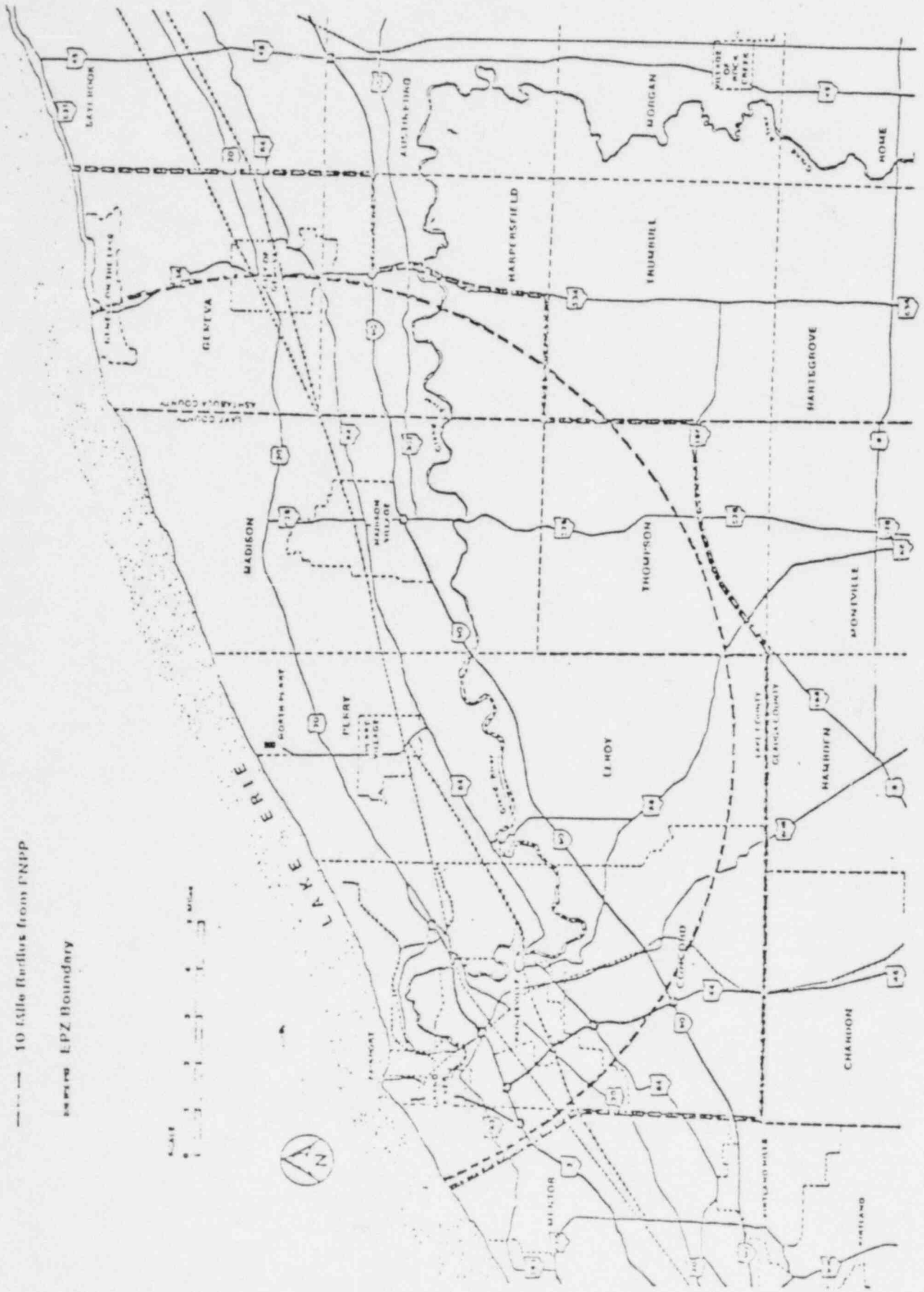
irradiated when neutrons split the uranium during the fission reaction. Heat given off from this split is used to boil water, creating steam which turns an electrical generating steam turbine. Water must flow through the reactor core to remove the heat from the reactor. If there is no water, or some other heat absorbing material, the fuel will heat up as the reaction continues. When the fuel is heated the radioactivity is released from the reactor core. This is where the greatest hazard of nuclear power generation exists. Should the reactor core heat up and the fuel melt you get what is known as the China Syndrome (the intense heat will melt through the earth's crust).

A buildup of radioactivity in the reactor core or reactor building must be released at some time. In some accident scenarios, the release can occur through some break in the reactor's coolant piping. Once the release occurs, it is only a matter of time before it reaches the atmosphere. The NRC has estimated the time of radioactive release as anywhere between one-half hour to 30 hours (NUREG 0654, p. 11).

## III. RADIOACTIVE EXPOSURE PATHWAYS

Emergency planning concerns itself with two different modes of radioactive exposure. The first mode is exposure to the body and inhalation. This is called the Plume Exposure Pathway because the radioactivity becomes airborne and travels in a plume in the direction of the wind conditions at the time of the accident. This particular area of exposure presents the most immediate danger since the radioactivity can be quickly absorbed in the human body. Scientific research has determined the 10-mile zone around a nuclear plant to be the Plume Exposure Pathway. The map on page 3 shows the 10-mile zone for the Perry Plant. This area is to be evacuated in case of a nuclear accident, but only if the county officials determine evacuation is necessary and prudent.

Exhibit 1. Emergency Planning Zone (EPZ) for PNPP



The second mode of exposure is that of ingestion of the radioactivity from contaminated sources. The Ingestion Exposure Pathway is an area which measures a 50-mile radius from the Perry Plant. Contaminated vegetables, water, or milk from around the plant presents serious health hazards for individuals living within 50 miles from the plant. Since the contaminated water and land cannot be used, questions as to the economic impact of the agricultural and industrial community arise. (These questions will be discussed in Section VI.) Furthermore, the prolonged exposure to individuals in the area increases the amount of health effects of a release of radioactivity. Table 1 further distinguishes the source of radioactive exposure and their health effects.

## IV. HEALTH EFFECTS OF RADIATION EXPOSURE

Dangers associated with radiation exposure due to a nuclear plant accident divide into two general categories: (a) latent-genetic and (b) chronic-somatic. The chronic-somatic effects are those arising from a 100 Rem or more exposure according to NRC documents (NUREG/CR-1131, Examination of Offsite Radiological Emergency Protective Measures for Nuclear Reactor Accidents Involving Core Melt, p. 25, 1978). Rapid fatality or prolonged cancer can occur. Exposure of this magnitude is a result of direct contact with highly irradiated material or gas. (For more specific effects to radiation exposure, see Table 2 on page 6.) The 10-mile Plume Exposure Pathway is designed to reduce the possibility of this type of exposure. Individuals who receive this much radiation will suffer immediately following such exposure, unlike the latent-genetic effect which occurs over time and is more widespead.

A NRC document compared the two health hazards of radioactivity in this way:

TABLE 1

ACTION AND HEALTH EFFECTS VERSUS EXPOSURE PATHWAYS

| Exposure Pathway | Response Time | Action Available | Public Health Effects |
|---|---|---|---|
| Air - Particulate | Minutes - Hour | Protective (P) | Delayed |
| Gas | Minutes - Hour | Protective | Rapid Fatality, Early, and Delayed |
| Water - Particulate | | | |
| Rainout | Hour - Day | Protective | Delayed |
| Fallout | Minutes - Hour | Protective | Delayed |
| Immersion | Day | Protective & Restorative (P&R) | Delayed, Early, & Rapid Fatality |
| Food - Milk | Day - Month | P&R | Delayed |
| Drinking Water | Hour - Month | P&R | Delayed |
| Beverages | Day - Month | P&R | Delayed |
| Foodstuffs | Day - Month | P&R | Delayed |
| Soil - Resuspension | Day | Restorative | Delayed |
| Direct | Minutes - Days | P&R | Early, Delayed, & Rapid Fatality |
| Direct - Facility | Minute | P&R | Rapid Fatality, Early, & Delayed |
| Air | Minute - Hour | Protective | Rapid Fatality, Early, & Delayed |
| Water | Hour | P&R | Delayed, Rapid Fatality, & Early |

Source: "Manual of Protective Action Guides and Protective Action for Nuclear Incidents", EPA 520/1-75-001, September, 1975, rev. June, 1980, p. 1.16.

TABLE 2

SENSITIVITY OF VARIOUS TISSUES TO CANCER INDUCTION BY RADIATION

| Site or Type of Cancer | Spontaneous Incidence of Cancer | Relative Sensitivity to Radiation Induction of Cancer | Remarks |
|---|---|---|---|
| Major radiation-induced cancers | | | |
| Female breast | Very high | High | Puberty increases sensitivity |
| Thyroid | Low | Very high, especially females | Low mortality |
| Lung | Very high | Moderate | |
| Leukemia | Moderate | Very high | Especially myeloid type |
| Alimentary tract | High | Moderate to low | Especially in colon |
| Minor radiation-induced cancers | | | |
| Pharynx | Low | Moderate | |
| Liver and Biliary tract | Low | Moderate | |
| Pancreas | Moderate | Moderate | |
| Lymphomas | Moderate | Moderate | |
| Kidney and Bladder | Moderate | Low | |
| Brain and nervous system | Low | Low | |
| Salivary glands | Very low | Low | |
| Bone | Very low | Low | |
| Skin | High | Low | |
| Sites or tissues in which maginited of radiation-induced cancer is uncertain | | | |
| Larynx | Moderate | Low | |
| Nasal sinuses | Very low | Low | |
| Parathyroid | Very low | Low | |
| Ovary | Moderate | Low | |
| Connective tissues | Very low | Low | |
| Sites or tissues in which radiation-induced cancer has not been observed | | | |
| Prostate | Very high | Absent? | |
| Uterus and Cervix | Very high | Absent? | |
| Testi | Low | Absent? | |
| Mesentery and Mesothelium | Very low | Absent? | |
| Chronic lymphatic leukemia | Low | Absent? | |

Source: 1980 BEIR Report.

> "In contrast to early somatic effects, both latent cancers and genetic effects are random phenomenon whose probability of occurrence for a given individual is a function of the dose received by that individual. Consequently, these effects may be observed at long distance from the reactor where a small dose might still be received by large numbers of people." (Source: NUREG/CR 1131, "Examination of Offiste Radiological Emergency Protective Measures for Nuclear Reactor Accidents Involving Core Melt", 1978, p. 25.)

In a 1982 memorandum from Roger M. Blond to the Reactor Risk Branch of the NRC addressing the basis of the Emergency Planning Zones stated:

> "Even with a source term (value of radiation release from a plant accident) reduction of a factor of 100 there could be early fatalities and injuries out to about one and five miles respectively. With respect to the detectability of latent cancer fatalities, such releases would generate statistically detectable cancer in the exposed population for many tens of miles." [Emphasis and bracketed material added. (Source: Memorandum for Ronald M. Scroggins, Director, Administration and Resource Control Staff, Office of Nuclear Regulatory Research, from Roger M. Bond, Reactor Risk Branch, Division of Risk Analysis, Office of Nuclear Regulatory Research, January 28, 1982.)]

This statement acknowledges the cancers of people exposed to radiation from a plant accident, yet not evacuated since they live more than 10 miles from the plant.

Various radionuclides may be released from the nuc power reactor. They all have different levels of radioactivity and absorb in humans at different rates. Some of the several hundred radioisotopes include cobalt 60, strontium 90, iodine 131, xenon 133, cesium 137, and plutonium 239. According to the Reactor Safety Study, WASH 1400, a release from the power plant may occur from one-half hour to 30 hours after the accident. If the release were to take place one-half hour after the accident, it is highly unlikely that any evacuation will be effective. In fact, exposure to the radioactivity would be great since people will be trying to evacuate, or gather in a central building at the same time the radioactive release occurs.

## V. PROTECTIVE ACTION GUIDELINES

The Environmental Protection Agency was responsible for developing guidelines for determining how much radioactivity can be released from a plant accident before any action is taken. Protective Action Guidelines, or PAGs for short, are divided into two categories: whole body and thyroid. Table 3 shows the number of Rem exposure which is determined by a dose estimate and is the level at which a Protective Action (i.e., evacuation or sheltering) is initiated. A projected dose is obtained from power plant sources (the Utility). Some information may be obtained from outside the Perry Plant but this means waiting until the radiation is dispersing into the community before knowing the proper protective action to take. Therefore, actions taken in a nuclear power plant accident are based on scant, unbiased information.

The NRC realizes the problem with information flow for determining a dose estimate. The decision to take a particular action will have to be based upon human judgments, not scientific data like they want us to think. The EPA Manual of Protective Action Guides and Protective Actions for Nuclear Incidents, September, 1975, rev. June, 1980, p. 1.8 stated: "In addition, the decision will likely be made under difficult emergency conditions probably with little detailed information available." From this sound information a decision must be made which will protect the public, and according to the reports, be most cost-effective.

A decision to evacuate will have to be made with limited knowledge of the type and amount of radioactive release. Also, projections as to the estimated dose individuals will receive will be calculated on meteorological models which contain a lot of variation in their predictions. The agency responsible for preparing the system for estimating dose projections is the National Oceanic and Atmospheric Agency. In one report discussing

TABLE 3

PROTECTIVE ACTION GUIDES FOR WHOLE BODY EXPOSURE

TO AIRBORNE RADIOACTIVE MATERIALS

| Population at Risk | Projected Whole Body Gamma Dose in Rem | Projected Thyroid Dose |
|---|---|---|
| General Population | 1 - 5 [a] | 5 - 25 [a] |
| Emergency Workers | 25 | 125 |
| Life-saving Activities | 75 | None |

[a]When ranges are shown, the lowest value should be used if there are no major local constraints in providing protection at that level, especially to sensitive populations. Local constraints may make lower values impractical to use, but in no case should the higher value be exceeded in determining the need for protective action.

Source: Manual of Protective Action Guides and Protective Action for Nuclear Incidents, EPA 520/1-75-001, September, 1975, rev. June, 1980, p. 2.3, 2.5.

the model for estimating dose they wrote that the "...output information must then be judged within that framework of uncertainties. As pointed out by Crawford, et al., 1978, these accuracy statements are largely based upon scientific judgment; there is not enough data upon which to base a statistical estimate of the reliability of airborne effluent concentration. Thus, each stage of calculations will have its associated uncertainties." (Emphasis added.) Not only will the information which the National Oceanic and Atmospheric Agency depend upon be suspect, but the result of their own calculations will be "uncertain". It is from these uncertainties that human lives will depend. Furthermore, the admission of trouble at PNPP and its extent is dependent solely upon CEI which has a $5 billion vested interest in not arousing a public alarm.

## VI. ECONOMIC IMPACT OF AN ACCIDENT

An accident would have far reaching economic effects on the surrounding counties. These costs will be in several categories. Agricultural costs will result from the inability to utilize the farmland which is contaminated to grow crops. The length of time land must lay fallow will vary depending upon the amount of radioactivity but, will be unusable for at least a year. Since crops can concentrate radioactive materials in the land by their uptake of nutrients from the soil, the ground must be free from radioactivity below the surface as well as on top of the ground. Grazing animals will not be allowed to eat the crops grown on the contaminated soil because they too will concentrate the radioactivity in their bodies. They will have to feed from outside sources. Furthermore, water will have to be transported into the contaminated zone and kept from the radioactivity so the animals can use it. All of these necessary actions are costly and could render the agricultural community bankrupt.

A Nuclear Regulatory Commission study in 1982 estimated the effects of a serious nuclear plant accident on the economic community. (See Tables 4 and 5.) Specifically, they looked into the effects on the area surrounding the Perry Plant. Agricultural industry within 21 miles from the plant would lose all production for more than one year (NUREG/CR 2591, "Estimating the Potential Impacts of a Nuclear Reactor Accident", 1982, p. 89.) Crop loss would extend for 271 miles from the plant, and last at least one year. These effects are astronomical. Questions remain as to who will bear the burden from these losses, individual farmers, Cleveland Electric Illuminating, or the Government? Thus far, there is no protection, such as insurance, that an individual farmer can get.

Another more significant economic impact of a nuclear plant accident is in the industrial sectors. The NRC study found that loss of employment for more than one year in Lake County would be 76,558 persons, in Geauga 21,466 persons, and in Ashtabula 40,165 persons. Table 4 further breaks down the losses of employment. In the area which is affected by an accident the losses of employment would be significant because of the wide variety of economic factors. These factors include the decrease in the importing of goods to the radioactive area, decrease in supply of resources into the area, and other complex economic variables. What is clear is that an accident at the Perry Plant would have far reaching consequences which are likely to reshape the economic base for many residents living within 50 miles from the plant.

## VII. RESPONSE OF THE PERRY PLANT IN AN ACCIDENT

In order to obtain a license to operate a nuclear power plant, CEI must make an Emergency Response Plan for the plant site. These onsite plans must follow the regulations of the NRC and coordinate well with the plans of the Counties, State, and Federal organizations. When an accident

TABLE 4

PRIVATE SECTOR EMPLOYMENT LOSSES FROM AN ACCIDENT AT

THE PERRY NUCLEAR POWER PLANT

1978 Figures

| Industry | Direct Losses in the Physically-Affected Area |
|---|---|
| Agriculture | 9,000 |
| Mining | 1,000 |
| Construction | 15,000 |
| Nondurables manufacturing | 27,000 |
| Durables manufacturing | 72,000 |
| Transportation, communication & utilities | 14,000 |
| Wholesale trade | 7,000 |
| Retail trade | 58,000 |
| Finance, insurance & real estate | 14,000 |
| Services | 57,000 |
| Total | 288,000 |

Source: "Estimating the Potential Impacts of a Nuclear Reactor Accident", NUREG/CR2591, 1982, p. 94.

TABLE 5

EMPLOYMENT EFFECTS ON MANUFACTURING FROM A NUCLEAR PLANT ACCIDENT

| Industry Name | Number of Employees Affected More Than One Year | | |
|---|---|---|---|
| | Lake County | Geauga County | Ashtabula County |
| Paints and allied products | 187 | | |
| Miscellaneous chemical products | 223 | - | 20-99 |
| Paving and roofing materials | 62 | - | - |
| Fabricated rubber products | 1,094 | 2,180 | 100-249 |
| Miscellaneous plastics products | 250-499 | 1,265 | 2,500-2,499 |
| Blankbooks and bookbinding | - | 100-249 | - |
| Blast furnace and basic steel products | 100-249 | - | 1,000-2,499 |
| Iron and steel foundries | 100-249 | - | - |
| Nonferrous rolling and drawing | 100-249 | - | - |
| Nonferrous foundries | 342 | - | 100-249 |
| Miscellaneous primary metal products | 171 | - | - |
| Metal cans and shipping containers | - | - | 20-99 |
| Cutlery, hand tools, and hardware | 500-499 | - | 500-999 |
| Fabricated structural metal products | 250-499 | - | 20-99 |
| Screw machine products, bolts, etc. | 1,040 | 140 | 100-249 |
| Metal forgings and stampings | 904 | - | 250-499 |
| Miscellaneous fabricated metal products | 980 | 20-99 | 444 |
| Construction and related machinery | 4,265 | - | - |
| Meta working machinery | 1,493 | 236 | 516 |
| Special industry machinery | 783 | 100-249 | - |
| Miscellaneous machinery, except electrical | 1,252 | 58 | 20-99 |
| Electrical industrial apparatus | 334 | 100-249 | - |
| General industrial machinery | 100-249 | - | - |
| Household appliances | - | - | 20-99 |
| Electrical lighting and wiring equipment | 250 | 20-99 | 100-249 |
| Miscellaneous electrical equipment and supplies | 20-99 | - | 500-999 |
| Motor venicles and equipment | 891 | - | 500-999 |
| Aircraft and parts | 20-99 | - | - |
| Measuring and controlling devices | 1,000-2,499 | 250-499 | - |
| Musical instruments | 500-999 | 250-499 | - |
| Miscellaneous manufacturers | 246 | - | - |
| Miscellaneous non-metallic mineral products | 129 | - | 100-249 |
| Total manufacturing sector | 27,395 | 6,202 | 13,506 |

Source: "Estimating the Potential Impacts of a Nuclear Reactor Accident," NUREG/CR-2591, 1982, p. 92.

occurs, the utility has 15 minutes in which to contact all of the counties as well as the state.

The Shift Supervisor is the first to become aware of the impending or exisiting problem with the plant. According to the plan for the Perry Plant, "The Shift Supervisor shall declare an appropriate emergency classification whenever, in his judgment, the plant status warrants such a declaration." ("Emergency Plan for Perry Nuclear Power Plant Units 1 & 2, p. 4-2.) Any offsite dose projections come from the Shift Supervisor. This means that the action taken is dependent upon the judgment of the Shift Supervisor. It is possible that it will take quite some time before the Shift Supervisor has enough information to make this judgment.

An emergency condition at the plant is determined by a control room alarm or instrument. Once the control room notifies the Unit Supervisor and Shift Supervisor of the emergency, several actions must be taken. The Perry Plan prioritizes the Shift Supervisor's activities as:

1. Ensure the safe operation of the plant;
2. Ensure that immediate notification requirements are met;
3. Dispatch Radiation Monitoring Teams;
4. Perform additional emergency actions as time and conditions permit.

It is required that the notification of offsite organizations such as the Counties and State governments be within 15 minutes of the accident. This means that the Shift Supervisor will either have to ensure the safe operation of the plant within 15 minutes, as is assumed by the plan's prioritization, or make an alteration in the plan. This change will either delay the safe operation of the plant or delay the time of notification of the authorities. As is generally known, a person's actions in a state of crisis

are altered and unpredictable. One person in charge of organizing the plant staff, notifying the authorities, and making judgments as to the protection action recommended seems to be insufficient.

Relying on the action of CEI employees to advise of an emergency and the appropriate response by the Counties may have some problems. First, the notification of the organizations offsite is dependent upon the Shift Supervisor, who has many functions in an emergency. Secondly, there is some conflict of interest between the calling of an emergency condition by CEI and the bearing of the cost of the County response by CEI. It would be advantageous for CEI to minimize the significance of the accident to avoid having to pay the cost of an evacuation. Furthermore, in light of the nuclear industry's concern with public image, it would not be unlikely to initiate an emergency unless the accident was severe. This would eliminate the possibility of early evacuation or some other response.

## VIII. RESPONSE OF THE COUNTIES IN AN ACCIDENT

Federal regulations require the development of Emergency Response Plans by various organizations situated around the Perry Plant. These plans must be functional to assure that proper response to an accident will result in a given circumstance. Any County which is within the 10-mile zone must be able to provide its residents with a "safe" means of avoiding excessive exposure to radioactive releases from the power plant. Lake, Ashtabula, and Geauga Counties are required to draw up these plans according to federal guidelines. The Federal Emergency Management Agency (FEMA) is responsible to review the plans and give their recommendation to the NRC. This must occur prior to the nuclear plant's full-scale start-up (low level testing may go on prior to the acceptance of the plan).

The plans are a series of communication, technical, and organizational listings which together are supposed to make a smooth operating emergency re-

TABLE 6

REPRESENTATIVE SHIELDING FACTORS FROM GAMMA CLOUD SOURCE

| Structure of Location | Shielding Factor[1] | Representative Range |
|---|---|---|
| Outside | 1.0 | |
| Vehicles | 1.0 | |
| Wood-frame house[2] (no basement) | 0.9 | |
| Basement of wood house | 0.6 | 0.1-0.7[3] |
| Masonry House (no basement) | 0.6 | 0.5-.7[3] |
| Basement of masonry house | 0.4 | 0.1-0.5[3] |
| Large office or industrial building | 0.2 | 0.1-0.3[3,4] |

Notes:

1. The ratio of the dose received inside the structure to the dose that would be received outside the structure.

2. A wood-frame house with brick or stone veneer is approximately equivalent to a masonry house for shielding purposes.

3. This range is mainly due to different wall materials and different geometries.

4. The shielding factor depends on where the personnel are located within the building.

Source: SAND 77-1725 (unlimited release).

sponse. Several factors go into the preliminary stages of the working plans.

Cooperation and Agreement

Since the 10-mile zone crosses three Counties, the decision-making process should be a consensus agreement. The plans require, however, the Counties to individually decide on the proper response to any radiological emergency. Although the plans use similar language in defining the extent and type of emergency, different Counties may choose to take different measures in protecting their residents. For instance, Lake County might call for an evacuation while Ashtabula and Geauga Counties advise people to seek shelter in their homes. One or two County's response which is different could lead to serious misconceptions in the other County(ies) as to the nature of the accident. In this circumstance, chaos would result. The County residents may nevertheless choose to evacuate without the organizational assistance the County is supposed to provide.

The plans lack inter-county cohesion, which would assist in the decision-making. Although the Counties are separate jurisdictions, they are put in the same situation if there is an accident, and one decision-making body would facilitate orderly steps. In a nuclear plant accident, time is of the essence so a delay in the decided response, if a consensus is reached, could have serious effects on the amount of exposure a person receives.

Another area of cooperation between the Counties is found in the plan of Lake County. Individuals living in institutions who cannot be transported by a bus require an ambulance. The Lake County plan, as it stands, includes the use of ambulances from adjacent Counties to aid in their evacuation. Again, if the Counties do not agree on the same response, it is unlikely they will commit vehicles to aid the County. Since a decision

TABLE 7

POPULATIONS IN 10-MILE ZONE

OF LAKE, ASHTABULA, AND GEAUGA COUNTIES

| Counties | # of People | |
|---|---|---|
| Ashtabula County | | |
| Geneva | 7,100 | |
| Geneva on the Lake | 960 | |
| Geneva Township | 3,800 | |
| Harpersfield Township | 1,100 | |
| Total Ashtabula County | | 12,960 |
| Geauga County | | |
| Thompson Township | 1,800 | |
| Total Geauga County | | 1,800 |
| Lake County | | |
| Fairport | 3,197 | |
| Grand River | 599 | |
| Madison | 1,998 | |
| North Perry | 299 | |
| Painesville | 17,384 | |
| Perry | 1,399 | |
| Townships | | |
| Concord | 9,691 | |
| Leroy | 2,198 | |
| Madison | 16,185 | |
| Mentor | 7,000 | |
| Painesville | 13,388 | |
| Perry | 4,796 | |
| Total Lake County | | 78,634 |
| Total of All Counties | | 93,394 |

Source: Emergency Plan for Perry Nuclear Power Plant Units 1 & 2.

in one County does not cross jurisdictional lines, other Counties may choose not to assist them in any way. Questions as to who will pay the ambulance corps to cover their insurance are not answered either.

The plans also depend upon many volunteer organizations to fulfill the vital response requirements. For instance, school bus drivers are asked to drive not only students from school but also individuals who do not own cars. The plan states that if the school bus drivers do not volunteer, then fire department personnel will drive the buses. However, most of the fire department personnel are also volunteers and may not participate in the evacuation. Health hazards associated with these activities may be great and many bus drivers and firefighters may choose to leave the area and take their families and/or themselves to a safe place. Furthermore, fire department volunteers are not trained in driving a school bus in normal conditions let alone an emergency. Part IX analyzes a survey of various organizations involved with the plan and will answer some of these questions.

Moving over 93,000 people living within a 10-mile concentration is going to take proficiency which a well-regimented population will find hard to accomplish, let alone a population filled with children and elderly.

Evacuation of the Population

At school is where the problems begin. The plans allow any parent who chooses to pick up his/her child in case of an accident to do so as long as they sign a release form. The situation can be pictured. It is likely that many parents will choose to pick up their children. This is because the school buses will not take them home, but will take them to a reception center where a parent may pick them up. A parent will be much more satisfied knowing that the child is safe with them, than to travel to a location to find them. Therefore, the amount of cars in the school

parking lots will cause traffic problems and delays. The school buses are in the school lots and parents' cars are in the parking lots. Parents must find their child(ren) and sign a release if they have not already done so. The buses will have a hard time getting out of the lots, and further panic will complicate things.

Inside the buses will be another problem. The plans call for the suspension of load limits of 66, and allow 80 in a bus. (See Section IX on bus driver surveys.) This means children will be standing in the aisles while the bus is travelling. Furthermore, the students may be panicked and the situation will only be worsened with overcrowding of the buses.

Home

At home several steps are taken before evacuating. If one works outside the home they will return home before the evacuation. If anyone works outside the 10-mile zone but lives within the zone they must pass the perimeter check. This is because once an evacuation is declared, no one outside the 10-mile zone will be allowed back into the zone unless they live there. Perhaps this means someone working outside the zone must have proof that they live inside the zone to get home. This group of workers will be delayed, at the perimeter, and, therefore, delayed in their evacuation.

Once everyone is at their home, the plan calls for the closing of all outside vents and windows to avoid radioactive particles from entering the home. Then, one should lock up the home. All "valuables" should be taken also. How one collects their valuables in a short time is left to the individual. Clothes should be taken also in case you are not able to return for a long time. On the way out of the door, everyone is asked to put a green card in the front window to let the police know the

house is evacuated. (The utility is responsible for sending out these green cards.) If there is not a green card in the window, the police are required to go to the door and be sure the house is empty. In a situation such as a nuclear plant accident, residents in the 10-mile zone are asked to maintain a composure similar to going on a vacation.

Individuals Without Cars and Nursing Home Residents

Individuals and families who do not own a car (approximately 3,212 people, as indicated in Table 8), or have some means of evacuating, are to go to central locations to be picked up by a bus. Of course, there has to be enough bus drivers to volunteer to pick them up. The plan does not require the drivers to commit themselves to driving in the evacuation prior to the Emergency Response Plan evaluation by FEMA. In any event, the plan does have provisions for transporting the carless population. It is almost certain this group of people will be the last to be evacuated since the buses will be busy picking up children from school first if the accident occurs during the day. If the accident occurs at night the drivers are asked to nevertheless drive to pick up the carless individuals. This will take time because drivers will have to get their buses, fuel them and find the route they are to take. In the final analysis, the carless population will be the last to be evacuated.

A subgroup of the carless population is those individuals who live in nursing homes and other institutions. These individuals (estimated at 1,735, as indicated in Table 8) will also be evacuated by bus. The number of residents at nursing homes in the evacuation zone is substantial and orderly evacuation is necessary. How bus drivers will respond to carrying such individuals is much different than children. These individuals must also be transported to facilities which can accomodate them. Here again it is unclear who will absorb the high cost of relocating these individuals

TABLE 8

TRANSPORTATION DEPENDENT POPULATION

| Zone Area | Non-Auto | Institutional | School | Total |
|---|---|---|---|---|
| 1 | 51 | 0 | 0 | 51 |
| 2 | 402 | 40 | 4,600 | 5,042 |
| 3 | 389 | 420 | 4,300 | 5,109 |
| 4 | 1,203 | 800 | 5,800 | 7,803 |
| 5 | 128 | 0 | 800 | 928 |
| 6 | 240 | 0 | 700 | 940 |
| 7 | 799 | 475 | 3,000 | 4,274 |
| | 3,212 | 1,735 | 19,200 | 24,147 |

Source: Emergency Plan for Perry Nuclear Power Plant Units 1 & 2.

with such special needs. Hospitals will also have to be evacuated if the situation arises. These underlying problems are not directly addressed in any of the Counties' plans.

Bus Drivers and Protection

Any individual who is going to be exposed to the radioactivity must have to protect themselves from exposure which could lead to health effects. bus driver is going to be "protected", according to the Counties' plans, by monitoring the amount of radiation exposure the driver has already received. By wearing the dosimeter the driver can tell how much radiation they have been in contact with. Of course this does not take into account the differing exposure to different parts of the body. The dosimeter is placed in one location. Also, this "after the fact" type protection will do nothing for a driver exposed to high concentrations. Firefighters and police, on the other hand, are going to be equipped with respirators and protective clothing. This will help reduce their exposure to the radioactivity. Bus drivers will not have this type of protection. Being on a bus does not do anything for their protection from the radiation. Table 6, which is from the CEI Emergency Response Plan for Perry, discloses the protection from the vehicle. According to the table, the bus driver will be exposed to the same amount of radiation inside the bus as outside the bus. A serious problem exists as to the protection of bus drivers and has not been the concern of the Counties' plans.

Traffic Control

Once the evacuation is underway, the problem of traffic control and congestion is left to the police department. They are to control the flow of traffic and respond to any assorted problems. One of the problems is that of stalled cars in the road. The police must call tow trucks in to get the cars removed so traffic will flow. It remains to be seen how

a tow truck will bypass a traffic jam to get to the stalled car, let alone tow it out of the way. If the weather conditions are bad, like a snowstorm, the problems are further complicated.

Also, it is imperative that your car has enough gas to get you out of the zone and to your destination. If you do not have enough gas, then what do you do? The answer is not known.

If you are exposed to radioactivity, the contamination must be handled properly. Hospitals in the area are supposed to obtain equipment and training for handling large numbers of contaminated individuals. Thus far the equipment has not been purchased and the planned capacities of the proposed facilities are far from adequate. According to the FEMA's informal review of the County plan of Lake County, "There is no evidence that the hospital (Lake County Memorial Hospital East or West) has the capacity for evaluation of radiation exposure or uptake." Also, rescue workers have to be trained in handling contaminated individuals so as not to injure themselves. No plan for the training has yet been implemented.

The concept of a Radiological Emergency Response is sound. In case of a nuclear plant accident and release of radioactivity, people whose lives are endangered must be equipped to respond. This means leaving the area of possible radiation exposure. However, in the type of society we live in today the practicalities of having an effective response are questionable. A concentration of more than 93,000 people in an area limits the possibility of an evacuation because it is dependent upon so many variables. The emergency plans can attempt to alleviate the problem on paper, but do nothing when it comes time to take action.

## IX. SURVEY RESPONSE AND ANALYSIS

In July of 1983 the Perry Legal Defense Fund initiated a survey of several key institutions and organizations involved with the evacuation

TABLE 9

SCHOOL BUS DRIVER SURVEY RESPONSE*

| Questions Asked & Answered | Know of Plan & Will Drive | Know of Plan & Will Not Drive | Drive | Not Drive |
|---|---|---|---|---|
| Do have information on radioactive hazards | 50% | 75% | 25% | 20% |
| Volunteer without pay | 100% | 0% | 87.5% | 0% |
| Will make several trips into the 10-mile zone | 100% | 0% | 87.5% | 0% |
| Will pick up individuals without automobiles | 100% | 0% | 87.5% | 0% |
| Will drive in summer | 100% | 0% | ---- | ---- |
| Drive if emergency not in school hours | 100% | 0% | 100% | 0% |
| Have a family you will assist in evacuation | 50% | 100% | 75% | 60% |
| Of total responses answered & unanswered surveys | 4% | 8% | 16% | 10% |

*Thirty-one did not know of plan and did not respond to survey questions.

conflict becomes acute in crisis situations. Seventy percent of the bus drivers who said they would drive, also said they have families they will have to evacuate. Unfortunately, the Emergency Response Plans do not account for this conflicting area and assume the bus driver will do their work -- making several bus trips -- prior to evacuating their families.

The County plans suggest a bus capacity of 88 persons, which exceeds all state-imposed limits. The survey asked the bus drivers how many students should be on a bus in such an emergency. The responses ranged from 40-80 with an average of 60.5 pupils. This is a far cry from 88, and has a lot more credibility coming from the bus drivers.

One last finding of the surveys which was purely fortuitous was the finding of multi-organizational affiliations. For instance, one bus driver was also a firefighter and Emergency Medical Technician for an ambulance. Plan developers included this individual in three resources -- bus driver, firefighter, and ambulance operator. No questions on the survey illicited this response, but the response was written in. There is now an undefinable amount of persons being relied upon to perform many functions.

Bus drivers are the most important link to an evacuation, since approximately 24,000 people without transportation must be moved out of the 10-mile evacuation zone. The survey indicated several deficiencies in the plan which must be addressed if the evacuation is to be successful.

One alternative to bus drivers operating the buses is the use of firefighters. The County plans include the use of firefighters to drive buses which school bus drivers will not drive. Surveys distributed to fire chiefs included the question of using firefighters to drive buses.

Eighty percent of the fire chiefs responding to the survey felt the firefighters should not be driving buses. Firefighters' qualifications for driving buses in an emergency were their experience driving fire trucks

the same as a fire truck or car. Precautions are unique to buses and without familiarity with them the safe operation of the bus is called into question.

The majority of firefighters are volunteer and will have to be mobilized in case of an emergency. Of the fire department responses from the fire chiefs, only one indicated that the firefighters have agreed to participate in the evacuation plan. Firefighters have many roles in the evacuation plan. In order to rely on their services for carrying out the plan, the County officials must get a commitment from the fire departments. Futhermore, it must be determined whether the individuals are also affiliated with any of the other response organizations (i.e., ambulance, bus driver, police) to determine the exact number of personnel. Table 10 has other areas of questioning the survey addresses.

The police surveys reported consistent feelings that the plans are workable on one condition. The condition is that they receive all of the equipment necessary to carry out an evacuation. The police departments are attempting to get Cleveland Electric Illuminating to purchase all of the equipment. So far, as of this printing, there has been no purchase of equipment.

Ambulance corps surveys revealed that none of the responding companies have procedures for a radiological emergency. Also, none have been contacted about the Ambulance corps role in the evacuation. The plans of all three counties identify the need of ambulances in the evacuation of elderly, handicapped, hospital patients (if the hospital is evacuated), and any emergencies occurring during the evacuation. The need for cooperation in the evacuation planning is a minimum foundation which cannot be overstated. However, as in the case with bus drivers, no communication between the developers of the evacuation plans and the ambulance corps participants

TABLE 10

FIRE CHIEF SURVEY RESPONSE*

| | Yes | No | N/A |
|---|---|---|---|
| : :f evacuation plan? | 80% | 20% | |
| _:n feasible? | 40% | 20% | 40% |
| : firefighters agreed :rticipate? | 20% | 80% | |
| _: they drive bus? | 20% | 80% | |
| :ey qualified? | 60% have driver's license and/or drive fire trucks | 20% | 20% |
| _:ion training? | | | Not yet |
| :n vehicles to :port people needing :al assistance? | 20% | 40% | 40% |
| :rtunity to comment? | 60% | 40% | |
| :refighters know of : :n plan? | 60% | 40% | |

* 3.9% of the fire chiefs surveyed responded.

were made. This leads to misconceptions about various roles the organizations are to play.

The response, or lack of it, was very disheartening. Especially in the case of nursing homes where no surveys were completed. There is a need to openly confront the issues of the Emergency Plans. A recognition of the practical deficiencies and inadequacies must be addressed before it is too late. The licensing process of the Perry Plant will not bring to light these deficiencies unless the various emergency response organizations and agencies engage in a dialogue. The Perry Legal Defense Fund surveys succeeded in precipitating the Emergency Plan inadequacies. There must now be some confrontation of the issues in a public forum.

## X. QUOTES FROM VARIOUS SURVEYS

When asked, "Would you drive a bus in an emergency?" the written comments were:

> "As of right now I would. But, two to 10 years from now I don't know if I would. Depending upon if I'm expecting or if I have a family at that time."
>
> "I have my own family and elderly parents to consider. I am against that Perry Plant, and don't want to see it in operation."
>
> "It was my understanding only Perry drivers would be driving."
>
> "Would be glad to help."

One person, in analogizing evacuation planning in a nuclear accident with nuclear war stated:

> "Remember the bomb shelter, this is just another scare tactic."

Another comment read:

> "Who will pay to replace contaminated equipment? The consumer, of course. They'll (CEI) just go to the PUCO (Public Utilities Commission of Ohio) well again, and the PUCO better get this message loud and clear, the well is dry. This plant is obsolete."

"If there is an accident, I feel no one will be alive to tell about it."

"I'll be busy getting my family out. When all the utility execs and their families and the NRC and their families move into the shadows of the cooling towers of a nuclear plant, call me, and I'll help them get out, not until then. I will volunteer in any natural disaster, not man-made with such a wide area for human error."

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