THE PSYCHOLOGICAL IMPACT OF THE
RADIOLOGICAL ACCIDENT IN GOIANIA

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This work describes the psychological impact of an accident caused by the violation of a capsule containing Cesium 137 in the city of Goiânia, Goiás, Brasil, in September of 1987.

Its object is to confirm the importance of having mental health teams working, not only with accident victims, but also side by side with the rescue teams in the event of radiation accidents.
"It would have been very good to have a psychologist with us here in Goiânia, from the very beginning; not just to accompany people from CNEN, but a psychologist who could accompany and study and understand everything that was happening at the human level, during the critical phase of the accident. I mean on the level of people's sentiments, their emotions. So many things happened, and these things need to be documented, not as journalism, but as a study of human behavior. The pressure was too much to stand".

Deposition of a nuclear physicist in Goiânia, 3-3-88
INTRODUCTION

Ever since the destruction of Hiroshima and Nagasaki, the terms "nuclear" or "radioactive" are associated with annihilation of life on the planet; the mushroom cloud, fallout, cancer, death. The chain of association is composed of all that the instinct for preservation of the species negates.

As a consequence, any accident deriving from damage to nuclear or radioactive material or structures causes a strong impact on various sectors of the population, an impact that propagates itself like a wave; uncontrolled, affecting not only those actually injured, but the public in general.

Its characteristics differ from those of any other catastrophe and even when the number of deaths is small, an accident of a radioactive or nuclear nature instills terror because it cannot be sensed or fled from. The danger is invisible, its effects still not entirely understood, and all men fear the unknow.

Nuclear energy, for one reason or another, has always remained surrounded by mystery. Little has been explained to the public about its benefits or about its risks, which makes it difficult to break the chain of association. Consequently, when there is an accident, the danger is perceived in a form unusually intense, and the result is panic.

To deal with this panic it is important that immediately after an accident occurs, mental health teams should be sent to the locale. Their objective would be to give support to the victims and to all work group, i.e., those whose tasks are in hospitals with the victims, those who deal with the public and press and the technicians who carry out decontamination of the locale. This intervention is necessary in order to mitigate the loss of emotional control which is experienced by everyone; not only the victims but those who succor them.
<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Full Form</th>
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<tbody>
<tr>
<td>CNEN</td>
<td>National Nuclear Energy Commission, Rio de Janeiro</td>
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<td>ESIE</td>
<td>School of Specialized Instruction, Army</td>
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<td>FEBEM</td>
<td>State Foundation for Care of Minors, Goiânia</td>
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<tr>
<td>FURNAS</td>
<td>Furnas Electric Power Station S/A, Rio de Janeiro</td>
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<tr>
<td>HOT</td>
<td>Hospital for Tropical Diseases, Goiânia</td>
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<tr>
<td>HGG</td>
<td>Goiânia General Hospital, Goiânia</td>
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<td>HNMD</td>
<td>Marcílio Dias Naval Hospital</td>
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<tr>
<td>IEN</td>
<td>Nuclear Energy Research Institute, Rio de Janeiro</td>
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<td>IGR</td>
<td>Goiânia Radiotherapy Institute, Goiânia</td>
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<td>IPEN</td>
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<td>IRD</td>
<td>Institute for Radioprotection and Dosimetry, Rio de Janeiro</td>
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<td>NUCLEBRAS</td>
<td>Brazilian Nuclear Companies S/A, Rio de Janeiro</td>
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OBJECTIVES

The objectives of this work are:

1 - To describe the psychological impact of an accident involving a Cesium source, which occurred in Goiânia in 1987 and more particularly, to describe the impact on the following groups:
   - the hospitalized victims;
   - the contaminated and irradiated victims, as well as those whose goods and property were contaminated;
   - the doctors and hospital staff;
   - the support groups;
   - the government technicians who worked in the decontamination of Goiânia as well as in the hospitals;
   - the population.

2 - To describe the behavioral disturbances deriving from this impact and try to explain them theoretically.

3 - To describe the psychological work executed in Goiânia and Rio de Janeiro during the accident.

4 - To demonstrate the necessity for creating mental health teams to be integrated, from the first, with other working groups at any nuclear or radiation accident.

5 - To make recommendations, based on lessons learned in Goiânia, for relieving the stress that accidents of this type can cause.

6 - To present conclusions.
METHODOLOGY

1 - Collection of Data

a) During the first two weeks of March, 1988, in the city of Goiânia, the author interviewed the following groups:

- victims who had been hospitalized;
- psychologists, psychiatrists and nurses who treated these victims;
- unhospitalized victims (including interviews made in their homes);
- journalists from the city, who covered the accident for TV and the press;
- functionaries of the LEIDE DAS NEVES FERREIRA Foundation, social workers in particular, and people chosen at random in the streets of the city, such as taxi drivers, sales persons, etc.

b) During the last part of March, interviews in Rio de Janeiro included:

- the staff of the Marcílio Dias Naval Hospital;
- doctors from CNEN and FURNAS, two of the first trained professionals to enter in contact with the victims, on September 30, 1987;
- the first technicians from CNEN to enter in contact with the accident;
- radioprotection technicians who worked in the hospitals, and
- the ex-Director General of Community Support from Civil Defense of Rio de Janeiro, who participated in the operations for aiding the victims.

c) During the month of April, 1988, the author made a research among the CNEN technicians who worked on various fronts during the accident.

2 - Data Analysis and Editing of the Work

- data collected in March were studied, behavioral disturbances analysed and compared with disturbances recorded in the literature and hypotheses were formulated. Methods of interventions were studied for each specific finality.
- research carried out in April was analysed and this work was prepared.

3 - Observation:

It should be made clear that the present work is largely based on deposi-
tions. Throughout the text care has been taken not to alter these depo-
sitions in either content or form.
HISTORY

In mid-September, 1987, Goiânia, State of Goiás, Brazil, two scavengers of old metal removed part of a unit containing radioactive material from an abandoned radiotherapy institute (IGR). Their intention was to sell the metal to a junkyard. They took the object home and in the backyard, attempted to dismantle it, having no idea of its significance. They succeeded in partially opening it, so that a portion of the Cesium 137 source was exposed.

The apparatus was sold, but the bits of material which they had managed to remove from it were distributed among friends and relatives because of its brilliant blue glitter. All of them played with the powder, and a six year old girl rubbed it on her body, and later ate with her hands contaminated by the substance and swallowed it. The fragments were kept as curiosities in various houses.

The capsule containing the rest of the source remained in the junk-yard (now known as Junkyard I) for some days, and then was sold to another (Junkyard II), and was freely handled by many people, who shortly afterward began to experience vomiting and diarrhea but no doctor succeeded in diagnosing the symptoms correctly.

After some days, the wife of the owner of Junkyard I took the capsule to the Health Department where its significance was eventually recognized and the symptoms of those involved were diagnosed as acute radiation syndrome.

The National Nuclear Energy Commission (CNEN), a government organ, was alerted and with the prompt arrival of technicians from that institution, treatment of the victims was initiated along with a search for focal points of contamination, and the process of decontaminating the city was begun.

A triage center and monitoring post were mounted by the CNEN in the Goiânia Olympic Stadium, where every day thousands of people came to be monitored. During subsequent months 112,800 people were examined and those who were contaminated sent to decontamination posts or hospitalized.

During October, November and December of 1987, the work of personnel decontamination and the recuperation of contaminated locations was undertaken.

10) The radiotherapeutic source had the following characteristics at the time of the accident: Total mass of 17g, bulk density of 3g/cm³ and an activity of 2000 Ci. The estimated dispersion was of 17g, 1+ was manufactured in 1971 and made of cesium chloride.
in joint endeavour by the Federal Government, the ESiE, the Civil Defense, the State of Goiás, NUCLEBRAS, FURNAS and CNEN. In January and February the work was continued in more detail; a veritable fine-combing operation.

A child, a woman and two men died as a consequence of the accident and around 249 people were contaminated. These victims will be subject to medical follow-up for the rest of their lives, with the LEIDE DAS NEVES FERREIRA Foundation continuing this work with CNEN.

2 120 people showed contamination of clothing only, and 129 showed internal and/or external contamination.

3 The Foundation was created from the Social Assistance Nucleus, formed in Goiânia in October 1987 to furnish assistance and serve as an information center for procedures in accidents of this nature.
IMPACT ON THE VICTIMS

When, on the 29th of September, the symptoms of people with vomiting, diarrhea and blisters were diagnosed as symptoms of irradiation, and the ramifications of the accident became apparent, the first measure taken, while waiting for the CNEN technicians to arrive, was to evacuate the people whose houses were contaminated. Those whose physical condition was most serious were sent to the HDT, while others were isolated in eight army tents on the grass of the Olympic Stadium, where they were left for 24 hours without attention since no one had courage to come near them. Only the following day when a doctor and two radioprotection technicians arrived, were these people fed and given clinical-laboratory evaluations, monitoring and decontamination baths, and triaged according to the gravity of the case.

The more seriously affected were again transferred, from the HDT to the HGG, a Government hospital which at that time was on strike, with only its emergency sector functioning. The Director of this hospital had arranged for the evacuation of part of this place to receive the victims and here again they were left alone, since because of the strike, the fear or lack of preparation, no one came to give them any attention whatsoever. In the evening, treatment began when three doctors from Rio de Janeiro arrived; a radiation specialist from NUCLEBRAS, a doctor from FURNAS and the doctor from CNEN who had already spent the entire day working at the Stadium.

SOCIAL ASPECTS OF THE VICTIMS

An important aspect of this accident was the fact that most of the people who had direct contact with the radioactive source pertained to a low-level socio-cultural, low-income group, having as well large, closely interrelated families, living under extreme poverty conditions with inevitable promiscuity and lack of hygiene. The majority of the men were odd-job men or scavengers, with a low intelligence coefficient and ages ranging from 14 to 40 years. Some presented personality disturbances during treatment.

Other victims, such as functionaries of the Sanitary Department, firemen, etc. belonged to a more favored and enlightened social class. It was noted that the higher the social level, the greater the preoccupation with the consequences of the accident and awareness of the risks involved. Less enlightened victims were less anxious at first.
THE UNHOSPITALIZED VICTIMS

People living near focal points of contamination were evacuated from their houses and had their lives completely disrupted by something which signified no threat to them, and for which they were not responsible. It was an invisible catastrophe and therefore difficult to believe in. Their houses were invaded, they were forced to abandon their possessions, nor could they reenter later in order to retrieve some precious belonging. Some houses were demolished and their owners forced to sleep in the street since, in face of the discrimination against anyone connected with the contaminated area, they had nowhere to go. Some had members of their families hospitalized. In their panic and despair they employed the Government technicians for help.

One of the Health Department doctors who had himself been in contact with the capsule and had received a high dose, related in March, 1988: "When I realized that we were dealing with radioactive material I got into an extremely upset emotional state. I began reading everything possible about Cesium 137 and that made me worse still. I lost eight kilos because I couldn't eat with so much anxiety. I talked to the doctors who were radiation specialists and they calmed me down, and I kept on working because I knew that if I stopped to think it would be worse. From the literature on Cesium I learned that this material lodges in the musculature, and immediately I began to feel the effects of muscular spasms in my legs and arms, for no reason at all. I knew that they must be psychosomatic but I couldn't be certain. I also had a hemorrhage in the left eye, because I knew that Cesium gives eye problems. I made the necessary exams and had no internal contamination, only a high radiation dose. I had no psychological accompaniment, nor medical either. In our work group we made support therapy among ourselves; talking a lot, and one consoling the other. As to the future, there are risks for me, but I'm going to lead my life, navigating the boat while there is time."

THE DIRECT VICTIMS

Each individual is a separate universe different from all others because of his life history and personality. This accident affected all these people dramatically in their bio-psycho-social system, however normal their personalities might have been considered. Some, healthier, and with
employment and more stable relationships, had fewer problems than those, for instance, who felt that the many inquiries by police and other authorities regarding the Cesium capsule, might prove prejudicial to them.

After the triage in the stadium, those contaminated were sent to FEBEM (Primary), HGG (Secondary), or HNMD (Terciary), according to the gravity of the case. Later, after more specialized examinations, various FEBEM patients were transferred to HGG, some from HGG to FEBEM and a few from HGG to HNMD. These transfers increased the ever-mounting tension and preoccupation, since to be sent from FEBEM to HGG was an indication that the case was serious.

Some of the populace were terrified by what they read and heard, and fled from the initial triage, only to return to the Stadium later, some already presenting severe radiodermatitis and symptoms of internal contamination.

A number of scavengers and junk collectors were interned in FEBEM. The majority were adolescents who, according to the psychiatrist who accompanied them, were highly nervous; full of fears of that invisible and incomprehensible "thing" whose physiological effects kept appearing progressively. This nervousness and irritability generated aggression in the patients, expressed by threats of touching other people in order to contaminate them: a vengeance reaction used to compensate their fear of rejection and death. They felt themselves endowed with power to intimidate those who were uncontaminated. All demonstrated a compulsion to touch and hold others, a great fear of rejection; fear of the future, when they would leave the hospital, fear of never again going to school, never to have a girlfriend or to marry. Their only thought was to leave the city, change their identity and go someplace where no one knew them. The families of these adolescents experienced the same fears.

5 Primary - Term used to indicate light external or internal contamination justifying methods of decontamination which could not be accomplished elsewhere.

6 Secondary - Indicating light-to-moderate hematological compromise and moderate-to-severe radiodermatitis.

7 Terciary - Indicating hematological compromise and/or severe radiodermatitis.
The reactions of patients at HGG varied greatly according to the moment, for it was from there that they were sent to HNMD if their state was grave, and it was there that they returned when they began to improve. Some stayed at HGG throughout their treatment. All the patients felt a negative impact when one of their number was transferred to HNMD, and when there was news of a death, their morale deteriorated and they experienced severe depression. But when someone returned, they all felt themselves reinforced.

According to the psychologist who accompanied them during the months of November and December, the patients developed a sensitivity which enabled them to capture any feeling of change in the air, as happens with people who are in danger. They were aware that the discrimination against them within the hospital was very great and that the hospital as a whole was afraid of them. This, added to visits from the merely curious, who had no connection with the hospital, did them much harm psychically, and this uneasiness was verbalized to the psychologist.

According to one of the nurses, these patients, having a very low social level, were people who had never owned anything, and now suddenly they were famous, with a right to have everything; important, different, but at the same time confused, isolated from the world, fearful of confronting reality and fearful of being rejected. Treated as they were by doctors and nurses totally covered by overalls, masks, caps, gloves and boots, which increased their sensations of rejection by society, they began to present serious behavioral disturbances and to treat the nurses aggressively.

At HNMD the professionals in attendance affirmed that the patients had a clear perception of the gravity of their situation and even those with a low intelligence coefficient ran the gamut of suffering; emotional, social and (primarily), physical. These victims remained totally isolated from their families, unable to have visitors, seen as objects of scientific curiosity, frequently being photographed or examined and observed by doctors not of their team, who came once and never returned.

At first, when the symptoms still were not intense, they were impatient with all the protective apparatus and procedures. Preoccupation began with the first death, with the fear that the next might be their own.
A doctor who attended these patients from the first, affirmed: "I cannot say that I gave psychological support to the patients, but I tried to talk to them, explaining what was happening, because they didn't know anything and were very anxious. One of them (E.F.), was a person with a higher level of education, and he asked me what would be the consequences of the accident; if he would die, or have cancer. I tried to explain that although he had a high dose, it had been spaced out, and this was less serious. I said that the treatment they were having was the best possible, given by the most qualified people, so as to quiet the situation".

The medical staff attempted to explain the various phases of the syndrome and the treatment involved. They were greatly preoccupied with the possibility of one patient transmitting an infection to another, and therefore anyone with an infection or the suspicion of one, was isolated. Two patients died in isolation, and afterwards the fact of being isolated generated enormous tension. Since it was after a scintiscan that one patient had his forearm amputated, from then on making a scintiscan caused in the other patients, extreme fear of a similar fate. All had serious lesions on feet and hands and at any thought of amputation they stopped eating and sleeping, or if they slept they were subject to nightmares. Their aggression increased and they refused medication.

A professional at HNMD relates that innumerable manifestations of negation, anger and depression appeared among the most gravely affected patients, along with an intense desire to die and be rid of the suffering. M.G.F. asked if it would be too great a sin to hurry along the end by disconnecting the tubes, as she found the waiting unendurable. There was also much discussion among the victims as to who was to blame for the accident, and there were accusations and quarrels.

Eventually some of the patients improved sufficiently to be returned to HGG, which raised the morale of the rest because of the return of hope. The aggressive energy which had previously gone into defense and confrontation with the possibility of death, was therapeutically channeled. None the less, there was much anxiety about returning to Goiania and facing discrimination. When they heard of the stoning of the coffin they said "If they do that to the dead, what will they do to us?"

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8 See page 37
PSYCHOLOGICAL ACCOMPANIMENT OF THE HCG VICTIMS

A psychologist relates: "I was called at the end of October to attended one patient who was very anxious, but all I could do for him was to listen, because he gave no chance for me to say anything. He just needed to verbalize his feelings.

Another patient called me to his room and began to verbalize all his anxieties and preoccupations. He felt terribly threatened by imminent death; defenseless, attacked by an invisible enemy, and felt that if I supported him, who knows, maybe he could defend himself. This patient suffered from auto-rejection because he could not endure to look at his own hands. I kept giving him support therapy, and I tried to learn about radiation, at a superficial level, so as to talk more with him about the subject.

We were completely covered, head to foot, and to attend people who were clamoring for help, hiding ourselves behind things was very difficult. To try to pass a sense of security to another person while wearing those clothes which gave a connotation of fear, - as if I needed to protect myself from them, while they just used shorts, was almost impossible. We stayed at a distance and they always complained about this distance and as their decontamination progressed, they asked us to come without masks. I told them that I felt very uncomfortable being dressed like that, without showing my face, as if I were a doll, I said we used these clothes so as not to contaminate them, because of their low immunity, but if they wanted to take the risk, I would take off my mask at a few meters' distance, for them to see my face, and then I would replace it. They agreed, and I did this, and they were very happy (the smiles were marvelous). The fear that they sensed, coming from the people who treated them, made them feel ostracised. Because of this I wanted so much to take their hands, to touch them.

Later we were free to take off our masks and gloves, and finally even the overall was unnecessary. Nobody can imagine how they improved emotionally.

Little by little, the patients began to improve, and in direct ratio to the improvement in their health, their anxieties increased. When they learned of a death they were in despair, terrified to be the next one; always with that expectation. They had never thought of cancer until then. They prayed, and suggested that I call in a priest. I managed to do this, and he came.
Among the patients in Rio de Janeiro, the only one who really profited from the accident was D.A.F., who got to be a star. His recovery was so remarkable, in spite of having received what was thought to be a lethal dose, that he became an object of much public attention on TV, which resulted in considerable gains for him, emotionally and financially. In fact the gains were so great that they prevailed over everything else, and I didn't want to diminish them because at that moment it was better that we should be preoccupied emotionally than socially.

Sexuality made its appearance. One patient pinned a picture of a naked woman on the wall. I brought some magazines for them; when there is evidence of libido, it is because the emotional state is healthier.

During a crisis I never tried to learn anyone's past history, and I don't know if they had had marked personality disturbances, because the most important thing at the time was to get them out of their present crisis.

PSYCHOLOGICAL TREATMENT AT HNMD

The psychological attendance at HNMD was undertaken by the Chaplain, who had a degree in psychology from a university abroad, and made use of psychology in his pastoral work. He relates: "I established frequent contacts with a patient who later died, and accompanied her illness. She passed through all the phases, from negation and rage to bargaining with the Divinity and the Saints. Later there was depression, acceptance and peace. I came to visit her often, and gave her special attention. I was completely covered up, face and all, but she knew my voice and when I didn't appear, the social worker would call for me. The nutritionist, the social worker and I formed a little group who viewed the patient as a human being, a person, not just someone who was contaminated with Cesium, and we managed a dialogue with them. All had serious lesions on their hands and feet, and I had to prepare them for the possible loss of a member, talking for hours to make them accept the possible loss of a part, in order to save the whole. When one did have an amputation, I tried to help him assume his new corporal identity, even though he was in a semi-coma when he went to surgery.

We tried to help those who were dying to confront death and the others to support the loss, because they were all one family. The work that I did in
the hospital was normal for me; loss of members and death. I give spiritual help; not only Catholic, but I give something of the profound spiritual values."

DISCUSSION ON BEHAVIORAL DISTURBANCES

Regarding the type and degree of the victims' mental pathology, there is a certain divergence of opinion among the attending professionals. Two of the patients had been interned in psychiatric hospitals, but it was impossible to recover the histories of whatever occurrences had caused them to be interned. However, all professionals were unanimous in affirming that behavioral disturbances arose among the patients during the months of their hospitalization, of a nature sufficiently severe to necessitate the presence of a psychiatrist to sedate them. Some broke up the infirmary, others presented the most profound depression, others showed signs of hysteria or narcissism and still others of social psychopathy. Without their past histories, comparisons could not be made, but the fact is that before the accident these people were leading what was considered a normal life, within their social contexts. For them, according to depositions, the threshold of pain, whether physical or emotional, is higher than for those of the more favored classes. To make them weep or feel pain demands a stronger stimulus. During the accident they faced facts in a fatalistic manner, believing that if someone died it was because he was meant to die, and if they suffered, it was because they deserved to suffer. But they never stopped thinking of the secondary advantages of the accident, such as compensation for the loss of their possessions. They demanded a great deal and wished to recover from the State more than they had ever actually had.

It is evident that the suffering involved in being imprisoned in a hospital, without adequate movement, experiencing great pain, unable to understand the motive for so many medical procedures, feeling deeply the absence of familiars, ostracised for being the carrier of an unusual syndrome, - all of this might well bring an individual to develop deflagrable pathological personality nuclei, however low his intelligence coefficient and however disconnected from reality this person might be.

Depression was another factor which aggravated the patients' mental state. One of them, it was reported, who was more intelligent and
obviously had full comprehension of his situation, did not improve because of his apprehension. He had various infections during his treatment and remained hospitalized longer than any of the others, during which period he learned of the deaths of others who had been in a less precarious state than he. It would appear that depression and apprehension had prevented his organism from reacting positively. Fortunately for him, the bacteria proved less stubborn than he in their resistance to the antibiotics, and in spite of himself, W.P.M. surmounted the crisis.

I.B.S., interned in the HGG, cried for two days without stopping when he learned that he was to be transferred to Rio de Janeiro. He insisted that he felt nothing, and that he didn't wish to go. He arrived at HNMD in an extremely depressed state and shortly after, died of opportunistic infection. His immunological system did not react.

Judging by the behavioral disturbances that arose during hospitalization it is reasonable to suppose that some patients experienced a reactivation of previous pathological nuclei.

The basic function of the psychic system is to reestablish an equilibrium which has been disturbed by external stimuli. Failure in maintaining equilibrium results in a state of emergency. Any excitation too intense to be contained in a determined limit of time represents a simple example of emergency. 'Too intense' signifies beyond capacity for control. This capacity depends on constitucional factors and on the individual's previous experience. (4)

The Ego avoids traumatic states through its capacity to anticipate events which might occur and thus prepare for the future. Unanticipated events are experienced in a more violent form and thus produce a traumatic effect. (4)

Quantities of uncontrolled excitation, caused by sudden occurrences, or chronic tension, create a highly painful tension and release pathological nuclei in the individual. An emergency release is generated, in part as an automatic function, against the will, and without the participation of the Ego, and in part by the Ego's residual forces. Some of the symptoms are:
1. blocking or diminishing the Ego's diverse functions, such as motility control, contact with reality, etc.;
2. excess of incontrollable emotion, especially anxiety and frequently rage;
3. insomnia, or serious perturbation during sleep, such as nightmares or dreams in which the trauma is released, and
4. secondary psychosomatic complications such as the liberating of nuclei of pre-existent mental illness.

Traumatic action might result in the awakening of latent conflicts between the Ego and Superego. For example, when speaking in a fatalistic manner, as when the victims confronted the accident by repeating 'This is destiny', or 'this happened because I deserved it'. In reality, their attitude was a repetition of conflicts originally existing between the external world and the Ego.(4)

Secondary benefits played a major rôle here. The benefits in this case refer to certain ways in which the patient can use his illness, which have nothing to do with the original problem, but can be of the greatest practical use; for instance in obtaining compensation for lost property. The symptoms can serve secondarily as a demonstration of his infirmity, in order to obtain a security equal to that which he had in infancy. For the patient, the manner of how to obtain these secondary benefits (which for him has become an idée fixe) converts into the principal problem of the treatment.(4)

This was clearly demonstrated in the case of the Goiania victims by the manner in which they concerned themselves with compensation for their lost possessions. This battle to obtain financial compensation created an unfavorable climate for psychotherapeutic support but at the same time, it acquired an unconscious significance of protective love and security. Consequently, this form of compensation should not be underestimated by the psychotherapist who, at times, not realizing its significance, tends to persuade the patient to give less importance to his more material preoccupations.
TABLE I

REACTIONS OF THE PATIENTS IN HGG, HNMD, AND FEREM, ACCORDING TO THE PROFESSIONALS

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<th>SUBJECTS</th>
<th>Psychiatrist I</th>
<th>Psychiatrist II</th>
<th>Chaplain, HNMD</th>
<th>HGG's Psychologist</th>
<th>Psychiatrists in HGG</th>
<th>Doctor in HGG, Nuclear medicine</th>
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<tr>
<td>Desire for death</td>
<td></td>
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<tr>
<td>Insomnia and/or fault of appetite</td>
<td></td>
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<tr>
<td>Need for contact with the family</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Melancholy and/or depression</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Nightmares</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Delirium</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Absence of fear of death</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ideas of death-in-life</td>
<td></td>
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<tr>
<td>Fear of death and/or panic</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Guilt</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fear of ostracism</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>A need to be touched</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Need for secondary benefits (escape from social anonymity)</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

*Psychologists from LEIDE DAS NEVES FOUNDATION*
<table>
<thead>
<tr>
<th></th>
<th>PSYCHIATRIST IN HGG</th>
<th>CHAPLAIN IN HNMD</th>
<th>PSYCHOLOGIST OF HGG</th>
<th>DOCTOR IN HNMD</th>
<th>DOCTOR IN HGG</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PATIENT I</strong></td>
<td>Presented irritable depression which could be reactive. Absence of fear of death because of lack of perspective</td>
<td>presented depression because of death of his daughter.</td>
<td>Presented grief, depression, weeping. Absence of fear of death.</td>
<td>Presented some mental pathology - melancholy, weeping, aggressiveness, accentuated libido, longing for mother. Only had problems when at HGG.</td>
<td>Presented extreme neurosis-disturbances triggered by situational component. Shouted to call attention. Pathological relation with mother.</td>
</tr>
<tr>
<td><strong>PATIENT D</strong></td>
<td>Presented a psychopathic hypomanic conduct, exacerbated by leaving social anonymity-aggressive (&quot;let me hold you to contaminate you&quot;).</td>
<td>Most of the time in coma. Afterwards was well.</td>
<td>Presented lack of moral censure, aggression with threat to contaminate the healthy.</td>
<td>Presented some mental pathology - melancholy, weeping, aggressiveness, accentuated libido, longing for mother. Only had problems when at HGG.</td>
<td>Presented some mental pathology - melancholy, weeping, aggressiveness, accentuated libido, longing for mother. Only had problems when at HGG.</td>
</tr>
<tr>
<td><strong>PATIENT E</strong></td>
<td>Presented an asthenic, histrionic psychopathic attitude. Screamed to call attention. Irritated by long confinement.</td>
<td>Narcissism, latent homosexuality, screamed to attract attention</td>
<td>Narcissism, latent homosexuality, screamed to attract attention</td>
<td>Narcissism, latent homosexuality, screamed to attract attention</td>
<td>Narcissism, latent homosexuality, screamed to attract attention</td>
</tr>
</tbody>
</table>
## TABLE III

**REGARDING PSYCHOLOGICAL/PSYCHIATRIC WORK PERFORMED AT HGG, HNMD AND FEBEM HOSPITALS**

### TYPE OF TREATMENT GIVEN

<table>
<thead>
<tr>
<th>Type of Treatment</th>
<th>Psychiatrist at HGG</th>
<th>Psychologist of HGG</th>
<th>Psychologist of Leide das Neves F.</th>
<th>Chaplin of HNMD</th>
<th>Psychiatrist FEBEM I</th>
<th>Psychiatrist FEBEM II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prescribed possible medication</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accompaniment</td>
<td></td>
<td>X</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Catarse</td>
<td></td>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No answer</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

### PERIOD IN WHICH TREATMENT BEGAN

<table>
<thead>
<tr>
<th>Period of Work</th>
<th>Psychiatrist at HGG</th>
<th>Psychologist of HGG</th>
<th>Psychologist of Leide das Neves F.</th>
<th>Chaplin of HNMD</th>
<th>Psychiatrist FEBEM I</th>
<th>Psychiatrist FEBEM II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beginning of October to December</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>End of October to January</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Final of November to present date</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Date of work omitted</td>
<td></td>
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<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
IMPACT ON DOCTORS AND HOSPITAL STAFF

The doctor from Nuclebrás and the doctor and two radioprotection technicas from the CNEN, were profoundly shocked when they entered the ward assigned to the victims at HGG and encountered twelve patients with severe lesions, left entirely alone, without treatment, food or adequate clothing. On the night of that same day, a doctor from FURNAS, arriving at HGG, discovered an ambulance with a naked patient presenting severe radiodermatitis, dehydrated and gasping for air, abandoned on a stretcher inside.

The condition in which the patients were encountered, the problems at HGG, which was on strike, the discriminatory attitude of the local doctors and the lack of assistance from the nursing staff; all this, added to their own lack of practical experience, brought the doctors from Rio de Janeiro almost to the breaking point. Two hours of sleep per night was the average, and appeals to the Goiania medical community brought no response. Only after the passage of weeks did some local doctors and nurses volunteer, confronting ostracism (since they, like the patients, had become objects to inspire fear), and uniting into a multidisciplinary team.

Impact on the doctors in the hospitals varied greatly, depending on personality, locale and the phase of the accident during which each one began work.

The major shock was felt by those who had the first contact with the casualties, who were by then demonstrating all the symptoms of the syndrome. One doctor relates: "After the first 48 hours of intense work the tension was so great that I began to present psychosomatic symptoms imitating radiation syndrome; fever, headache, vomiting. I even began to cry".

The feeling of impotence experienced by the Rio doctors was enormous, in face of the lack of resources and the difficulties inherent in working in a strange hospital without the slightest cooperation. Another doctor points out that there exists a very great difference between studying the biological effects of radiation and actually encountering radiodermatitis, and that in the beginning he was emotionally upset and confused, only later becoming more involved with the treatment techniques and less emotionally affected.
At the HHMD less stress was experienced. Not only was the hospital better prepared, but there was international assistance. None the less, there was great emotional involvement with the patients and many professionals admitted to having difficulty passing from theory to practice.

The doctors of forensic medicine, who had no nuclear training but who made the autopsies, also suffered great impact, principally from the first two deaths, one of which was a six year old girl. Their problem was not only reaction to the deaths and the manner in which they occurred, but also the fact that they had to perform their tasks impeded by the astronaut-like protective clothing.

Most doctors came to feel great affection for the patients, and the sentiment was reciprocated. According to one of them; "We would have liked to accompany them for a long time to come, because there was a very strong bond between us and also because any doctor likes to know how his patients are doing. But the State of Goiás took over this accompaniment." Another says "I was very sad at not being able to continue accompanying them, after all the effort to save them. This was a tremendous frustration". According to still another: "On the professional side, the work was very gratifying. We had only a few deaths and I feel that the work was rewarding. It would have been very useful to continue to accompany the patients, because our work was not finished when they left the hospital".

THE HOSPITAL STAFF

At HHMD there were nurses with specialized courses in radioprotection, but nevertheless, they were all afraid. The Chaplain of the hospital says: "Some nurses, at the beginning, hardly had courage to stand up. Their knees trembled and they said to me "Father, pray. Pray hard, because I'm not going to be able to do it". I tried to talk to them, so they could verbalize their doubts and fears. But many of them wanted to quit and abandon the work because they said they could not bear coming here to the hospital; to think that they had to go to work in the infirmary. They were afraid of being contaminated if they came near the patients".

9 The Fundação Leide das Neves Ferreira and Doctors from Rio are working together, periodically.
S.R., Chief Nurse at HNMD, directly responsible for care of the patients since their first day, relates: "Word of the accident arrived at the hospital on September 30th. Nobody had any real idea of what had happened; nothing was confirmed, we didn't know what to expect. We felt an enormous impact when they opened the doors of the airplane and we saw that scene: six patients with ugly lesions on their feet, hands and necks, already without hair, very debilitated. Since that first day, I accompanied them and lived their drama, up until the survivors returned to Goiânia.

The impact on the nurses was enormous. I can't say for the others, but for us here, it was enormous. We began the work; one nurse, one auxiliary nurse and I. We began very cautiously, but when we saw the dimensions and the gravity of the case, saw the risk we were running, staying for a long time beside the patients, receiving a high dose of radiation, we were frightened. We had to find volunteers, which wasn't easy. I wanted volunteers only. It is difficult to compel a person, and if you do, you have two problems to resolve, the panic of the nurse and of the patient. It was difficult. The volunteers got as far as the door, but when they saw the scene they panicked and left running.

When L.N.F. and M.G.F. died we already knew by the dose that they would die, but even so we were sad. But those two boys who died, one was very debilitated on arrival. He improved, had a relapse and died. The other was apparently very well, and we were stunned because we were very attached to him. They died, and we never imagined that they would really die. In the end, we were just like the patients; in panic.

We didn't hide anything from them; we thought they would all die, we wanted to get out of there. Here we were risking our lives, but they were dying anyhow, so what was the use? But we had to turn into psychologists, talk to them constantly, feel for their problems, put ourselves in their place, cry with them, be intimate with them. I had several attacks of nerves because of their anxiety. We suffered all the stress, along with them.

At the HGG the psychological impact was very strong. There was a great deal of tension among the few nurses who volunteered. They were rejected and ostracised wherever they went, even by the doctors of the hospital, which called them suicidal, and told them that they would contaminate their own children, who might get cancer. Some did abandon the service, because of the stress, but the situation finally improved and in December the
protective clothing could be discarded and things began to go back to normal.

IMPACT ON THE RADIOPROTECTION TEAMS IN THE HOSPITALS

The primary shock was the notice of the accident, and the second came with the initial sight of radiodermatitis. For most, the cause of stress was at first simply overwork. Organization of the service was only beginning; procedures, coordination, division of tasks, etc. There was theoretical knowledge but no practical experience and time was needed to establish a routine.

A few of the radioprotection technicians say that they were sufficiently prepared and felt no particular impact. None the less their emotions became deeply involved. They found it difficult to accompany the physical and mental suffering, afraid always that the patients would die. They all were happy when someone was given his discharge.

Others were affected more strongly and wept daily. One technician told of his emotion at monitoring the cadaver of a victim and said he had never imagined that such a thing could actually happen.

The team that dealt with excreted waste felt themselves under great tension, and suffered from exhaustion and psychosomatic problems such as continually having grippe, which complicated their work. According to the doctor who treated them, this could have been a consequence of depression of the immunological system.

Some of the technicians from HNMD were later sent to Goiânia, to the HGG. There they encountered former patients who had returned from Rio when their state improved. They told of the surprise and pleasure of the people at seeing them again, and of the affection and friendship that grew up among them.

TABLE

REGARDING PSYCHOLOGICAL TREATMENT OF PROFESSIONAL IN THE HEALTH AREA OF HGG HNMD and FEBEM HOSPITALS

<table>
<thead>
<tr>
<th>TYPE OF TREATMENT</th>
<th>HNMD</th>
<th>FEBEM</th>
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<tbody>
<tr>
<td>THER</td>
<td>X</td>
<td>X</td>
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</table>
IMPACT ON THE SUPPORT GROUPS

The population of Goiânia, which had ostracised and discriminated against the accident casualties as well as against the few who came to help them, was in its turn discriminated against and ostracised by the rest of the country, which considered anyone and anything from Goiânia, suspect.

The panic and confusion that took over the city was such that groups were organized to give information and support to the public. Support was also needed by the Government technicians whose task it was to decontaminate the city. The technicians from CNEN wanted someone to accompany them into the contaminated areas because the people there were terrified and hostile. Information, when there was any, was contradictory. The technicians claimed that it was taking four hours to do one hour’s work because of the time lost in giving explanations and calming the population.

One of the first persons to offer help to the city was Colonel S., at that time in charge of Community Support in the Rio de Janeiro Civil Defense Department. Accompanied by three sergeants, he arrived at the locale of the accident and set up a support system in conjunction with the other government groups. Accustomed to dealing with catastrophes, he felt no major impact from this one. What did impress him, however, was the violent rejection that the victims suffered, which created the necessity for a written certificate of non-contamination, often demanded before one person would treat with another. He was also impressed by the lamentable scenes at the burials.

It was very difficult to encounter volunteers in the area of social assistance, but those who presented themselves, participated fully in the work, visiting both the interdicted areas and those nearby, along with the CNEN technicians. The populace in areas adjacent to those interdicted, showed enormous anxiety and the social workers did much toward solving their problems and tranquilizing them. A telephone system was organized whereby people might call and advise the authorities of any point of contamination encountered, and a technician accompanied by two social workers would verify the veracity of the denunciation. In the first days, the people were terrified of the CNEN workers, with their overalls, masks and the strange apparatuses they carried. The presence of the social workers helped to mitigate this fear and enabled them to approach people directly and create confidence through conversation and explanations.
A social worker relates: "The people asked if we were from Goiania or from Rio. They thought that if we were from Goiania and had faith in CNEN's work, so would they. But if we were from Rio they would be less confident: it was easy for some outsider to have confidence because he could depart at any time and leave them in a contaminated city".

Another worker relates: "The experience that marked me most in the whole process was when the house of T.F., one of the victims, was to be torn down. We went into that house with the demolition group to take an inventory of her belongings, all dressed for the first time in those overalls and things. They told us we couldn't touch anything, not even our own faces. When I entered that house I felt so shocked, so filled with pity... The front room was full of things, all disorganized, books, clothes, sofa, and I had to list them all as fast as I could because the time we could stay in there was so short. I was upset because I was invading someone's privacy. The house of that woman represented everything she had lived through up to now; the photo that was apparently of her husband who had died, the pictures of her children. They were pictures of her entire life experience. And suddenly this group, having nothing to do with that life, invades her home and writes down coldly everything that she was losing, which was now to be considered trash. In the bedroom, a pile of letters with the name of her husband, from the time of their courtship, and suddenly everything goes into the trashcan, the letters, everything that she had lived through. Even today when I think about it, I'm upset."
IMPACT ON THE TECHNICIANS

Included among the approximately 700 people who worked together during the accident were scientists and technicians from the CNEN, from Nuclebrás S.A., the Center for Development of Nuclear Technology of Nuclebrás as well as the Armed Forces and Civil Defense. While these last were trained to deal with catastrophies, the government technicians, whose academic qualifications ranged from technical school certificaties to doctorates, were accustomed to work with radiation problems within determined standards, and under laboratory conditions. That is to say, their training referred to safety norms and accident scenarious appropriate to possible accidents in radiation laboratories and reactor plants, but was not adaptable to the field. These highly trained specialists, whose aptitude was for the introspective work of the exact sciences, were subject to continual training in safety measures but always returned to their own specific areas, and were not accustomed to dealing with the practical aspects of this type of emergency, nor with the psychosocial problems arising from it.

Directly following the first notice of the accident, a small number of specialists went to Goiania to verify the proportions of the accident. When the work of decontamination and removal of radioactive waste began, the number was increased and small groups were formed for environmental control, for decontamination and for radiological protection. Later when the Chairman of CNEN arrived, the number was, again greatly increased, and the definitive control established.

The first technicians arriving in Goiania were appalled by the proportions of the accident, coupled with the lack of an infrastructure for confronting it. The first group began their work in the discomfort of the unfamiliar protective clothing (which caused dehydration), in a temperature of 40°C. The situation was extremely chaotic. Along with the difficulties inherent in their technical work they had to confront the uneasiness of the population, the persecution of journalists avid for information and the stress that all this engendered.

It should be noted that the highly adverse working conditions gave rise to a great deal of creativity in dealing with the endless problems. Among various examples were the infirmary for radiation burns (considered model by international standards), which was set up by the pitifully few
doctors at HGG, and the whole-body-counter mounted by Dr. Carlos Alberto
Nogueira de Oliveira, for determining very high levels of contamination in
the organism. One technician states that 26 days was the maximum work period
that could be supported. After that the stress began to generate
psychosomatic problems similar to acute radiation syndrome, and in some
people, pain in the shoulder muscles (trapeze), which caused them to harden.
There were technicians who got so involved with their work that they
neglected to take the precautions necessary for their own safety. Some
showed excessive courage; others on the contrary, felt panic and fled.

The psychological impact derived from being faced with a major and
totally unpredictable accident varied widely from person to person, depending
on the degree of sensitivity, the type of work performed, the phase of the
accident when they entered into the scene (emergency situation, period of
localization of contamination points or period of decontamination), etc.
A few collapsed and had to desist entirely because of crises of weeping,
nightmares and psychosomatic reactions. There were also unexpected changes
in behavior which surprised their colleagues. One man comments: "In the
middle of that multitude at the Olympic Stadium, I, who am timid, suddenly
encountered a line of six thousand highly nervous people, and felt calm
and tranquil, doing the things that had to be done, and giving instructions.
As problems came up I went solving them, using common sense and working
steadily."

During those months of October, November and December, 1987, and
January and February, 1988, people accustomed to working in an organized
manner, under reasonable conditions, had here to do everything and anything:
monitor, decontaminate, drive earth-moving equipment, use pick and shovel,
clean cess-pools in hospitals and houses, tear down walls and suffer and
weep together with the victims, trying without "know-how", to give them
moral and psychological help.

Many strange and difficult situations had to be dealt with, as for
example the violent reaction of the people toward the technicians which
at times resulted in physical aggression and threats against their lives.
RESEARCH REALIZED BY THE AUTHOR AT CNEN

To have a better understanding of the impact on the technicians a detailed research was made among the 78 functionaries of CNEN and its subsidiary institutes whose work was in the hospitals and in the decontamination of the city, during the period of October, 1987 to February of 1988.

METHODOLOGY

The technicians received a multiple choice form in March and April of 1988. The item "What fact or happening caused the greatest impact on you, psychologically", was left for personal interviews, for whomever wished to make a more complete statement of his sentiments.

The author interviewed everyone personally.

GROUP SELECTION

Selection of the Group was made by drawing on lists containing the names and the departments where each one worked. Only those who, when indicated at random, appeared voluntarily, were interviewed.

The group consisted of professionals of auxiliary, medium and superior levels. The spectrum of persons interviewed, without consideration of sex or age, was as follows:

<table>
<thead>
<tr>
<th>Institute</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>IRD</td>
<td>29</td>
</tr>
<tr>
<td>IEN</td>
<td>11</td>
</tr>
<tr>
<td>IPEN</td>
<td>22</td>
</tr>
<tr>
<td>CNEN (Head office)</td>
<td>SEDE 16</td>
</tr>
</tbody>
</table>

This gave a total of 78 people.

INTERPRETATION OF RESULTS

1) Of the 78 technicians examined, 16.20% worked at the head office of CNEN; 37.18% at IRD; 14.1% at IEN and 28.21% at IPEN.

2) REGARDING PROFESSIONAL ASPECTS

a- 32.05% of the people presented themselves voluntarily for work in Goiania; 57.69% were designated for the work, but expressed a wish to participate, and 10.26% went because they were designated. The majority went voluntarily.
b- 46.15% believed themselves trained for the task, 32.15% believed themselves untrained, and 21.80% believed themselves partially trained. This would indicate that 53.85% of the personnel did not consider themselves fully competent for the work.

c- 84.62% of the people interviewed believed that their work during the accident developed them professionally. 14.10% felt no improvement and 1.28% made no response.

d- 75.64% of the people interviewed felt the necessity for more training in case another accident should occur, 23.07% did not feel it necessary and 1.28% made no response.

3) REGARDING RELATIONS WITH THE PRESS

47.44% considered that relations with the press were good, 5.13% considered them reasonable, 1.28% considered them poor, and 46.15% had no relations with the press.

It should be remembered that the CNEN technicians who spent the months of October and November in Goiania were more importuned by the press than those who came later. They said it was necessary to be very alert, as the pressure exerted by the reporters was very strong. They felt themselves forced to cede information because of the insistence, which verged on saturation. Later, the relationship was considered good. Some felt that although the reporters wrote down everything that was said, the conclusions made by the newspapers were tendentious.

4) REGARDING RELATIONS WITH CIVIL DEFENSE AND THE ARMY

69.28% considered the relation good, 2.56% considered it reasonable, 0% considered it bad, and 28% had no relations with either group.

5) RELATIONS WITH THE GOVERNMENT OF GOIANIA AND ITS FUNCIONARIES

56.41% considered the relations good, 6.41% considered them reasonable, 3.85% considered them bad and 33.33% had no relations with the Government.
6) REGARDING THE EMOTIONAL ASPECT

a- 64.10% felt no trepidation before going to confront the accident, 20.53% felt fear and 15.38% felt apprehension.
b- 42.30% felt exhaustion and physical stress, 28.31% felt as much psychological as physical stress, 11.54% felt psychological stress and 2.56% did not respond.

This would indicate that the work in Goiania was stressful, in one form or another, for 69.23% of the technicians working there.

c- Which was the greatest impact felt by the technicians? 75.64% considered it to be the situation of the victims and the population; 6.41% felt no impact whatsoever, 3.84% were not involved in facing the accident doing desk work, and felt no impact, 2.57% felt saddened by the way in which CNEN and nuclear energy were considered guilty, 2.57% were shocked by the proportions of the accident, 6.41% gave various other answers and 2.56% made no response.

c-1 In order to have a clearer view of the statistics showing that 75.64% of the people interviewed felt as the greatest impact, the situation of the victims and population, it can be verified that: 27.12% were shocked and emotionally involved with the irradiated victims in the hospitals, 27.12% felt pity and grief with the people's panic, 15.25% were astonished by the population’s lack of information concerning radioactivity, 13.55% felt emotion at being able to help, 8.47% felt themselves to be invading privacy when they entered houses to decontaminate them, 3.40% felt themselves impotent before the destitution of the people affected.

c-2 It is important to note that those who worked in the first months felt the greatest impact: 100% of the technicians who worked during October and November felt some type of impact; 85.71% of those who worked from November to February experienced the impact but only 50% of those who worked from January to February. This demonstrates that those who faced the first moments felt some type of impact, which lessened as the months went by.

c-3 Among other types of impact, for 6.40% there was a sensation that time had stopped, inside the houses. They felt the poverty of the people. and they (the technicians), suffered aggressive treatment during this work.
### RESULTS

#### Professional aspects

<table>
<thead>
<tr>
<th>I Did you work in the Goiânia accident?</th>
<th>N° of persons</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>voluntarily</td>
<td>25</td>
<td>32.05</td>
</tr>
<tr>
<td>designated</td>
<td>8</td>
<td>10.26</td>
</tr>
<tr>
<td>designated, but wishing to participate</td>
<td>45</td>
<td>57.69</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>78</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>II Were you trained to do this work?</th>
<th>N° of persons</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>yes</td>
<td>36</td>
<td>46.15</td>
</tr>
<tr>
<td>no</td>
<td>25</td>
<td>32.05</td>
</tr>
<tr>
<td>partially</td>
<td>17</td>
<td>21.80</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>78</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

#### Relationship of technicians with other work groups

<table>
<thead>
<tr>
<th>V How was your relationship with the press?</th>
<th>N° of persons</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>good</td>
<td>37</td>
<td>47.44</td>
</tr>
<tr>
<td>reasonable</td>
<td>04</td>
<td>5.13</td>
</tr>
<tr>
<td>poor</td>
<td>01</td>
<td>1.28</td>
</tr>
<tr>
<td>no relation with press</td>
<td>36</td>
<td>46.15</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>78</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>VI How were your relations with the army and Civil Defense?</th>
<th>N° of persons</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>good</td>
<td>54</td>
<td>69.23</td>
</tr>
<tr>
<td>reasonable</td>
<td>02</td>
<td>2.56</td>
</tr>
<tr>
<td>poor</td>
<td>00</td>
<td>00</td>
</tr>
<tr>
<td>no relation</td>
<td>22</td>
<td>22.21</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>78</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
TABLE V

VII

<table>
<thead>
<tr>
<th>How were your relations with the state of Goiás?</th>
<th>N° of persons</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>good</td>
<td>44</td>
<td>56.41</td>
</tr>
<tr>
<td>reasonable</td>
<td>05</td>
<td>6.41</td>
</tr>
<tr>
<td>poor</td>
<td>03</td>
<td>3.85</td>
</tr>
<tr>
<td>no relations</td>
<td>26</td>
<td>33.33</td>
</tr>
<tr>
<td>Total</td>
<td>78</td>
<td>100</td>
</tr>
</tbody>
</table>

Emotional Aspect

VIII

<table>
<thead>
<tr>
<th>Were you afraid to confront the accident?</th>
<th>N° of persons</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>no</td>
<td>50</td>
<td>64.10</td>
</tr>
<tr>
<td>yes</td>
<td>16</td>
<td>20.52</td>
</tr>
<tr>
<td>partially</td>
<td>12</td>
<td>15.38</td>
</tr>
<tr>
<td>Total</td>
<td>78</td>
<td>100</td>
</tr>
</tbody>
</table>

IX

<table>
<thead>
<tr>
<th>Did you feel stress at any time?</th>
<th>N° of persons</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical stress</td>
<td>33</td>
<td>42.31</td>
</tr>
<tr>
<td>Psychological stress</td>
<td>09</td>
<td>11.54</td>
</tr>
<tr>
<td>Physical and Psychological stress</td>
<td>12</td>
<td>15.38</td>
</tr>
<tr>
<td>Felt no stress</td>
<td>22</td>
<td>28.21</td>
</tr>
<tr>
<td>No response</td>
<td>02</td>
<td>2.56</td>
</tr>
<tr>
<td>Total</td>
<td>78</td>
<td>100</td>
</tr>
</tbody>
</table>

X

<table>
<thead>
<tr>
<th>What was the greatest psychological impact that you felt during the accident?</th>
<th>N° of persons</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>The feeling of identification with the victims and population</td>
<td>59</td>
<td>75.64</td>
</tr>
<tr>
<td>Shock on seeing the proportions of the accident</td>
<td>02</td>
<td>2.57</td>
</tr>
<tr>
<td>Feeling of sadness because of the blame put on CNEN and nuclear energy for the accident</td>
<td>02</td>
<td>2.57</td>
</tr>
<tr>
<td>Felt nothing</td>
<td>05</td>
<td>6.41</td>
</tr>
<tr>
<td>Was not involved with the work</td>
<td>03</td>
<td>3.84</td>
</tr>
<tr>
<td>Others</td>
<td>05</td>
<td>6.41</td>
</tr>
<tr>
<td>No response</td>
<td>02</td>
<td>2.56</td>
</tr>
<tr>
<td>Total</td>
<td>78</td>
<td>100</td>
</tr>
</tbody>
</table>
### TABLE V

#### XI Feelings of Solidarity with the Victims

<table>
<thead>
<tr>
<th>Feeling of solidarity with the victims and population</th>
<th>Nº of persons</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeling of pity for the victims; Emotional involvement with them, and Shock at sight of radiodermitis at HGG, FEDEM and HNMD.</td>
<td>16</td>
<td>27,12</td>
</tr>
<tr>
<td>Sadness and pity at seeing the panic of the population</td>
<td>16</td>
<td>27,12</td>
</tr>
<tr>
<td>Surprise at lack of information to the population about radioactivity</td>
<td>09</td>
<td>15,25</td>
</tr>
<tr>
<td>Emotion at being able to help the victims and population when they could</td>
<td>08</td>
<td>13,55</td>
</tr>
<tr>
<td>Sensation of invading privacy of the victims when entering their contaminated houses</td>
<td>03</td>
<td>5,09</td>
</tr>
<tr>
<td>Feeling of pity at seeing the people suffering discrimination</td>
<td>03</td>
<td>5,09</td>
</tr>
<tr>
<td>Feeling of impotence in facing appeals for help from the devastated population</td>
<td>02</td>
<td>3,40</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>59</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Psychological impact felt by the technician according to the period in which he worked in the accident

<table>
<thead>
<tr>
<th>Period</th>
<th>Number of persons</th>
<th>Impact</th>
<th>Nº of persons</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Worked in October - November</td>
<td>17</td>
<td>felt</td>
<td>17</td>
<td>100</td>
</tr>
<tr>
<td>Worked in October - November December Indeterminant</td>
<td>13</td>
<td>felt</td>
<td>12</td>
<td>92,30</td>
</tr>
<tr>
<td>Worked in October to March Indeterminant</td>
<td>10</td>
<td>felt</td>
<td>09</td>
<td>90,00</td>
</tr>
<tr>
<td>Worked in November &amp; December Indeterminant</td>
<td>14</td>
<td>felt</td>
<td>12</td>
<td>85,71</td>
</tr>
<tr>
<td>Worked in November to February Indeterminant</td>
<td>09</td>
<td>felt</td>
<td>07</td>
<td>77,7</td>
</tr>
<tr>
<td>Worked in January and February Indeterminant</td>
<td>06</td>
<td>felt</td>
<td>03</td>
<td>50,00</td>
</tr>
<tr>
<td>No specific date given</td>
<td>09</td>
<td>felt</td>
<td>03</td>
<td>50,00</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>28</strong></td>
<td><strong>-</strong></td>
<td><strong>-</strong></td>
<td><strong>-</strong></td>
</tr>
<tr>
<td>Treatment of patients</td>
<td>Meteologist</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------</td>
<td>-------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decontamination of the junkyards, streets and other contaminated areas</td>
<td>Medical physicist</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decontamination of material</td>
<td>Reactor licensor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Whole body measurement</td>
<td>Chemist</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radioprotection and monitoring in hospitals and residences</td>
<td>Physicist</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Monitoring the public</td>
<td>Chemical engineer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decontaminating the public</td>
<td>Mechanical</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decontaminating residences</td>
<td>Electrical</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Removal, packing and transport of waste</td>
<td>Telecommunications specialist</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Development of norms and procedures</td>
<td>Radiocommunications</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Search for contamination focus, and verification of denouncements</td>
<td>Telephone operator</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Removal of contaminated matter in contaminated houses</td>
<td>Specialist in radioactive waste treatment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lecturing on nuclear energy</td>
<td>&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Soil analysis</td>
<td>Clinical dosimetry calibration</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demolition of sidewalks</td>
<td>Monitoring instruments</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ditch-digging</td>
<td>&quot;</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
THE PUBLIC

The City of Goiania, founded half a century ago, has a tranquil and agreeable aspect. It lies 500 km from the capital of Brazil and has a contingent population of around 1.200.000. The news that a radiation accident had occurred in the city generated, at first, only apprehension. However, through the media as well as through the rapid spread of alarming rumors, sufficient panic was created to mobilize 40.000 people, who by the fourth day after the notice, were already abandoning the contaminated zones. According to the newspaper FOLHA DE SÃO PAULO, by the 3rd of October, people were abandoning their houses of their own volition.

On October 14, according to the paper O GLOBO, pregnant women were fleeing not only from the city, but from the State of Goias, to have their babies far from the danger of Cesium.

Fear of contamination took over the city, with most people unable to distinguish between radiation and contamination. Everyone, especially the families of those directly affected, complained of the lack of information.

The Nuclear Energy Commission and the State Government initiated, during that first week, the distribution of 100.000 booklets explaining the nature of radiation, giving orientation as to procedures and asking that the isolated areas be avoided and anyone showing symptoms of radiation to go at once to the Olympic Stadium.

The Government of Goias published various official explanations in the newspapers, always insisting that the situation was under control. The CNEN also informed the public daily that the situation was under control.

Technicians from CNEN, such as Dr. José Julio Rosenthal and the Secretary of Health of Goias, Antonio Faleiros, gave countless lectures and participated in collective interviews with the press, in order to better explain the issues to the public and to put an end to the veritable epidemic of rumors generated by want of real information. Unfortunately, there is not a great deal of information available, at the popular level, about radiation and its risks and benefits, and these attempts proved insufficient to remedy a situation already out of hand.
Dr. Rosenthal relates his experiences when on October 1st, he had to inform people who lived in the contaminated area, that they must leave their houses. "An avalanche of questions began from those people awakened suddenly at that hour of the morning, because I was going through all the affected locations asking that they should all congregate in the Stadium so that I could give the most ample information possible to the whole group. After most of them began to head for the Stadium, the questions that came flooding were from the people of the affected neighborhood: What happened? What is Cesium? Is it contagious? Can the food and water be ingested? What is radioactivity? Does it burn? What are the effects on women and children? Is it true that it gives cancer? And if it does, when will we feel it? Is it dangerous where I live? Where can I go? Are the animals and fowls dangerous? How does it spread? Will our lives be shortened?

PANIC

The masses of people streaming toward the Olympic Stadium to have their contamination indices measures were evidence of the bewilderment and fear that overtook the city. Four or five enormous lines formed daily at the CNEN monitoring post.

A technician who worked at the post says: "We could see very clearly the problem of the terrified population. They believed this thing called radiation was a new sickness, a sort of bubonic plague, very contagious, and they took their own clothes and burned them. It makes one think of the Middle Ages when the plague would strike and the people would go out and put fire to everything. They believed that radiation could be carried by the wind and infect everyone. It gave a lot of trouble to explain things to everyone because each one who came, got an individual lesson. We technicians were trained for this, and during twelve hours a day we took turns among ourselves, measuring radiation and giving classes. All in all, about 21 people were working, including people from IPEN, IRD, SEDE and IEN. Some of them would do the measuring, others would decontaminate the people if they found anything and the rest would go out looking for new points of contamination in the town. We had to take turns because the work was too exhausting to do one thing the whole time.

We gave superficial explanations to each person about what had happened, what was radiation, what was contamination and its symptoms." Many
showed enormous blisters and burns, with reddened skin, vomiting and diarrhea. They insisted that this was something new for them and that these symptoms only appeared after the accident, although monitoring showed no contamination whatever.

It was shocking to see people trembling and crying when they were being measured by the detector. A little girl fainted in my arms because she was contaminated. Lots of people fainted in the lines, out of fear.

There were many who lived far away in other states, even Rio de Janeiro, who turned up for measuring."

DISCRIMINATION

Since the most remote eras of history, men have practiced ostracism, segregation and other types of discrimination as a form of self protection or of hygiene. An example is found in the Bible, where the Children of Israel are commanded to expel the lepers from the camp, "for they are unclean". In exactly the same manner, motivated by an identical instinct for self-preservation, the people of Goiania attempted to separate themselves from the victims. They were rejected by all, including hospitals and hostels.

The medical community of Goias refused to attend irradiated patients. There were many appeals but they were not attended. At the HGG, doctors, nurses and other patients avoided approaching the section where the victims were housed. A doctor from Goiania said during an interview: "I was very much afraid to work because I was dealing with contaminated people. My perceptions of things was prejudiced. I believe there was a lot of disorganization because anxiety disorganized the structure of the place where I was working."

According to one newspaper, the HGG, since it took in the radiation victims, had become a danger to the populace. Of the 320 beds, only 31 were occupied by routine cases, aside from the accident casualties. In normal times the HGG attends around 1,500 patients daily in the out-patient clinic. On December 4, only four people came for treatment. The Medical Association of Goias fell out with Director of the hospital for insisting on treating the victims in Goiania.

The staff that did treat the irradiated patients were ostracized even within the hospital itself. Functionaries who were pregnant took their maternity leave earlier than necessary. One patient complained that two nurses had refused to give medicine directly into her hand.

The less seriously affected people were afraid to leave FEBEM and possibly be stoned, especially after the incident at the burial of two of the victims, and people whose houses had been interdicted but who were not themselves irradiated, had tremendous difficulty in renting a place to live.

Even those who had no contamination but were related to those who had, were treated with hostility in the street. S., wife of one of the patients in HNMD, was attacked in the street. The people threw paper balls and even rocks, and called her the wife of a thief. Her own family avoided her and if she went to the market, neighbors wrote letters to the authorities denouncing her presence.

A boy who was unjustly accused of entering a contaminated house to steal the TV, was arrested and then released when he proved his innocence. But the neighbors attacked and beat him until he had to ask protection from the CNEN people at the Stadium. He lost his job and had to move to another district.

Around 600 people tried to impede the burial of the first two victims in the local cemetery. They were people from that neighborhood, reinforced by the curious from other districts, who blocked the middle of the street so the hearse could not pass, shouting "Not here!" These people, who lived in the five districts around Cemetery Park in the northern zone of Goiania, insisted that burying the radiation victims there would devalue the districts, which were in the poorer part of town, and would prejudice commerce, as had already occurred near the contaminated areas in the central zone of the city.

This reaction by an angry mob was unprecedented and overstepped all the limits of Brazilian Catholic education and tradition. The caskets were stoned and in frustration at not having any better weapons, crucifixes were wrenched from nearby tombs as well as pieces of sculpture, bricks and anything else that came to hand, until a Police shock troop had to be called out so the burial could continue.
The behavior of the people in that locality was an act of autoprotection against future discrimination and was a direct consequence of the attitude demonstrated by the rest of the population of Goiânia towards any one attinged even indirectly, by radiation. The bodies in the cemetery were not bodies of neighbors, but had become radioactive waste.

On October 30, the burial of two other victims was more tranquil, without manifestations or tumult, although shock troops were put on alert, to guarantee the burial, if necessary.

CERTIFICATES OF NON-CONTAMINATION

The unaffected population of Goiânia found it necessary to obtain "Certificates of Non-Contamination", in view of the attitudes demonstrated not only by the residents of the city toward one another but by the residents of the state and the rest of the country.

A person from Goiânia was turned away at a luxury hotel in Ipanema, Rio de Janeiro and a group of tourists, forbidden to disembark in Manaus, were forced to return by the same plane.

Even the tourist agencies demanded the certificate from anyone who intended to travel. In other countries, reservations of residents of Goiânia were cancelled and the Embassy of a European country demanded a certificate for two were applying for visas to that country.

The journal O GLOBO of 11-4-87 informed that there was a daily average of 300 complaints about hotels in other states and abroad cancelling reservations of Goiânia residents, and advising those interested that a document attesting to no-contamination could be obtained at the CNEN station in the Olympic Stadium or from the Bureau of Health or the State of Goias. The certificate was valid for three days.

In the opinion of authorities, such a document merely increased the

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11 - Issued to:
- People who were going to travel
- People who lived in Goiânia
- School and other places
- Transportation of material from the city and the state to other states.
atmosphere of discrimination, but the populace insisted on this form of passport so as to avoid problems.

That they had reason was demonstrated by the newspaper FOLHA DE SÃO PAULO, which on November 11th reported "Without this document, an inhabitant of the city can be stopped at the borders of other states... as occurred with 31 passengers of the Goiania-São José do Rio Preto line of the National Express Ltd., who were barred at the border of Minas Gerias and sent back because they had no documents proving their state of health".

A permanent line of people formed daily at the Stadium in order to be monitored and receive the clearance certificate.

DISCRIMINATION IN GOIANIA

From the moment the notice of contamination by Cesium 137 was made public, the movement in the commercial enter located at the junction of 54th with 74th street in the Airport Sector, fell off. Some shops even closed when customers refused to buy for fear that the products had been contaminated. Garbage in that sector was no longer collected, as the collector was afraid to approach and taxi drivers refused passengers to the Airport sector.

The radioactive waste deposited near Abadia de Goiás provoked innumerable problems for its inhabitants. They lost their jobs, were avoided by their relatives and the commerce diminished drastically.

In Goiania, land values in areas touching, or near to, the contaminated points, fell of as heavily as rentals. Some properties, such as the building Edificio Maria Alice, could not be rented at all. Another building near Junkyard II was almost totally abandoned, with only 19 of its 88 apartments still inhabited.

In December, M.C.G. and her children were impeded when they tried moving to a new apartment, because they had been neighbors and friends of contaminated persons. The inhabitants of the building alleged that their contaminated friends might attempt to visit them, and there were pregnant women in the building. Even with the presence of CNEN technicians to prove
that they represented no danger, they continued to be barred, and their furniture stayed in the street. On the 12th of December the newspaper DIARIO DE MANHÃ printed a notice that the courts had guaranteed their right to the apartment.

DISCRIMINATION AGAINST THE STATE OF GOIÁS

The panic created by the accident affected not only the people of the state, but its economy. Tourism fell off radically, leaving planes and hotels empty and reservations cancelled, even in Caldas Novas, a hot-springs resort 190 km from Goiânia.

Produce of the state, such as meat and eggs, the principal staples of the economy, had their quality contested in various other states. Small farmers had trouble marketing their crops.

The drop in the state income and taxes was enormous, causing a serious economic problem.

In the city of São Paulo, a car with a Goiânia license plate was stoned and the windshield broken. According to O GLOBO, the only explanation, yelled by a group of people at a nearby bus-stop, was "Look out, here comes the Cesium!"

In Brazilia, a car with a Goiânia license stationed in front of a restaurant was partially destroyed and "Get Out, Cesium!" written on it.

On 1-28-88, the paper ESTADO DE SÃO PAULO informed that when the National Forum of Directors of Municipal Education met in Brazilia, some members of the Seminar were afraid to be near the representatives from Goiânia. In Rio de Janeiro, during the Feira da Providência, an enormous charity bazaar where all states participate, the stand of Goiás was interdicted because the others alleged that the stand and its products might be contaminated.
LOCALIZATION OF THE MAIN CONTAMINATION POINTS IN GOIANIA CITY

1- Inst. Goiano Deposit.
2- Point where the source was violated.
3- Point where the source was broken (junkyard).
6- Point where most of the contaminated lead shield was taken.
9- State Health Service.
4-5-7-8-10= other contaminated points.
DISCUSSION ON THE PSYCHOLOGICAL ASPECTS

The attitudes and reactions of the population of Goiânia in face of the accident were greatly stimulated by the media and by rumor (5).

A singular phenomenon observed was the appearance of symptoms of radiolesions and of acute radiation syndrom in 8.3% of the 60,000 people measured by the CNEN teams during the first ten days after monitoring began. These people had not been near contaminated areas and presented no indices of contamination, or when they did, it was of an order too low to have caused such symptoms. This phenomenon was also observed by Dr. Carlos Eduardo Brandão of CNEN, who attended patients at the HGG during October, November and December. The blisters, the reddened skin, vomiting and diarrhea could indicate that fear of the accident had temporarily activated nuclei of hysteria in persons already predisposed.

Hysteria can imitate any infirmity, a circumstance which makes the clinical picture of conversion hysteria so extremely multiform (4). This "hysterical identification" expresses the neurotic desire to occupy the place of another person. It should be explained that identification is the psychological process by which an individual assimilates an aspect, a property or an attribute of another, transforming himself, totally or partially, to accord with his model, with whom there exists an emotional bond (5).

The neurotic conflict on which a psycho-neurosis is based is an unconscious conflict between the impulse of the Id (instinctive), to procure an outlet and the attempts of the Ego to forestall any direct release of the impulse, and to block its access to consciousness (4). The Ego turns progressively less capable of dealing with the mounting tensions and is in the last instance, overcome (3). When the Ego is weakened, a stimulus from the external world can cause involuntary releases which manifest themselves as symptoms. What is seen in conversion hysteria is that these symptoms are expressed through alterations in the physiological functions. Along side of "identification" exists a less stable process called "imitation". In the Goiânia situation we can suppose
that there was unconscious imitation, in place of identification. The imitation is temporary and its object can be anything that appears to offer some advantage or the possibility of finding release and relief from internal conflicts (4).

For physiological reasons the skin manifestations indicate irritation of the endocrine-vegetative system, which fact explains the tendency by the skin to convert itself into a base for emergency releases during states of nervous tension. The gastro-intestinal apparatus also is receptive to this type of conversion and a common example of this is the formation of ulcers of nervous origin (4).

Other manifestations presented by the population included fainting, sudoresis, palpitations, crises of weeping and acute anxiety, all of which may be considered as symptoms of a phobic picture. When a person reacts to a happening in an exaggerated manner, or demonstrates sentiments more intense than are appropriate, this is a sign of dislocation. The reaction actually relates to some other situation, which has been suppressed. In a phobia, the anxiety is perpetuated in a special situation which represents the neurotic conflict. When a person has this type of predisposition, some grave occurrence might unconsciously reanimate the basic pathogenic conflict and thus give rise to symptoms of fear.

Both the multitude in the Stadium and the residents in neighborhoods bordering the contaminated areas had extremely aggressive reactions and even in some cases, resorted to violence. A situation of real danger unlocked predispositions that might have been latent in these people. The degree of trauma depends on the pre-traumatic history of the individual and the level of his sensations of emotional deprivation. The reactions are specific and the emotional quality of the access of anxiety and hate generates an uncontrollable internal tension which emerges involuntarily as neuro-vegetative and neuro-motor manifestations. Had ideal conditions

12 Cases of hysteria area mentioned in "The 1987 Los Angeles Accident: Exposure Irridium 192 Industrial Radiographic Source", Ross, Holly et alii
13 There are, of course, many other types of conversion, but these are mentioned because they particularly pertain to the Goiania situation.
obtained in Goiania, with psychologists working at the Stadium along with the monitoring technicians, the objectives would have been identification of the patient's clinical picture and alleviation of the psychic distress of persons demonstrating this symptomology through orientation and immediate referral to State psychological centers for individual treatment. Another objective would have been to join the social workers in helping technicians to deal with the mob of people, so that monitoring and decontamination could be facilitated.

PSYCHOLOGICAL ACCOMPANIMENT OF THE POPULATION OF GOIANIA AFTER THE MONTH OF NOVEMBER

According to information obtained from the Leide das Neves Ferreira Foundation, around the middle of November (more or less a month and a half after the accident), a commission formed of residents from the contaminated area on 57th Street requested that Governor Santillo send a group of psychologists to attend them. They claimed to have emotional and psychosomatic problems, such as panic, disorientation, insomnia, headache, nightmares and general sensations of loss. This request was granted immediately and a team of psychologists was sent out to attend the residents and give psychological support as well as information concerning radiation and Cesium 137 contamination. The team was given preparation for these scientific explanations by the CNEN group, through lectures and debates.

An unstructured questionnaire was elaborated with topics regarding the complaints of the people, what they thought about the future, etc., as a primary step. Part of the team made house visits in the contaminated areas, hearing complaints, participating and tranquilizing. These residents felt threatened, discriminated against by everyone. They could not leave because the were not welcome anywhere, and even hotels refused to receive them. They were afraid of the future.

An office, or consultation room, was set up at 57th Street for the benefit of some who showed an elevated level of anxiety and panic. There they received individual treatment without charge and without appointment. The office was open Saturdays and Sundays so that people could feel a supporting presence.
Techniques for relaxation were utilized and each psychologist used his particular technique for crisis intervention. The treatment was superficial, seen as an emergency measure.
RECOMMENDATIONS:

RECOMMENDATIONS AS TO THE PATIENTS

Hospitalization because of swallowing, inhaling or having contact with radioactive material is highly distressing at best. By the time the patient arrives he is often vomiting and with diarrhea, together with other characteristics of radiation syndrome (2).

On being informed of his situation the victim is profoundly shocked, as nothing in our century except AIDS, causes more terror than a radiation or nuclear accident.

It is necessary to determine promptly the extent of his knowledge about radioactivity (1) and its effects and his level of comprehension regarding the significance of the accident. This determines the degree of panic to be anticipated and the type of irrationally dramatic actions which may occur. Immediate intervention by a hospital psychologist is of vital importance, since the patient must confront not only his physical problems but the threats and uncertainties that radiation provokes. Psychological support should not only be immediate but continued indeterminately. This early intervention should be carried out in conjunction with clinical treatment, where it will be useful in helping the patient deal with his panic and fear of the progressive effects of his illness, the development of lesions, the always increasing pain and opportunistic infections, and will enable him to accept the medical treatment more easily (2).

The psychologist involves him in the process of his own cure, convincing him that he is part of a team whose goal is his recuperation (13). Without this powerful psychological reaction to the radiation syndrome will leave the patient completely disoriented. A positive response to this involvement is beneficial, whereas depression will contribute even more to the drop in his immunity (11).

It should be mentioned that the treatment involves the participation of innumerable specialists such as the hematologist, ophthalmologist, plastic surgeon, etc (2). It involves painful procedures, blood samples taken several times, total isolation because of opportunistic infection. A doctor (if
possible, chief of the medical group) who is in daily contact with the patients, and on whom they can depend for support, would give them the greatest feeling of security.

Another aggravation to the emotional state of the patient is the total lack of physical contact with other human beings, as the teams attending him are totally covered up and their faces never seem. The division of the infirmary into "hot", "warm" and "cold" areas and the eternal presence of radiation monitors and of the radioprotection technicians with their procedures, all intensify the stress.

Work techniques

Various techniques of hospital psychology may be utilized, such as crisis intervention, incentivating the patient to verbalize his emotions and to feel that the psychologist comprehends them, and relaxation techniques, which are useful in cases where the pain is intense, or when the despair of the patient becomes so great that suicidal tendencies appear. In these cases the intervention should be intense and very carefully done, and psychiatric assistance is needed.

The process of eliminating an emotion or a disagreeable experience, reliving it verbally and releasing the emotional charges which accumulate, is called catharsis. In Greek the word is synonymous with purging or evacuation, whether by natural or artificial means, which according Aristotle, cleanses the soul. It is the more or less complete neutralization of an excessively excited state, obtained by the bonding of emotion and its external cause. This method is used in psychoanalysis.

The patient whose treatment is not effective, and whose syndrome progresses rapidly toward death, confronts all the sentiments inherent in his state, i.e., negation, fear, depression, hate, ambivalence and the search for a meaning to existence.

Usually, hospitals have a chaplain and at such a moment (but depending on the patient), his intervention can be very beneficial. He can also be helpful in preparing the other patients for the imminent death of their companion.
Preoccupation with their bodies, the fear of mutilation and of amputation should all be worked through. If the patient loses a member there must be work toward acceptance and later, toward readaptation of the corporal image.

The social worker can be of great help in the hospital, working in conjunction with the psychologist. It is the social worker who deals with services of a practical nature, who collects information about the life of the patient before the accident; facts about his family and its ramifications, about his significant relationships, and associates; how these people could be of assistance in the treatment and how they are reacting to the accident. (1) Discovery of his beliefs, attitudes and expectations in relation to the radiation syndrome and the treatment could be of the greatest help, not only in dealing with the patient but with his family. Control of information of an alarming nature, the control over letters sent and received, the installation of a telephone line for communication with families; all these are activities of the social worker.(1).

Finally, the team of psychologists and psychiatrists should have a voice in the clinical treatment, so that decisions might be weighed jointly as to when a medical intervention might be more prejudicial than beneficial for the body and mind of the patient. Depression diminishes the patient's involvement in the battle against the syndrome and lessens the will to live. The team could also control the number of visits of curious professionals, with their cameras and cinematographic machines, which leave the patients with a feeling of rage at being mere objects of scientific curiosity, or guinea pigs.

DISCHARGE

When the patient receives his discharge from the hospital, a new set of fears arises. In the hospital he was protected from the outside world, which he must now reenter confronting the danger of rejection by family and neighbors, abandon, or unemployment. (2) This return to the home, reentry into society, adaptation to a new life, should have psychological accompaniment. He should be encouraged to talk about his losses, which will
help him to reestablish selfcontrol and self-esteem, principally if he has had a member amputated.

The continuation of medical treatment with periodic checking is necessary, as is the comforting presence of a medical authority, especially if new radiodermatitis appears, causing depression and a sensation of frustration and failure.

The Family

The victim's family should be kept informed about all phases of his treatment and of everything that is happening. Secrecy should be avoided, since uncertainty causes acute anxiety. There should be clear and simple explanations given regarding radiation and its consequences. The psychologist attending them should use the same technique as is used with the patient himself, attempting to involve them in the treatment as part of the team. Group dynamics, to include if possible, concerned neighbors and friends would, if they verbalize and internalize their fears, guilt and anxiety, give a positive response and do a great deal for the morale of the family.

In the majority of cases the families also experience ostracism and discrimination and need supplementary support. If the patient dies, aside from the loss, the family must face the terrible shock of not being able to have a normal funeral for him; not to be able to see the body, which has to be put in a special lead casket, accompanied by all the procedures of radioprotection. The significance of the funeral loses its essence and casket and body become merely radioactive waste.

The Team

A mental health team should be trained at once to deal with future emergency situations, so as to prepare psychologists and psychiatrists for immediate action and avoid having to wait until they lose their entirely normal fears and personal preoccupations, as happened with Goiania Medical Community. Training should cover such items as:
- radiation
- effects of radiation
- some idea of radioprotection
- some knowledge of radiation medicine
- practical training with simulation

The mental health team should include the hospital psychologist, a psychiatrist, and a psychologist who is experienced in group dynamics and crisis intervention, family psychology, relaxation and behavioral problems.

RECOMMENDATIONS REGARDING PHYSICIANS, HOSPITAL STAFF AND RADIOPROTECTION TECHNICIANS

Descriptions of the behavior of the Goiania medical community clearly demonstrate the fear that radioactivity produces even in people with specific scientific knowledge.

Even specialists in radiation medicine, nuclear medicine and various other medical specialties who were trained to this end, and nurses trained to treat irradiated patients, tended to experience an emotional impact when first encountering real situations, since accidents of this nature are very rare. The instruction given is usually theoretical and the aspects of radiodermatitis are usually known only through slides. (8)

The radioprotection technicians who work in the infirmaries have little fear or radiation itself, but are entirely unaccustomed to the human side: having to work in a hospital, not a laboratory, dealing with the sick.

Support therapy for doctors and technicians aims at diminishing tension and emotional load, showing them how to deal with the patients' emotional side, as well as their own, and by increasing rapport, make the work of the specialized teams more gratifying. (2)
WORK TECHNIQUES

Diminishing tension, fear and emotional overload are objectives which can be reached through the techniques of group dynamics or individual crisis intervention. Various items can be dealt with, such as

- low team morale when facing a patient's imminent death, and their frustration with the uselessness of their efforts;
- the sensation of failure experienced when a patient dies;
- the difficult task of giving news of the death to the other patients;
- how to deal with emotional involvement with the patients.

Another task to be undertaken with the team members is to help them develop support therapy techniques for dealing with patients who bring them their emotional problems.

Informal, multidisciplinary encounters involving doctors, nurses, technicians, Chaplain, and social workers might result in more interchange among the various teams, insuring that all speak the same "language", so as to overcome difficulties without friction. (12)

The psychological team can be small; the number varying in accordance with the dimensions of the accident. (7)

RECOMMENDATIONS REGARDING TECHNICIANS IN THE FIELD

The task of the psychologist in working with technicians during accidents is to ease stress, analyze the comportment of any member of the group who deviates from his usual behavior, diagnose panic situations and situations involving negligence in carrying out personal security norms including implications to be derived from this neglect. Also to assist team leaders in deciding which members are psychologically equipped to participate in the more dangerous operations, and evaluate leadership for specific functions.

WORK TECHNIQUES

For stress and emotional crises, individual interviews, crisis intervention or group dynamics would be appropriate techniques. Catharsis, as
previously mentioned, is very effective.

To analyse situations involving panic or neglect of security measures, a psychologist should accompany the technicians during field work. Before undertaking risk operations the chiefs should hold discussions with small groups of technicians for risk assessment and to debate the best methods of carrying out the task, in order to prepare them for whatever happens. It must be remembered that improvisation is always necessary because nothing is foreseeable about this type of accident. (7)

THE TEAM

The psychological team as was mentioned previously varies in number, according to the number of technicians at the locale of the accident. (7)

One must emphasize that the psychological team in the field should have some idea of radioprotection and be trained in use of the equipment.

As a final injunction, a team should meet often, every year with the emergency group to discuss which are the best techniques for different types of accidents and prepare behavioral training through simulation with the personnel who might one day confront occurrences of a similar nature. It is a prophylactic measure.

RECOMMENDATIONS AS TO THE PUBLIC

Adequate orientation for the public by a mental team would have been highly valuable in the Olympic Stadium, in view of the confusion, long waiting lines of anxious people, etc.

In the moment of danger, real or imagined, when survival is threatened, people lose all notion of moral values, of right and wrong, mother love, fraternal love, everything, and run before the enemy. The Goiania accident differed in that the enemy was invisible. Human beings suddenly became rejects whom no one dared even approach. It was a violent situation, brutal and rapid, which involved a great number of people and generated panic.
Obviously, psychological accompaniment of an excited mob is impossible. An educational infrastructure must be created so that such violent reactions can be avoided. A complete prophylactic work in the radiation and nuclear areas should be carried out by the Government, with extensive education of the public, at various levels, regarding nuclear energy and its benefits as well as its risks.
CONCLUSIONS

These are some of the many conclusions to be drawn and lessons to be learned from the psychological impact caused by the Goiania accident:

1. That one can never be completely prepared for an accident. Something about it, whether its form or the number of people involved, will always be unforeseen and improvisation will always be necessary (7);

2. That the victims need long term psychological accompaniment from the very beginning of hospitalization, since behavioral disturbances may arise, and that this accompaniment should include the family;

3. That the physicians, nurses and radioprotection technicians who work in hospitals must have psychological support during their treatment of the victims, because the stress undergone is very intense;

4. That the impact on the public is very great and often gives rise to such behavioral disturbances as hysteria, phobia and violence. Support groups for communities affected should be formed soon after the beginning of the accident;

5. That the anxiety of the public increases in ratio to its distance from the accident, and this anxiety is fed by the news media; (6)

6. That discrimination against persons who represent a threat is inherent in human conduct and that it is difficult to deal with this problem, especially when it pertains to something so mysterious and unknown as radiation;

7. That psychological support should be extended to Government technicians when they must confront similar situations;

8. That mental health teams should have training in the basic principles of radiation, radiation medicine and radioprotection, so as not to desert the field in critical moments, and
9) that the public should be better informed about radioactivity and nuclear energy, both as to the benefits and the dangers.
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