

Major Technological Risk

An Assessment of Industrial Disasters

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II. SATURDAY JULY 10, 1976 : SEVESO

On that day, when production had been finished and most of the workers of the Icmesa* factory at Meda (in Lombardy, Italy) already enjoying their weekend, the temperature of a reactor which had been left in a cooling phase suddenly rose for unknown reasons; the 'safety' disc loosened and permitted a reddish cloud to escape into the atmosphere. Children noticed it; the cloud disappeared. The scene occurred in the northern outskirts of Milan, 18 km from the economic capital of Italy**.

Later it will be shown that in fact tetrachlorodibenzodioxine (TCDD) or 'dioxin' had thus spread around in unknown quantities. This is one of the most violent, most dangerous, most difficult to combat poisons which human intelligence has ever succeeded in manufacturing.

In the case previously examined, Flixborough, the disaster occurred within thirty seconds, and the destruction of the factory, the seventy-metre high flames, the smashed roofs of houses left no doubt about the reality of the disaster. Here, everything was different: the drama took on a different appearance. The cloud dissipated, everything was normal in appearance. But uncertainty was omnipresent, fear took the place of stupor. Perhaps death was there, very near, ready- to strike or to install itself for years to consummate its victory. This was the spectre of dioxin.

1. DIOXIN, A FORMIDABLE POISON

The aerosol*** pushed into the atmosphere on July 10, 1976 came from a factory load of trichlorophenol (TCF). This substance was sold to Givaudan for the synthesis of hexachlorophene****.

Hexachlorophene is among a number of chlorinated derivatives of which increasing use has been made over the last twenty five years for civilian and military purposes. These products enter into the manufacture of insecticides, herbicides, bactericides etc. Especially well known is the 2-4-5T used in forestry for clearing undergrowth, the hexachlorophene used for disinfection in hospitals (see Figs. 8 and 9 infra).

*The Icmesa factory, situated at Meda (a community adjoining Seveso which was more severely struck by the accident and which on account of this gave its name to the accident) belongs to the Swiss company Givaudan, itself a subsidiary of the Swiss Hoffmann-la-Roche group which is well known as one of the world's pharmaceutical leaders. It is known that Givaudan had recently been at the centre of the hexachlorophene affair (still recalled as the "Morhange talc" affair).

**See Figs. 5, 6, 7, p. 37). There was apparently nothing extraordinary going on, given the constant pollution one is used to in the area. However, this was an extremely serious accident.

***The cloud consisted of polyethylene-glycol, of di-ethylene, of soda and trichlorophenol, containing a lot of dioxin (9).

****And only for that as the Industrialist (10) who was suspected of having manufactured it for military uses stressed.

Seveso

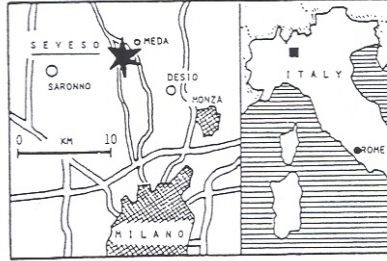


Fig. 5: Seveso, 20 km from Milan
(Source: 7, p. 162)



Fig. 6: The communities concerned
(Source: 7, p. 175)

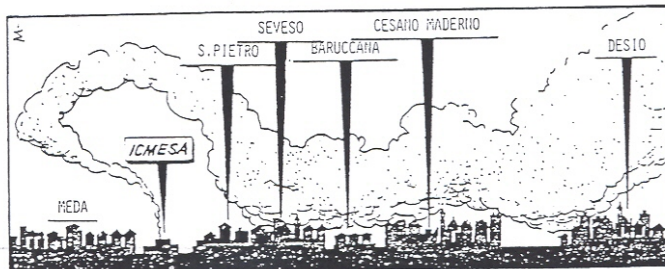


Fig. 7: Exhibit of the possible drift of the cloud
(Source: 7, p. 162)

The chlorinated derivatives, because of their antivegetative properties, are also used as additives in numerous products: varnishes, paints, inks, textile fibres ... Dioxin is still present in trichlorophenol in quantities that vary according to the use intended for the product: extremely weak if it is destined for medical use (less than 0.1 ppm = parts per million), less weak for other applications, especially when they are military; this was the case with the 'orange agent' widely used in Vietnam (the concentration of dioxin could go as high as 50 ppm, i.e. up to 500 times higher than the upper mark permitted for herbicides in France — decree of July 29, 1975). (3;4, p. 3; 5, p. 40); 6, p. 11; 7, p. 1).

Dioxin can form up in large quantities if there is an accidental increase of temperature and pressure in the reactor in the course of production of trichlorophenol. This is precisely what happened at the Icmesa factory on July 10, 1976.

1st: Sharp toxicity, astonishing stability

Dioxin is a very toxic substance and is generally compared with products already considered extremely dangerous in order to explain the degree of toxicity of TCDD: One of the most violent poisons, 500 times more toxic than strychnin, 10,000 times more than cyanide (8). The DL (lethal dose 50) i.e. that which kills 50 per cent of experimental animals, is 5 micrograms/kg for the rabbit and 29 micrograms/kg for the rat (9).

This product has remarkable stability; it can be eliminated only in negligible quantities; it accumulates in the liver, in nerve and fatty tissues. The toxic dose may be absorbed all at one time or fractionally in repeated doses. For primates no experiments have been attempted, given the toxicity of the product.

2nd: Probably very grave but yet little known deferred effects

Pathology presents mainly the following features (12):

- Chlorine acne i.e. inflammation of the sebaceous glands of the skin (cysts, boils),
- Changes in the liver, renal, thyroid, pancreatic functions; gastrointestinal lesions;
- Reduction of libido and sexual potency;
- Changes in the central nervous system (which express themselves in deficiency of memory, degradation of social relations, sleep problems, emotional instability ...).

This pathology gives rise to fear of the following effects :

- Immunosuppressive effect i.e. reduced resistance to infectious diseases;
- Teratogenic effect; TCDD is a powerful embryotoxin for all types of animals (including horses). It has therefore the property of causing teratogenic effects : death of the embryo or change in the foetal development with malformation at birth from very small doses. The toxic effect on the foetus of the rat manifests itself also if the mother has been intoxicated during the last phase of pregnancy; it is also transmitted by sucking. The distinctness of these experiences is such that it appears extremely improbable that such phenomena would not also be produced in human beings (12, p. 1331).
- Mutagenic effect: it can carry delayed cancer or even hereditary malformation. This effect has not been proved. However, as S. Zedda writes "the first lessons from Vietnam and certain experimental hypotheses constitute more than (just) a warning (12, p. 34)".

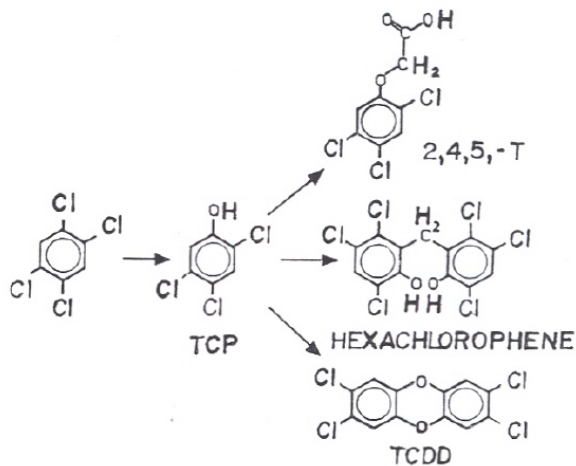


Fig. 8: Hexachlorophene and '2, 4, 5T' are prepared from the same composite: trichlorophenol. In the synthesis of this composite from tetrachloro-benzene an undesirable secondary reaction produces dioxin in very

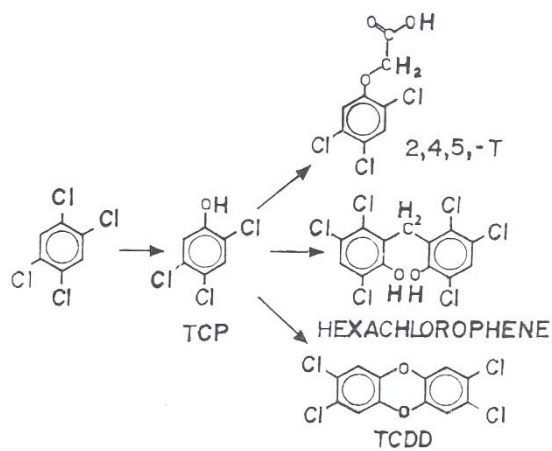


Fig. 8: Hexachlorophene and '2, 4, 5T' are prepared from the same composite: trichlorophenol. In the synthesis of this composite from tetrachloro-benzene an undesirable secondary reaction produces dioxin in very small quantities if the temperature is held down to no more than 200°C, in large quantities if the reaction is not controlled because the latter is exothermic.

(Source: 7, p. 163)

- Enzymatic induction and inhibition effect : certain enzymes are considerably induced while others are inhibited : the synthesis of DNA seems also weakened. The consequences of the effect remain largely unknown.

The existing uncertainties concerning the exact effects of the substance must be stressed, especially with human beings and here particularly those concerning the mutagenic and teratogenic effects. The director of the Hygiene Laboratory of Lombardy said that since it has never been seriously studied TCDD remains partly a mystery (13).

The effects are real if one follows Dr Ton That Thut of the Hanoi hospital who had to treat victims of the discharge of American defoliants : 60.000 tonnes of defoliants with trichlorophenol containing nearly 20 tonnes of dioxin between 1965 and 1972. These statements are disquieting as 30 per cent of the people affected have died and, years later, some of those poisoned continue to die from tumours of the liver and the mortality among their newly born is abnormally high (14). The international Commission of Enquiry, appointed at the request of the Americans has shown itself more reserved and did not establish a clear correlation between the accidents observed and the discharge of defoliant (9, 15); in the same sense and concerning the Laboratory Professor Tuchmann-Duplessis noted in a report: the experimental results while showing the great harmfulness of dioxin also suggest that there could be important differences between the reactions of rodents and those of primates (15, p. 6).

If they do not remove the fundamental ambiguities about the affects of the product the consequences of the accidents that occurred in chemical factories which produce trichlorophenol (500 victims, 15, p. 5) nevertheless make clear the dangerous nature of chlorinated derivatives of dioxin. The recall of these events shows yet another characteristic of dioxin: its stability.

3rd: A substance difficult to eliminate — as the precedents have shown

Accidents have occurred more particularly on November 17, 1953 at BASF, Ludwigshafen (West Germany) ; at Dow Chemical Corp. at Midlands (Michigan) in 1961; at Philips in Amsterdam in 1966; in England on August 23, 1968 at the Coalite and Chemical Products Ltd. (Bolsover, Derbyshire); in 1968 in France near Grenoble (3; 12, p. 25- 16).

The greatest discretion surrounded these dramas. However, after nineteen years of silence one learns that the German accident had caused forty two serious cases of chlorine acne; there were also fourteen victims who had damage to their liver and kidneys, to the cardio-vascular system, to the nervous systems of seven of them. Identical symptoms appeared with the wives and children of exposed workers. Some cases of chlorine acne were still under treatment fifteen years after the accident. The resistance of TCDD was demonstrated on that occasion: two years after the accident when an attempt was made to use the premises again new cases of chlorine acne were reported among the workers. Everything that was combustible was burned and everything that was not was cast in blocks of concrete for submersion in the Atlantic ocean*, work continued with the use of diving suits and oxygen masks.

In 1973 it was learned that the English accident had caused seventy nine cases of chlorine acne; some appeared still three years after the explosion of the reactor with workers of a factory under construction who had not been exposed before. The locations had to be sanitized again meticulously; the contaminated material was buried at a depth of forty five metres in an abandoned coal mine*. (See previous footnote).

Fifty workers were poisoned, of whom ten rather seriously in the Dutch accident. During the two years that followed the escape of dioxin, which was thought to have been between 200 and 300 grams, intestinal sarcoma were registered, serious liver diseases which caused the deaths of four workers. All attempts at depollution failed and after ten years it was decided to demolish everything for submersion in the Atlantic ocean* (see previous footnote). in the French accident twenty one cases of chlorine acne were registered with loss of weight, anorexia etc.

*The reports do not specify whether the various 'dustbins' that were (mines, ocean) used can be so used without danger.

Seveso

Substance	Molecular weight	Minimum lethal dose, moles/kg	Minimum lethal dose, ug/kg
Botulinus toxin A	9×10^{-5}	3.3×10^{-17}	0.00003
Tetanus toxin	1×10^{-5}	1×10^{-15}	0.0001
Diphtheria toxin	7.2×10^{-4}	4.2×10^{-12}	0.3
TCDD	322	3.1×10^{-9}	1
Saxitoxin	372	2.4×10^{-8}	9
Tetrodotoxin	319	2.5×10^{-8}	8-20
Bufotoxin	757	5.2×10^{-7}	390
Curare	696	7.2×10^{-7}	500
Strychnine	334	1.5×10^{-6}	500
Muscarin	210	5.2×10^{-6}	1,100
Diisopropylfluorophosphate	184	1.6×10^{-5}	3,100
Sodium cyanide	49	2.0×10^{-4}	10,000

Table 1: Comparative toxicity of various substances
(Source: 7, p. 164)

Species	LD ₅₀ ug/kg	Time in days between application and death
Guinea pig	0.5-2	5-34
Rabbit	10-115	6-39
Rat	22-100	9-48
Chicken	25-50	12-21
Rhesus Monkey	< 70	28-47
Dog	> 30-300	8-15
Mouse	114-284	20-25

Table 2: LD 50 for various animal species
(Source: 7, p. 164)

The case of a Czechoslovakian factory must be added which, between 1965 and 1968 (the year the establishment was closed down) was responsible for seventy eight cases of chlorine acne, practically all the factory's workers; there were two deaths, eleven cases of liver and metabolic troubles and psychic troubles in the majority of cases.

To these accidents, at the level of production, one can add those which have occurred in other links of the chain. In Missouri, in May 1971, a training track for horses was sprinkled with oil with the aim of stopping the dust flying about. This caused numerous victims among the animals. A 31-33 ppm contamination with dioxin in the soil was found. The soil was twice replaced (October 1971 and April 1972) but the horses continued to die until January 1974 among eighty five horses that had used the track during that period fifty eight fell ill and forty three died; there were twenty six abortions, numerous deaths at birth, and six congenital malformations were counted. There were also four cases of human contamination of which one was particularly grave. Three weeks later the same oil recovery company sprinkled two other tracks with the same results. Three years later it was found that the oil in question came from a factory which from 1969 to 1971 had produced trichlorophenol which contained lots of dioxin: the production was stopped at the end of the Vietnam war but no apparatus for the elimination of residue was installed (12, p. 28; 5).

Among the numerous other cases of intoxication due to chlorinated derivatives the one which occurred in Japan in 1969 needs to be specially mentioned. A vegetable cooking oil caused serious trouble to hundreds of people. Two years after the time of the accident no improvement was found in those intoxicated. In this case there was a teratogenic effect (15, p. 3).

2. THE FACTORY AT MEDA: SERIOUS INSUFFICIENCIES

1st: The operation as seen by the Hoffmann-la-Roche group

a)The production of trichlorophenol. In the past trichlorophenol, used for the synthesis of hexachlorophene in the Givaudan group, had been bought outside. Since the end of the 1960s it became, however, more and more difficult for Givaudan to procure trichlorophenol in the quantities wanted at the degree of purity required. Trichlorophenol was used in large quantities by the manufacturers of herbicides. The raw materials crisis of 1974 brought with it the depletion of this intermediary product which called for the decision to manufacture it.

Already during the years 1970-1972 pilot runs had been undertaken with a view to autonomous production. Eighty seven tonnes of trichlorophenol were manufactured during these trial runs. The production was interrupted in 1973 and 1974 and requirements covered by purchases. Production, correctly speaking, started in 1975 at Meda at the rate of 105 tonnes for that year. In 1976, 130 tonnes had been synthesised up to the day of the accident. All loads were manufactured without incident.

The trichlorophenol manufactured being destined exclusively for medical and cosmetic uses, the requirements were particularly high. Quality control had demanded the development of highly sensitive methods of analysis which could, at short notice, only be applied at Givaudan. This explains why the analyses could not be realised on the spot but on the contrary the samples had to be sent to Switzerland (10).

b) Safety. The optimal temperature for this reaction is 170° and the heating method of this apparatus did not permit to go beyond 190° , well below the critical temperature (230°). If there was no alarm bell installed it was not for financial reasons, its cost is extremely low, nor out of negligence but simply because there was no reason to expect a sudden increase of temperature (17).

A safety valve was installed on the apparatus but its purpose was not to anticipate the effects of an exothermic reaction but to serve safety in an operation at the start of reaction (17).

c) factory in the process of modernisation. From 1970 onwards the programme of modernisation and restructuring which was in progress for the whole Givaudan group was also applied at Icmesa. Manufacturing was rationalised, quality control strengthened, equipment modernised while a new installation for sewerage treatment which met the requirements was to go into operation from autumn 1976. In the space of five years Givaudan-had to invest 16 million Swiss francs in this small company, an amount that greatly exceeded the possibilities of the old owners. This amount represents an investment of 100,000 Swiss francs per working place. A good part of these improvements had been achieved at the time when the accident occurred. The manufacture of trichlorophenol was part of this modernisation programme (10) .

d)The choice of locality. When the need for proper manufacturing became imperative its location was discussed. Several of Givaudan's and Roche's factories were considered. The choice finally fell on Icmesa for the following reasons:

Icmesa had always been cut out as an important supplier of chemical products for the Givaudan group, and this role remained in the long term restructuring plan.

The manufacturing rationalisation programme for the old Icmesa factory demanded the allocation of new products to that company in order to maintain employment in the long term and permit the factory to run at least without loss. The manufacture of trichlorophenol tallied also perfectly with this allocation of functions from the point of view of chemistry inasmuch as the existing apparatus and installations lent themselves to the intended manufacture.

Greater freedom in matters of safety and protection of the environment played no part (10).

e) A formal denial: the installation had no links at all with the military. Never, neither at Icmesa, nor at Givaudan, nor at Roche have toxic substances been manufactured or supplied for military use (10).

2nd: Some radical criticisms from Italian disparagers of Hoffmann-la-Roche

a) Safety. in a reaction in which very precise control of temperature is Fundamental not only for the avoidance of tragedies but also for the achievement of a pure final product no thought had been given to the introduction of automatic temperature control, not even to that of a relay that would ring an alarm bell at the bottom of the ladder (12, p. 30).

Knowing that the reactor could explode they solved the problem by constructing a safety valve which would lead off directly into the atmosphere without any precaution, and this in a densely populated area.

They did not even approach the problem of the terrible parasitic reaction which transforms TCF into dioxin and which instead of an explosion could provoke the diffusion of the product with serious danger for the workers and the population living nearby (12, p. 30).

b) The choice of location. Roche had chosen Italy to manufacture trichlorophenol also because ... of the scientific underdevelopment in that country, because of the absence of restrictive regulations and the weakness of controls (12, p. 30), a country where the health authorities stifle all recourse, where municipal councils, engulfed to their necks in real estate scandals became vulnerable to blackmail because, for instance, they built residential quarters in the place allocated for a hospital. In addition, the salaries were low: 'understanding' trade unions. It is not through dishonesty, it is because of the myth of 'industrialisation' equals "progress was too fast, it was sustained with too much infatuation by the entire Italian Left that the unions might present dangerous interlocutors to the lieutenants from Basle". (18, p. 167).

c) An additional suspicion. Trichlorophenol was manufactured in Italy by Icmesa with the proviso that the factory did not directly produce dioxin as a strategic weapon for the USA and that it sustained certain technicians who had studied the installations of the Meda factory (18, p. 66).

Fritz Moeri, the actual builder of Icmesa's reactor, has expressed doubts in an interview given to Pierpaolo Bollani (*Tempo*, 8 August, 1976) about the fact that during the accident the factory was producing trichlorophenol (18, p. 68).

3rd: Observations by the Commission of Enquiry*

a) Process control. It was not automatic; it was worked manually and therefore discontinually (the continual system was in the process of being installed (p. 63).

b) Cooling system. This too was operated manually. Those responsible at Icmesa have always maintained in their depositions that this manual cooling system was valid (p. 63). The director of Givaudan, G. Waldvogel, has declared on the subject that the Temperature must not exceed a certain level and that the necessary valves had to be opened (p. 64).

The Commission retorts:

This logic renders the responsibility even heavier because it is quite evident that if the merely manual controls were considered adequate the continuous presence of people who are capable of applying them is an absolute necessity (p. 65).

c) There was not even an automatic signal or switching-off system.

Registering this information which was given by P. Paoletti (production coordinator at Icmesa) the commission notes that the system did have its usefulness (p. 66).

*All references given under this heading, unless mentioned otherwise, are relative to the report by the parliamentary Commission of Enquiry (No. 16). Only the page numbers are therefore given.

Coming back to the accident of July 10, the Commission insists:

The speed of intervention by Mr Galante, the workshop manager who was the first to realise that there had been an accident, may in fact have been due to chance (chance that he was in the vicinity of the establishment at the time of the accident) ... Recognising that something abnormal was happening he intervened and avoided a still more serious disaster (p. 66).

D)Staff training. The staff was not aware of the risks connected with the production of trichlorophenol which is serious not only as concerns major accidents but also for the more normal functioning of the company: on various occasions production residues had escaped from containers or pipes (p. 62, deposition by Mr Paoletti). The staff was not qualified to deal with these products.

e) The process used. In the examination of the causes of the accident of July 10, 1976 it must be taken into consideration that those responsible at Icmesa and at Givaudan have argued the absolute impossibility of foreseeing such an event and the negative character of experiences they have had subsequently in the laboratory (deposition by Guy Waldvogel, director general of Givaudan and Joerg Sambeth, technical director of Givaudan).

However, in the scientific literature between 1971 and 1974 one finds the description of other accidents in the production of TCF which were followed by the formation of dioxin; and the Commission considers it totally improbable that the technical directors of Givaudan and Icmesa could have been unaware of this. They themselves have, in other declarations made to the Commissions (Sambeth, von Zwehl, in charge of technical services at Icmesa; Paoletti, production coordinator at Icmesa) confirmed that they knew the work by Milnes (*Nature*, Vol. 232, 1971, p. 395) before July 10, 1976. This author had pointed out since 1971 that in a mixture of caustic soda and ethylenic glycol an exothermic reaction could develop ... that it could develop rapidly and out of control up to 410 and would then release large quantities of gaseous products.

In the case of Icmesa the Commission learned from a deposition (by an Icmesa technician) that at the time of the accident the reactor temperature which was not at all controlled was between 450 and 500 which signifies that the temperature had been considerably above the safety threshold and that conditions for the formation of a significant quantity of dioxin had developed, be it because the solvent had evaporated, be it that other substances had formed in an uncontrolled manner (p. 66).

The Givaudan patent provides that the distillation of the solvent occurs after the acidification of the trichlorophenol ; at the Icmesa factory the inverse process had been used. If this inversion had been avoided the prolonged contact at high temperature between ethylenic glycol and caustic soda (a contact which involves risk factors) would have been avoided and consequently the distillation of the solvent would not have occurred in a basic but in an acid environment. To this must be added that in the Icmesa process the diminution of the solvent, a gradual diminution, had as its necessary consequence the continuous reduction of the thermic head of vapour and favoured the conditions of danger of which Milnes had spoken. Finally, the change made in the molar ratio of the initial concentrations between the tetrachlorobenzene, the caustic soda and the ethylenic glycol must be stressed. Whereas the proportion in the Givaudan patent was 1:2:11.5 it was

1:3:5.5 in the Icmesa process*(p. 69).

These statements we found in the conclusion of this technical article :

Ethylene-glycol is expensive; shocking it is expensive; the transfer of ethylene-glycol is expensive and so is its handling. Whereas if one uses a smaller quantity one reduces staff, working time, energy consumption and the production services (19).

These modifications have as an effect on the one hand a noticeable variation (change) of production cost, on the other an increased risk of TCDD forming and exothermic reaction (p. 70).

f) Numerous infringements. Infringements in relations with the mayor.

The commission examined the placement of the factory and its activity the nature of which had changed with *the* lapse of time :

Icmesa had stated that the establishment was destined for the manufacture of pharmaceutical products ... It was obvious that any change in the type of production which could have required the inclusion of the establishment in one of the two categories foreseen in Article 216 (of the Testo Unico**) would have obliged the company to notify the mayor fifteen days before the start of the new production. This never happened. Icmesa asked only permission for the enlargement of the factory (p. 47).

Mainly on account of this fact the housing plan of Icmesa was approved (on June 30, 1973) without inspection of the Icmesa factory since it had been designed for the manufacture of pharmaceutical products. However, during the years 1969/70 the establishment had in fact been modified for the manufacture of TCF; so it started and reached a maximum level in 1975 (6,361; 33,000.; 40,350; 38,400; 105,000; 142,000 kg during the years 1970/71/72; 1974/75/76 (pp. 49-50).

Even in 1972, in a report on atmospheric pollution requested by the mayor following disquiet about the function of the installation Icmesa made no specific mention of the manufacture of TCF. It confined itself to alluding to an incinerator installation for organic residues and residues of phenol, (p. 77).

Infringement in relation to INAIL

Article 12 of the Testo Unico law concerning the obligatory insurance against work accidents obliges industrialists to declare to the National Institute of Work Accidents (INAIL) the kind of work which might cause work related disease carried out fifteen days before the start of its operations. There exists a list (annex 4 of the Testo Unico) of work related diseases which are to be insured. In this list the diseases caused by phenol and glycol can be found under numbers 15 and 22.

*Much more complete technical explanations may be found in an issue of the review *Seper* which is devoted to the case of Seveso.

**Basic law on sanitary matters of 1934, is the main piece of Italian legislation on matters of the environment, nowadays largely outdated; however, it has not yet been suitably recast (as we shall see later).

At the time the insurance report to INAIL was prepared (1947) Icmesa declared that the Meda factory manufactured chemical and pharmaceutical products; subsequently it never declared modifications undertaken that involved risk level and type of manufacture. (p. 75).

Infringement in relation to labour law

Icmesa did not instal the commission on working conditions provided for in Article 9 of the law of May 20, 1970, N°. 300; this commission has to examine the conditions of noxiousness {harmful conditions} (p. 76) .

Infringement in relation to the provincial administration

The competent provincial administration on matters of air and water pollution had forbidden Icmesa to release industrial refuse into public waters (June 27, 1957). But the situation remained alarming. In a report of October 18, 1969 from the Provincial Laboratory for¹ Hygiene and Prophylaxis one reads: Multiple, persistent nauseous odours, continuous and constant danger for the ground water level and the nearby stream. At last, in January 1972, Icmesa presented the installation project for water purification and incineration of residual dirt from the treatment of phenol (pp. 78/79).

Infringement in relation to the ANCC*

An industrial establishment in terms of the law (of July 26, 1965), No. 966 Article 2) has to obtain a certificate of prevention from the Vigili del Fuoco. It has to request control visits; the initiative is incumbent upon it and not on the fire police. Icmesa, after an interruption of its production in 1973, had to request a new authorisation (pp. 81-82).

When after a year it restarted production of TCF it requested renewal of the certificate or prevention. The Vigili del Fuoco carried out their visit but did not issue the certificate because they had reported deficiencies in the documentation. The commander of the Vigili del Fuoco notified the mayor of Meda and Icmesa that the renewal of the certificate of prevention was subject to the presentation ... of a technical report on the manufacture and the substances used. Icmesa resumed production of trichlorophenol until July 10, 1976 without the certificate of prevention (p. 82).

Infringement in relation to the Works Inspectorate

The inspector of works in Milan should also have been notified of the change of manufacture when Icmesa started manufacturing TCF. However they did not do that (p. 83).

4th The deficiency of the public authorities in matters of preventive control

a) Virulent criticism of the passivity of the administration. G. Pecorella, lawyer for the plaintiffs is specific: -he drama would not have happened if certain public organisations had not shut their eyes on what was happening in the establishment at Meda. The CRIA** knew since 1972 that Icmesa handled phenol:

* National Association for the Control of Combustions, an organisation charged with the control of apparatus working with pressure, from pressure cookers to reactor tanks in chemical industry installations

**Regional committee in charge of the control of the release of pollutants into the atmosphere (CHIAL = CRIA for Lombardy).

In fact, on February 2 of that year a request had been filed by Icmesa for an authorisation to instal an incinerator for phenol residues. CRIAL then requested a technical report on the industrial installation used from Icmesa in order to be able to determine the quantity and composition of the incinerated substances which were to be released into the air. This report was filed on March 7, 1972. In its reply of June 27, 1972 CRIAL expressed doubt about the completeness of the report and seemed to think that not all the ongoing operations had been mentioned as the necessity of setting up an incinerator would lead one to assume. It requested a new report to be filed within 30 days which was to include a description of all operations carried out, of all raw materials handled and the quantities of the substances which were to be released into the atmosphere.

The reply took thirty months without CRIAL ever making any move to get back at Icmesa. The report of March 28, 1975 speaks of the production of trichlorophenol for which a burner for phenolised water had been set up but it insists nevertheless that "the production of trichlorophenol has meanwhile been stopped but might be restarted very soon"; finally the report states that all the reactors "have a ... direct outlet into the atmosphere with a view to letting out possible accidental excess pressure (safety discs, low pressure valve)". Even at that time CRIAL was in no hurry at all to inform the mayor who would have had to impose the necessary protection measures on Icmesa (22, p. 108).

It must be pointed out that the members of CRIA include the chairman of the regional council, the regional director for ecology, the provincial medical officer, the health authorities, the chief of the regional works inspectorate, the representatives of the departments of the region, the president of the chamber of commerce etc. The authorities were therefore in the picture about what was going on at Meda.

The virulent criticisms become understandable if one considers for example the following table which shows how a quarter of a century had not been sufficient to get respect for the law (42):

- 1957: An enquiry shows that Icmesa poisons the water of a nearby stream.
- 1958: Those responsible at the factory announce that they have installed a purification system.
- 1959: A control shows that the water remains toxic.
- 1962: After two reminders from the provincial authorities Icmesa announces that it has put a new installation into operation.
- 1965: The quality of the water is still found unacceptable.
- 1969/75: New disposal systems for refuse are installed; the reduction of toxicity does not seem sufficient. A new process is introduced; it remains ineffective.
- 1975: A new dossier is sent to the Director of Public Prosecutions.

b) Moderate criticism from the Commission of Enquiry: the public authorities have not shown much zeal but they hope not committed serious mistakes. The parliamentary commission analysed the responsible authorities one by one. Summed up, its analysis is as follows:

The Inspector of Works had relied on the workers for information instead of requesting it from the management of Icmesa. Since the workers had no information from their company the inspector found himself blocked as he had not made use of his rights towards the company (16, p. 76).

ANCC did not investigate in depth; it has the excuse of industrial secrecy; only the inspector was entitled to know the production process. ANCC did not think of questioning the inspector (16, p. 98).

The fire brigade had no knowledge either of the industrial secrets. Only the inspector ... But they did not ask the inspector; neither did they alert the police commissioner who would have had the possibility of exposing the situation (16, pp. 95-96)

INAIL had no right to know the production process either, not even in the execution of its functions. But it did not occur to them, as it appears, to get in touch with the inspector (16, p. 100) .

All the persons mentioned in this list are more or less part of CRIA. It appears that there has not been a more global approach to the issues (16, pp. 94-95).

As the Commission remarks, everything was done in the most 'sclerotic' manner; everybody tended to work within the narrowest limits of their authority without using all their powers, without bothering about what was happening at Icmesa*.

3. THE CALENDAR OF IMPOTENCE

1st: July 10-24: Dioxin takes over control of the area; the industrial owners keep quiet; the bureaucracy reasserts itself

Saturday, July 10:

At 12.37 h, as we have said, the safety disc of the reactor in block B of the Icmesa factory slackened following a sudden increase in temperature and pressure; the industrial owners will say that the reason for this was unknown and inexplicable:

The manufacturing process, properly speaking, had been completed at 6.00 h and the night shift left the factory after having cut off all energy supply to the apparatus (10).

The Commission of Enquiry**for its part consented:

The last cycle for the week had started at 16.00 h on Friday 9th, i.e. ten hours late compared to normal conditions. Based on working hours, those responsible at Icmesa knew what would happen at the time of the interruption (16, p. 69).

*The situation must be seen in the general context of the control of installations in Italy. The case of Meda is in no way exceptional.

**In the same sense S. Zedda thinks he can maintain: on Friday, July 9, at 7.00 h in the evening a new cycle of reaction and distillation which normally lasts for fifteen hours was imposed on the workers, in full knowledge of the fact that on the following morning at 6.00 h the workers would leave and the weekend would start. Well, on that Saturday, July 10, something did not work in the reaction of distillation and smothering in the sodium-trichlorophenate water. However, the reactor was left to itself without an automatic alarm signal until the cloud escaping from the valve indicated at 12.40 h that the drama had started (12, p. 30).

12.37 h an employee was in the vicinity of the establishment and, as has been mentioned earlier, intervened. This was a lucky coincidence.

Outside, children saw a cloud for a moment.

Mr Galante alerted Mr Paoletti who stood in for the man in charge of production who was on holiday. To our knowledge no other intervention by any of those responsible at Icmesa took place until the next day (16, p. 105).

Sunday, July 11:

The first effects of the accident were noticed: vegetation burned, animals taken by disease; some twenty children had sores on their arms, red spots on their faces, some sort of burns on their bodies, high fever, intestinal troubles. Police inquired (20, p. 12).

The man responsible in the company (the engineer von Zwehl), also on holiday, was joined by Mr Paoletti: he asked for samples of the burned vegetation to be sent to the Givaudan laboratories in Switzerland for analysis. This was done on Sunday evening. A little earlier, at 17.45 h, two representatives from Icmesa informed the commander of the carabinieri that a cloud of herbicide had been spread over the area around the factory. The mayor of Meda and the health officer of the community were alerted (16, p. 106).

But there is an immense difference between a 'herbicide' and dioxin. However, since 14.15 h the technical director of Givaudan (Dr Sambeth) who had been given the news had established the hypothesis of an escape of dioxin if one follows his deposition at the Commission of Enquiry :

We had heard of accidents of a similar kind and I thought of this possibility; I thought at that moment, and I still think, that there was a very high concentration of dioxin around the safety disc and a smaller concentration elsewhere. I could not think at that time that the dioxin could have expanded over a very large area (16, p. 107).

Monday, July 12:

The industrial owners did not close the factory: work was resumed normally on Monday. On that day Icmesa confirmed by letter to the local health authority that an incident had occurred at its factory on Saturday and that measures of precaution had been suggested to the neighbours; but once more there was only an allusion to 'herbicides' :

Meda, 12 July 1976
For the att. of the Health Officer
Office for Health and Hygiene
20050 Seveso

Following our previous conversations we confirm that on Saturday, July 10, 1976 an incident occurred inside our establishment. The factory was at a standstill, as is usual on a Saturday, which is a non-working day. We are still studying the causes of the accident ... At the moment we can only assume that an inexplicable exothermic reaction has occurred in a reactor that had been left in a cooling phase. (There were the necessary substances for the production of raw trichlorophenol in the reactor: tetrachlorobenzene, caustic soda etc.). At the end of the normal working hours (06.00 h on Saturday) the reactor containing the raw product was left in a non-operating

state ... as usual. We do not know for what reason a rupture of the safety disc occurred at 12.40 h which permitted a steam cloud to escape which after hitting vegetation inside our establishment moved in a southeasterly direction, driven by the wind, and within a short time dissolved.

Not being able to evaluate the nature of the substances carried by those vapours and their exact effects we have intervened with neighbours asking them not to consume garden products, knowing that the final product is also used in herbicides (21).

This was then the first official document on the accident. The lawyer for the plaintiffs, G. Pecorella, called it "a perfect example of criminal hypocrisy" (22, p. 106).

Tuesday, July 13:

The health authorities sent this letter to the mayors of Meda and Seveso. They added their own evaluation :

After enquiries undertaken, no danger to persons living in the surrounding areas is to be feared (22, p. 106).

Wednesday, July 14:

The analyses carried out at the Givaudan laboratories at Duebendorf (Switzerland) showed that dioxin was present (deposition Sambeth, Commission of Enquiry, 16, p. 108).

On site, the deaths of a large number of animals in the area adjacent to the factory were reported (16, p. 113).

Thursday, July 15:

Serious cases of poisoning were reported among the population (16, p. 110). The mayors announced by means of posters that precautions must be taken in the affected area (ban on the consumption of garden vegetables) and met the industrial owners: the latter made no mention of the presence of dioxin (16, p. 113).

Friday, July 16:

Fifteen children, four of which were in a grave condition, were admitted to hospital; but nobody knew what treatment to apply. A strike was called; the inhabitants insisted that the authorities give them some exact information (20, p. 13; 23, p. 13).

The Italians on their part took samples for analysis (16, p. 114).

Saturday, July 17:

The mayors of Meda and Seveso added emphasis to the health advice given; they ordered the burning of the polluted garden produces, the killing and burning of the affected animals. On the same day the director of the provincial chemical laboratory also established the hypothesis: there could have been, an escape of dioxin (16, p. 114).

Sunday, July 18:

The mayor of Meda ordered the closure of the factory; seals were affixed to the doors of the accident block (16, p. 114). The director of the Provincial chemical laboratory in Milan, in a statement to the technicians of

Icmesa, declared the possibility of the presence of dioxin in the toxic cloud (16, p. 108).

Monday, July 19:

While five severe children were hospitalised, the director of the provincial chemical laboratory learned during a visit at Givaudan's that the industrial owners too knew that there had been a formation of dioxin (16, p. 111).

Tuesday, July 20:

Upon the return from Switzerland of the responsible Italian persons the health directorate knew therefore for certain the seriousness of what had happened on July 10; the mayors were informed (16, p. 115).

In the area, animals died within a radius of 3 km from the zone originally declared endangered (23, p. 14; 22, p. 107).

Wednesday/Thursday, July 21/22:

Meeting at the mayor's office in Seveso; no decision was taken. Under pressure from the Regional Council* supplementary protective measures for the citizens were adopted (prohibition to eat (meat from) animals from the area; closure of certain establishments, on the spot medical checks etc.). The multiplication of pathological facts and the expanse of the affected area provoked the local health authorities to demand from the police commissioner the declaration of a state of emergency by the Provincial Health Council. The scientific literature on this strange product called dioxin, which did not exist in the files of the anti-poison centre in Milan, was gathered (23, pp. 14-15).

From the most official quarters the tone was only just one of disquiet:

Police Commissioner of Milan
Official Communiqué
Milan, July 22, 1976

In connection with the Icmesa ... accident ... the Police Commissioner of Milan has received the provincial medical officer, Professor Eboli, the director of the chemical laboratory. Laboratory-of Hygiene and Prophylaxis, Dr Cavallaro, the health officer of the community of Seveso, Professor Ghetti ...

There is general agreement on stating that contrary to what has been suggested there exists at this time no toxic gas cloud. No extensions of the phenomenon beyond the communities mentioned below has been reported.

As a precaution, the Police Commissioner advises not to eat produce from the area ...

The Provincial Health Council has been called into session for tomorrow. (23, pp. 15-16).

Friday, July 23:

A large meeting gathered together the medical science experts at the Police Commissioner's office in Milan. The meeting went on all afternoon. In the evening, a terse communiqué minimised the seriousness of the situation (20, p. 13):

*Regional parliament, regional legislature. A law of 1976 about the regions very strongly decentralised powers in Italy.

Police Commissioner's Office
Official Communiqué
Milan, July 23, 1976

The Provincial Health Council in session at the Police Commissioner's office at midday for the examination of the events at Seveso and Meda ... confirms the validity of the measures taken by the Region of Lombardy and the initiatives by the local authorities concerning the prevention of possibly damaging effects on the population of the communities concerned.

The meeting has concluded that it is not necessary to suggest civil defence measures.

The university representatives who took part in the meeting have unanimously stressed that further measures need not be considered necessary or urgent (23, p. 16).

In the television news, Vittorio Rivolta, the Director General of the Health Service confirmed: Everything is under control (20, p. 13). A few hours later these communiqués looked ridiculous. The Director of the Medical Research Centre of Roche in Basle, Giuseppe Reggiani, confirmed: The situation is very serious; draconian measures are necessary; 20 cm of earth surface must be removed, the factory must be buried, the houses destroyed (20, p. 14).

To support his statement he presented summary charts of pollution drawn up by Swiss technicians (20, p. 14)

Saturday, July 24:

One last effort was still made to throw out the spectre of a disaster. The regional health director implicated G. Reggiani in the *Corriere d'Informazione*: This person was dumped on us; nobody expected him, and nobody expected such severe statements. To my knowledge, he is not an official representative of the company and I shall today request to know on whose behalf he speaks. I have made clear to him the seriousness of what he says. I have the impression that this person is bluffing. And this person will have to answer for his statements (23, p. 18).

However G. Reggiani received his 'official' recognition: "a doctor who acts as our consultant", asserted the director general of Givaudan in a letter to the medical authorities of Meda and Seveso (4, p. 9a).

These events brought about a substantial change of scenery. A large gathering of high-ranking medical personalities, politicians and administrators was held at the health directorate. At the end of the afternoon the verdict was pronounced with embarrassment :

One hundred and seventy nine people will have to abandon their houses within 24 hours; their dwellings are in an area which is too highly polluted (20, p. 14).

In the meeting it was also spelled out that people must eat absolutely no produce from the area (vegetables, eggs, meat, milk ...) which they had done over the last two weeks because of lack of sufficiently exact information (except for the immediate neighbours of the factory). The mayors found a population in uproar as they left the meeting. The harm was at last recognised, more or less, the existence of the tip of the iceberg was no longer denied.

A Series of Grave Warnings

TCDD - EXPERIMENTAL TOXICITY	
	DOSE (1)
- LD ₅₀ FOR LABORATORY ANIMALS	1 (0.6-115) $\mu\text{g}/\text{kg}$
- SYSTEMIC LESIONS (LIVER, BLOOD, SKIN ETC.) AND CLINICAL CHEMISTRY ABNORMAL FINDINGS AT CHRONIC ADMINISTRATION	0.1 "
- EMBRYOTOXICITY, FETOTOXICITY, POSTNATAL GROWTH RETARDATION	0.25 "
- REPRODUCTION, FERTILITY	0.01 "
- IMMUNODEFICIENCY (ATROPHY OF LYMPHOID TISSUE)	0.1 "
- ENZYM INDUCTION	1 "
- CARCINOGENICITY	0.1 "
- MUTAGENICITY (?)	2 $\mu\text{g}/\text{mL}$

(1) INDICATIVE VALUES

Table 3: Experimental studies on animals
(Source: 4, p. 9)

TOXIC EFFECTS OF TCDD IN MAN	
<u>DERMATOLOGICAL:</u>	CHLORACHE PORPHYRIA CUTANEA TARDA HYPERPIGMENTATION AND HIRAUTISM
<u>INTERNAL:</u>	LIVER DAMAGE (MILD FIBROSIS, FATTY CHANGES, HAEMOFUSCIN DEPOSITION AND PARENCHYMAL-CELL DEGENERATION) RAISED SERUM HEPATIC ENZYME LEVELS DISORDERS OF FAT METABOLISM DISORDERS OF CARBOHYDRATE METABOLISM CARDIOVASCULAR DISORDERS URINARY TRACT DISORDERS RESPIRATORY TRACT DISORDERS PANCREATIC DISORDERS
<u>NEUROLOGICAL:</u>	POLYNEUROPATHIES SENSORIAL IMPAIRMENTS (SIGHT, HEARING, SMELL, TASTE)
<u>PSYCHIATRIC:</u>	NEURASTHENIC OR DEPRESSIVE SYNDROMES

Table 4: Toxic effects on man
(Source: 4, p. 9)

2nd: July 25 - August 30: some measures against the dioxin; much effort to save the institutions on the spot

From Sunday 25th to Thursday 29th:

The army encircled 12 hectares of contaminated area with barbed wire on the 25th. On Monday 26th, the evacuation of the area designated by the authorities started at 11.15 h for 225 people. They were allowed to take with them those of their clothes which on that day were in wardrobes a ruling which can only be reported with astonishment: a piece of linen that was drying in the open air on the 10th or 11th could be taken along on the 25th. In fact, the inhabitants carried with them much more: food, various objects, before starting 'proper' housemoving on a large scale (20, pp. 14-15; 16, p. 229).

A first scientific report (worked out by NATO) was sent to the regional government authority; it gave draconian limits for the acceptable threshold of dioxin: 0.0125 micrograms/m².

That was in any case a concentration not measurable with the available apparatus. What was it good for, then? The NATO report will be forgotten (23, pp. 38-41). It will be kept secret but its disclosure on August 24 had the effect of a bombshell : the threshold established by the official services was in fact 400 times higher than the figure of 0.0125 micrograms/m² (20, p. 18).

Major confusion ensued. On July 24 Rome had let it be known that on the strength of a decree of January 14, 1972 the Region had full authority and responsibility in matters of health (23, p. 22). Two days later, on the 26th, the mayor of Seveso let it be known that as from July 16 there had been agreement between him and the authorities to proceed with the evacuation of the neighbourhood of Icmesa but that a series of events had intervened to hold up this evacuation (23, pp. 38-41). On the 27th the Minister of Health (at national level) accused the Region for its slowness in informing Rome (23, p. 21).

Also on the 27th, Vittorio Rivolta, regional minister of health, was given authority by the government of Lombardy to take matters in hand (24) . The army cordoned off an additional 15 hectares. A total of 227 people had been evacuated by that date.

The following day the disquiet increased. These lines from a correspondent of *Le Monde* show clearly the fear that can grow within a population that has been affected, little by little, as if by chance, by a mysterious invisible evil and which has frustrated the technicians and those responsible:

There is concern for the inhabitants of Baruccana and Cesano even though they are located several kilometers from the company, because a new contaminated area has been disclosed in those parts. As in Seveso, for some ten days chicken, rabbits and dogs began to die. Now, there are perhaps 15,000 inhabitants and not just a few hundred in danger, because the symptoms of intoxication with dioxin are very little known and take a long time to show themselves. Skin lesions, the most obvious symptoms, appear only after several days. Gastro-enteritis is feared and even very long-term effects, genetic effects.

And Marc-Ambrose Rendu notes also:

The men from the 3rd artillery regiment in Milan who have surrounded the factory and 30 hectares of neighbouring land with barbed wire have worked with bare hands, without special precautions. Only yesterday were they given rubber boots. Must they be put under medical surveillance? (25).

During the night a bomb exploded in Rome, in front of the offices of the Italian subsidiary of Hoffmann-la-Roche. The outrage caused considerable damage but there were no casualties (13)

Friday, July 30 - Sunday, August 1:

Vittorio Rivolta launched an appeal to the population on July 30. Laura Conti, communist party member of the regional parliament, a medical doctor, secretary of the Health-Ecology Commission of the Regional Council, reported this appeal and criticised it:

it defines dioxin as an "unrecognised gas", which is wrong;

- it states that "the dioxin has struck a limited, isolated and evacuated area": a large area is, however, neither isolated nor evacuated;

- it says "that no danger exists outside the evacuated area, that there are only hygienic measures to be observed"; that is inaccurate;

- it says finally "that in order to understand the phenomenon properly one can say that the polluted area is comparable to an area struck by fire where the fire has been brought under control"; which is an enormous psychological error. V. Rivolta indicates the end of danger while there remain deferred effects (23, pp. 31-32).

- This kind of declaration, classical in cases of disaster, could not check the negative development which was taking shape.

The economic effects of the toxic cloud were beginning to be felt: closure of restaurants, refusal to accept delivery of orders already shipped by furniture manufacturers; hotel owners in some holiday centres refusing accommodation to people whose identity cards show Seveso as their domicile.

Therapeutic abortion on account of the possible teratogenic effect of dioxin on the psychical health of the mother* was authorised by the Health Minister, L. DalFalco. The Christian Democrats, the movement "Communion and Liberation", the clergy of the province denied the dioxin danger. V. Rivolta, a Christian Democrat, was accused of "abortionism" for having admitted that there were risks for the women and the new-born. The polemics about abortion raged as other groups, who appeared to have come from Rome, pleaded in opposition to "Communion and Liberation" (20, p. 15).

On that Friday, July 30, the first map** of the polluted area was at last ready. There were distinguished:

·a zone A of strong concentration of endioxin, up to 5,000 micrograms/m² and more on a surface of 115 hectares with 700 inhabitants;

·a zone B, much less affected, up to 15 micrograms/m and above the threshold of 5 micrograms/m², stretching over 205 hectares with 4,280 inhabitants (3, p. 15, 26).

At the end of July more than fifty people were counted as receiving hospital treatment in the region. The citizens of Seveso, very disquieted, went for examination at the rate of 600 a day at a centre installed in a school in town (24).

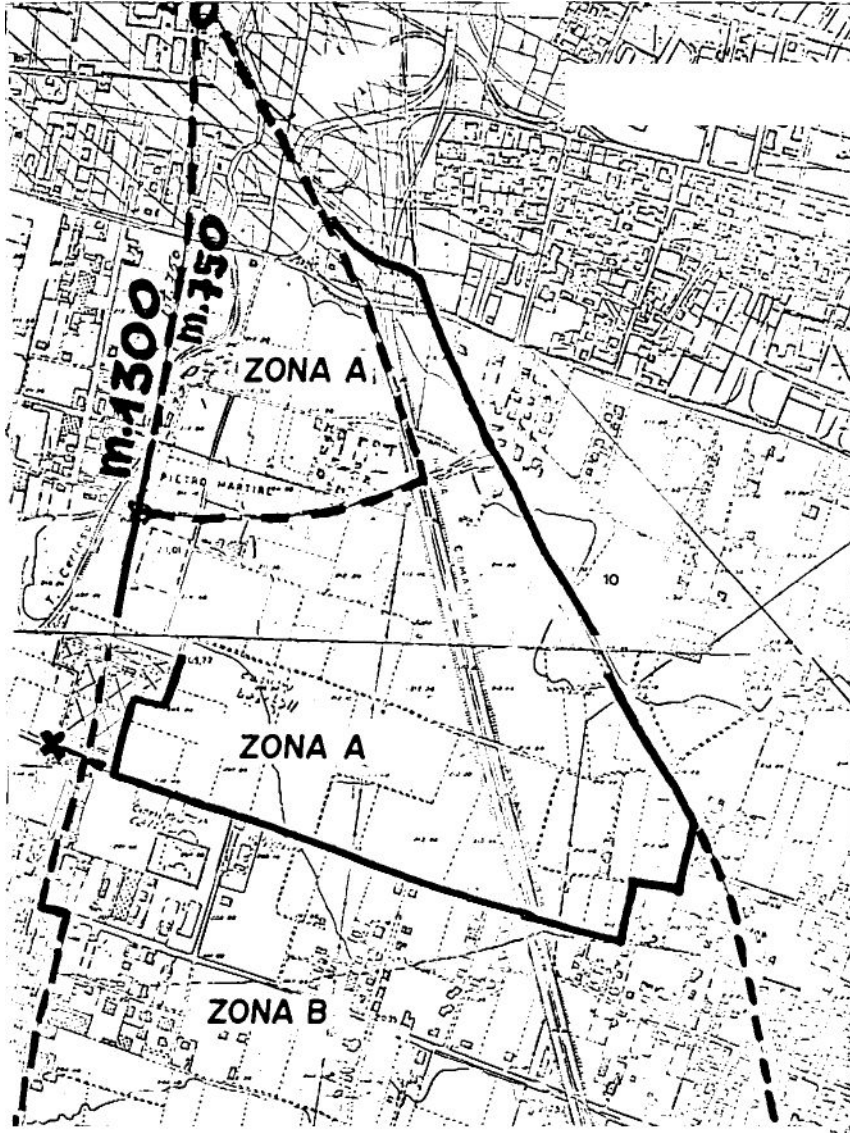
Monday, 2nd - Sunday, 8th August:

On August 2, 511 inhabitants were dislodged, and during the night a great bustle descended on the office of the mayor at Desio. The fact was that dioxin in larger quantities than those found at Seveso and Meda had been spotted at Cesano, Mademo and Desio. Must there be more evacuations? The representatives of the Region recoiled: "Here, 7,000 people must leave.

*Only the health of the mother permits therapeutic abortion according to Italian law. Since dioxin has no proven impact on the physical health of the pregnant woman there remained only the aspect of psychical health to obtain legal interruption of pregnancy.

**See map.

Fig. 10: First map of the contaminated area



We are aware that the evacuation of such a large number of people would cause a great 'shock'. The population was advised to use discretion : the women and children were removed; people were asked not to procreate during the coming months (20, pp. 15-16, p. 229).

The authorities were presented with diverse offers of 'solutions' for the treatment of the dioxin. As in similar cases, the market of ideas was packed but it remained difficult to discern what was valid from what was useless, even dangerous, patchwork.

Since the molecules of TCDD crumble at temperatures above 800° one thought of the flamethrowers used by the military specialists of "nuclear, bacteriological, chemical" warfare (13). The sowing of the oil with bacteriae that would destroy the dioxin molecules biologically was also proposed; or perhaps the release of ozone in order to increase the destructive effect of the sun rays; or the decontamination of people, animals and objects with household soap which would dissolve the dioxin molecules and thus facilitate the attack on them by the sun rays; for the soil it was proposed to spread a mixture of vegetable oil and animal fat (28).

Faced with this variety of proposed solutions the authorities were impotent. As L. Conti pointed out, it was not for V. Rivolta to compare these different scientific hypotheses. There existed an 'ecology' service but that was not taken into account. In fact, there was a strong rivalry between it and the 'health' service (23, p. 43).

The uncertainty about the quantity of dioxin spread about weighed heavily: 500 grams, 2 kilograms? Or, according to a British expert, D. F. Lee, who arrived on the spot, quite a different figure:

The estimated quantity of 2 kilograms of escaped dioxin appears understated. According to my theory, which I hope is wrong, there could in the end have been 130 kilograms of TCDD (23, p. 42).

Since the reactor was sealed off it was difficult to choose between all these hypotheses. Even in September Hoffmann-la-Roche still noted:

Dioxin escaped in a quantity which can still not be exactly determined. (10, p. 4).

Monday, August 9:

The medico-epidemiological commission set up by the Region after having considered the available literature approved a document confirming that dioxin is teratogenic for animals but that there are no data on man; that it is nevertheless reasonable to admit the danger; and that the first three months of pregnancy should be considered in zones A and B (23, p. 79).

Laura Conti (23) remarked that this document had been awaited with extreme impatience, as if it meant to her alone a decision. In any case, it meant only a sign of awareness of the dangers of dioxin; it permitted in no way therapeutic abortion, on the grounds of teratogenic risk, because the law concerns itself only with the health of the mother. Proving that there is danger to the foetus is useless where the law is concerned. The document of August 9 may perhaps help to plead psychical traumatism of the mother. Giovanni Cerutti saw there at last, according to him, "a loophole for therapeutic abortion" (20, p. 16).

The Catholic hierarchy remained vigilant. Monsignor Giovanni Colombo, Cardinal-Archbishop of Milan, reacted briskly:

While many have felt a duty to help relieve the difficulties we deplore that so many negative positions have been taken up such as the organisation of a campaign for abortion and the spreading of new and often unfounded alarm ... And the archbishop stressed the generous offer by some couples who had declared their willingness to adopt a child that was born deformed. "We invite those who are prepared to do this to make themselves known" (29, p. 100.; 30).

On the spot, a clinic for the medical follow-up on the population and the centralisation of observations was set up; financial aid of 240 million ffrs was released. There were still eleven people in hospital out of twenty four registered admissions; 220 pregnant women, of which 117 in their first three months of pregnancy had been examined; malformations were feared (31)

Tuesday, August 10

The local disquiet was revived by the state of health of the mayor of Cesano Maderno, one of the first persons to have visited the contaminated fields after the accident. The medical tests showed that the mayor had an excessive amount of white corpuscles. Could this be due to an ingestion of dioxin? (32). In the same vein, there was the death under suspicious circumstances of a woman of 35 in July: the examining magistrate had ordered an autopsy (25)

A ghetto feeling developed in the area as it felt itself rejected:

The Swiss authorities banned the import of fruit and vegetables coming from the Milan area and air samples were taken along the border (i.e. some 30 km from the polluted area) in order to discover any contamination that might reach Swiss territory. A shipment of furniture of Seveso manufacture was stopped at the German-Swiss border because the addressee, a company in Cologne, had refused to take delivery, being afraid that it might have been impregnated by the dioxin cloud (32).

Scientific opinions are not designed to appease fear. The weekly paper *Tempo* published an interview with Ton That Thut from the Hanoi hospital:

- out of every 1,000 people intoxicated 300 deaths were registered;
- the dioxin had caused serious liver damages;
- malformations and an extraordinarily high number of spontaneous abortions had been noted.

Situations such as those that followed must be seen in this mental climate. It shows the disarray of a population in the grip of a problem that was largely beyond the capacity of the authorities. The life-buoy for these people was science. Science had to know.

Laura Conti, stationed at a secondary school in Seveso, found herself, therefore, facing a population at a loose end and divided into two camps: one favourable, one hostile to therapeutic abortion. After her discrete intervention she had to face a militant from "Communion and Liberation" asking the following question:

-Wouldn't it be better, if one wanted a woman to abort, to do so on the basis of a test which would show whether she has been contaminated by dioxin?

-There is no such test ...

People resume the attack at the end of the gathering:

- You have to give a figure !
- You speak of danger, but danger must be expressed in a figure!
- A figure: you have it in your head; if not you wouldn't say the women should abort;
- I can't get out of this thinks the person involved... The only figure available ... but the Vietnamese situation is not the same ...
- Tell us that figure! We know that it's not identical, but one wants to have an idea !
- In Vietnam, among those who had hepatitis, 30 per cent of those who had had it, had cancer of the liver ...
- 30 per cent, 30 per cent, said the people (23, pp. 76-77).

On August 10 a second map* of the polluted area was ready. It showed:

- a zone A of 108 hectares, evacuated (730 people)**
- a zone B of 169.4 hectares; the children from that zone as well as the pregnant women were evacuated during the day;
- a zone R (R standing for caution) surrounding the first two, of 1,430 hectares.

Wednesday, August 11:

The scientific commission***appointed by the central government (on August 4) issued its verdict: Everything in the Seveso area must be destroyed, even the houses (20, p. 16).

Professor Cimmino declared: We shall need months, perhaps years, to understand the situation in depth (34).

The president of the Region, Cesare Golfari, rejected this opinion flatly:

No initiative for the sanitation of the terrain shall be taken; all decisions shall be taken by the Regional Council (22).

The Region argued that the destruction might raise polluted dust; V. Rivolta accused the Cimmino commission of pessimism; he thought that improvement was possible (declaration of August 14): We have well-founded hopes of recovering at least four fifths of the houses of zone A ... The improvement will be possible without pulling down the houses or removing the soil (19) .

On that Wednesday, August 11, it was decided to call the Regional Council

*See map

**The exact borders of the zone had changed at least three times (16, pp. 119-120).

***Cimmino Commission.

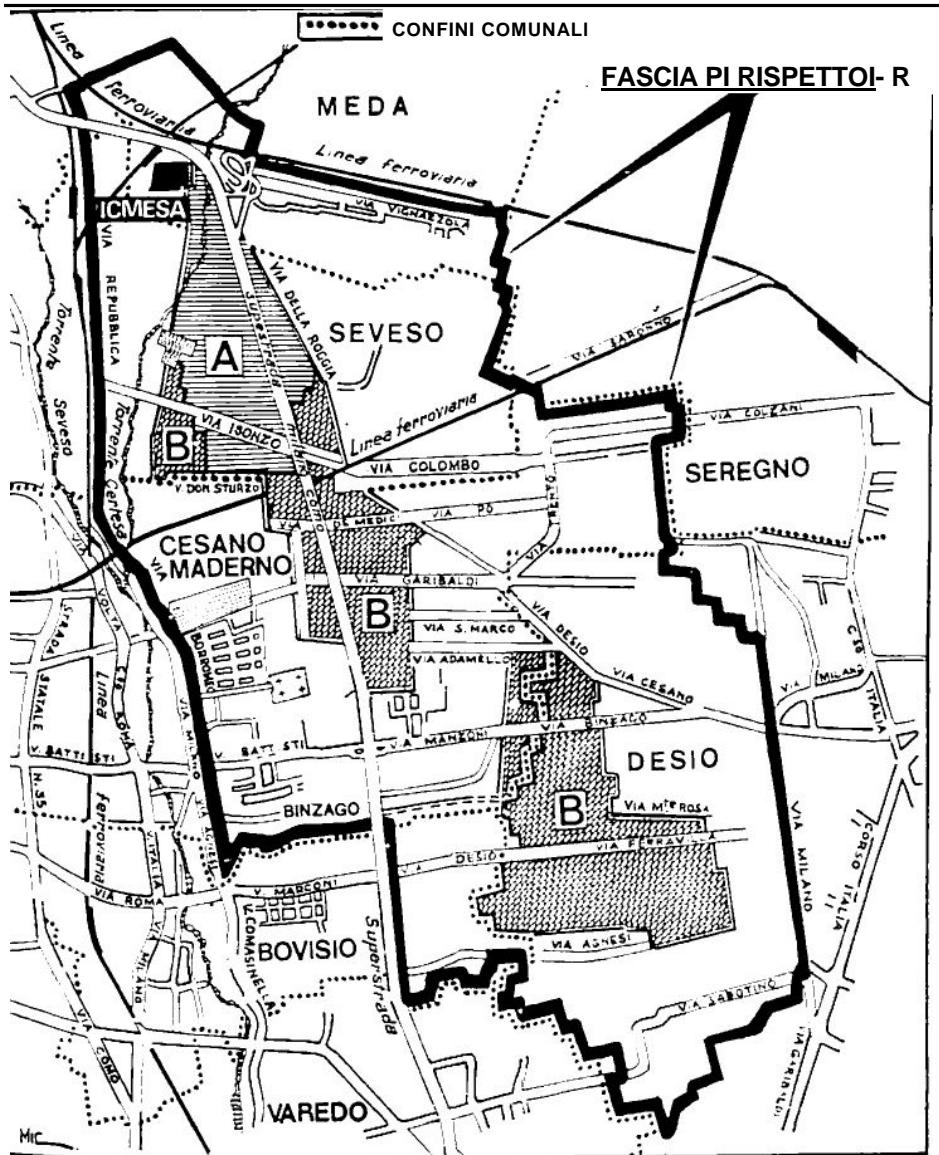


fig. 11: Second contamination map. Populations: see table 5, page 62
(Source: 39)

A Series of Grave Warnings

TOWNSHIP	ZONE A	ZONE B	ZONE R	OUTSIDE	TOTAL
SEVESO	681	626	7 945	7 738	16 990
MEDA	55	-	4 017	15 493	19 565
CESANO M.	-	2 731	14 991	16 111	33 833
DESIO	-	1 342	4 608	27 061	33 011
BARLASSINA	-	-	72	5 559	5 631
BOVISIO	-	-	167	11 058	11 225
LENTATE	-	-	-	13 037	13 037
MUGGIO	-	-	-	18 690	18 690
NOVA M.	-	-	-	18 467	18 467
SEREGNO	-	-	-	36 838	36 838
VAREDO	-	-	-	11 841	11 841
TOTAL	736	4 699	31 800	181 093	219 128

Table 5: Population of the different communities in the area concerned and in the zones of contamination (A, B, R) which have been established.

(Source: 4, p. 11)

Into session. The date was fixed... August 24, 1976.

The technical director of Icmesa was arrested and charged with causing "disaster by carelessness" and "omission of measures against work accidents" (26).

During a press conference called at Basle by the directors of Hoffmann-la-Roche, Mr Guy Waldvogel, director of Givaudan, indicated that he knew in advance the risk of an appearance of toxic products at the Seveso factory but that he had never imagined that "such a disaster" could occur. This was why no emergency plan had been worked out with the local authorities. Mr Alfred Jann, president of Hoffmann-la-Roche, said: We shall pay the damages. We have sufficient financial reserves for that (26).

A young woman from the contaminated area had a stillborn child (26). Whether or not this had anything to do with the accident of July 10, the event did not improve the tense atmosphere in the area.

Thursday, 12th - Monday, August 23rd

Confusion grew. Therefore :

- the polemics about abortion continued, the Pope joined in the condemnation (20, p. 17).
- the controversy between the Cimmino commission and the Region carried on; between those who favoured the destruction of the area and those who strained to reassure the people;
- the evacuated inhabitants began to pretest (20, p. 17);

- charges were brought against the mayor of Meda and against two regional representatives who had delayed the decontamination measures (20, p. 17).

Tuesday, August 24 :

The Regional Council could at last meet to discuss the action taken by the regional government. After preliminary polemics the political parties (except for the extreme Left) reached agreement and approved the action taken by the regional government. The agreement was, nevertheless, matched by reservation: It will be necessary to recheck and verify the real presence of dioxin in the soil and in the subsoil, a woman socialist declared in the name of the health commission (20, pp. 17-18).

Very complex elements intervened on that day. What would be the attitude of the opposition, in particular that of the Italian communist party? Would the regional government be overthrown? During the morning session Laura Conti for the Italian communist party drew up the indictment of the action carried out, an action from which the Council had been kept away since July 10; emotions and tensions were at their highest pitch: the audience heard the description of a reality which the officials had systematically wanted to cover up and to cover themselves since the beginning of the affair. The meeting dispersed, paled or overtaken by controlled feelings. Was that the end of the regional government?

In the afternoon, the government's action received a positive judgement. Why? Several factors came into play. On the one hand, at national level, the Christian Democrats let it be known that if there were problems in Milan the historic compromise would be endangered in »some: this was conveyed to the communists of Milan before the meeting resumed. On the other hand, the condemnation of the regional government at a time when it was in a difficult position might perhaps have signalled the appointment of a government commissioner. The opposition was not in favour of this. Finally, not all the actions of the Region were condemned: the attitude of V. Rivolta, a Christian democrat, towards abortion was judged dignified and courageous (23, pp. 93-100, Discussions).

The session of August 24 had at least permitted to save the institutions. The real battle against the dioxin had not started; that had to wait ...

3rd: September - October: in search of a politically, economically and socially acceptable dioxin; nature would do the rest

Rains on the confusion. Torrential rains fell on the region during the first week of September, and it was feared that it might disperse the dioxin. Decontamination had started, a procedure had at last been set up by Givaudan and was accepted, but according to the industrial owners' own statement it was rather late. The summer sun which had been useful for the degradation of the poison no longer shone; autumn with its rain was already there, the leaves were falling. Was the dioxin already in the plain of the river Po? For its part, the regional executive did not exactly show wild determination in the battle against the dioxin which strongly embarrassed Hoffmann-la-Roche and Sid not fail to raise criticism.

Laura Conti noted that every decision was overthrown the moment precise Plans were forthcoming which had been devised with the most sophisticated techniques. They fell victim to the fetishism of precision. Everything was measured...in order to have a clear conscience. All this fervour was aimed at overthrowing all decisions. (23, p. 109).

Laura Conti juxtaposed this inertia with a phrase of V. Rivolta pronounced after a meeting on August 24: If within, three months experience shows negative results we shall let nature run its course (23, p. 100).

The group from the Italian communist party had at the time talks with the president of the regional government. It got the impression that the cause of the inertia was to be found in "the confident expectation of miraculous solutions that would ameliorate the soil; solutions that would permit leaving everything as it was." (23, p. 114). This inertia was taken by the population as proof of the harmlessness of dioxin. In public gatherings the secretary of the Health-Ecology Commission frequently noticed this negation of danger: You are all right, aren't you? We, we are all right ! (23, p. 116).

Shame and fear about abortion. The battle raged on in the field of abortion. The women found themselves tossed from one hospital to another, thrown out, like this one for example :

We don't do political abortions here. Your child is in excellent shape. So, there are no objective causes that could involve psychic trouble (35).

They had to prove before colleges of forensic psychiatrists that they were in grave psychic danger. For the women who had lived through the traumatic experience of the toxic cloud the interruption of pregnancy, often desired, has been a drama of violence and shame, writes Marisa Fumagalli (29) who quotes the witness of a psychiatrist in *Unita* of September 23:

The five hospitalised women were spared nothing; from the intolerable psychological intimidation exercised continuously and subtly by the nursing and auxiliary staff of the gynaecological section to the niggardly attitude of the psychiatrist of the Desio hospital who subjected these women to further examinations which were unnecessary from a scientific point of view and shameful at human level : he began the conversation by exhibiting false certificates which attested to the non-pollution of the dwellings of these same women (29, p. 101).

Driven back by the counter-attack from the Milan doctors the hospitals of the area had to give in finally. The women of Seveso were shown no respect. It had even been insinuated that some of them, taking advantage of the dramatic situation had feigned non-existent psychic troubles (29, p. 102).

One could not get out of this abortion mire. Thus, on October 30, *Avvenire* (a conservative Catholic journal from Bologna, close to the Catholic hierarchy) published, with a lot of noise, a "document on the effects of dioxin" which originated in the provincial health office of the Democrazia Christiana in Milan:

Small doses of dioxin such as those that may have been ingested by the inhabitants of the area are probably quite harmless for in order to make dioxin toxic it must necessarily be present in the human body, like any other poison, in certain concentrations below which it is not dangerous ...

It has been said that dioxin is teratogenic; this is true for certain animals but there is an infinite number of substances that one comes across every day which are teratogenic for certain animals but not at all for man.

It seems quite improbable that teratogenic effects could exist with the women who have not previously shown functional lesions of the liver or the kidneys because of the dioxin.

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It is true that doubts exist concerning malformations: their probability would be increased by 50 per cent. What does this mean? If in normal circumstances four out of every one hundred children are born with some more or less serious malformations, 50 per cent more would mean six out of every hundred (23, p. 120).

First official enquiries. After weeks of self-satisfaction, of assurances and smug optimism the regional authorities began to show some reservations, to accept some questions. For instance the president of the regional executive, Mr Cesare Golfari:

In these sectors (sector B) life can return to normal. Elsewhere one will have to wait till vegetation is removed, the soil stripped and the houses cleaned. For zone A, on the other hand, especially in the sectors adjoining the factory, no early return to normal activity can objectively be foreseen. This will require much time and doubtless very different methods.

We have been to the United States, and we have questioned Vietnamese, English, German and Swedish scholars. Nobody has been in a position to supply us with an exact decontamination technique. The only means is photosynthesis. For dioxin to disappear completely under the influence of the sun, years are needed. It remains to be seen how the process can be accelerated. Diverse methods have been suggested to us for this purpose (35).

Here again is V. Rivolta leaning on the legislative and administrative staff for a denunciation :

"The legislative disorder, the dispersion of competences, the lack of funds for the public administration to have existing standards enforced which latter are anyway fragmentary and incoherent." According to him, legislation had to be revised, but without waiting any longer "the services for prevention, control and assistance must be improved taking into account that the Lombardy region does not even have a medical officer for every province".

But it is very late. After so many denials of the noxiousness of the product these enquiries and these very belated measures met only with the weariness of an exhausted population. Its main aim was: to forget.

Dioxin? Sure ... But nobody has died, and in any case we are not going to live like this, in a state of siege, until the end of time!

Scepticism became widespread among these people who had been torn away from their houses, objects of the headlines of world news, these women in the centre of politico-moral conflicts about abortion, condemned to give birth to malformed children or to try to be considered insane in order to get an abortion which basically they were ashamed of; and all that because of an invisible poison, often claimed to be 'under control' by the top people.

In the end, these people did not trust science any more (35), Robert Sole remarked and wrote:

After having had much fear, the inhabitants of Seveso, Meda, Desio and Cesario Maderno are now very weary.

That is understandable: this dioxin: after all, nobody has seen it. Never has a disaster zone shown such a normal face. Even if tomorrow a new yellowish cloud, loaded with the worst poison were to soar over the roofs:

who would guard against it? Here, the sky is cloudy for eight months of the year. A thousand factories sprinkle it permanently with fumes: it means work. Work, 20 km north of Milan, is hallowed. Merchants, artisans and small industrialists have not understood that one lets them live there, lets them come and go but that one closes their businesses. Some of them cheat: they work at night. Big red and white posters had to be put up on the walls to threaten them: with sanctions.

The weariness of some does not let one forget the persistent disquiet of others. They were waiting for certainties: they had been given an avalanche of scientific formulae, as obscure as they were contradictory. Obviously, the scholars were groping in the dark, and the politicians had suspended their judgement (35).

One must also remember that the majority of people who were evacuated from zone A owned their houses: they found only temporary shelters, though luxurious ones.

There was also the wrong that had been inflicted on all those small businesses of the province : Two hundred and seventeen businesses had been closed in zones A and B since July and their inventories blocked. As for the 5,000 others, the authorities had to buy full page advertisements to confirm that they were 'sound' and that their products may quite safely be bought (35).

At the end of three months no method of sanitation seemed to be working. The discontent of the inhabitants of the communities concerned (more than 100,000) grew from day to day

October 7 : Meeting of the Regional Council — the wager of the 5 micrograms/m

This day was chosen for the second meeting of the Regional Council after the accident. The stake at this meeting was not a small one: it had to be decided at what scale evacuations had to be carried out. There had been 800 people in zone A; there were 4,800 in zone 3; the watermark would rise to 12,000 if one counted the people who very regularly visited the disaster zone. Still greater precautions could have involved 20,000 people and more*. The field was rather large for a decision on evacuation.

Complicating the 'technical' issue there was the political issue of V. Rivolta's tendency which was in danger of being overthrown by other tendencies within the Democrazia Christiana. These difficulties explain a certain confusion in the behaviour of the assembly.

The council started by approving the report by the socialist Scevarolli (president of the Health-Ecology commission), which begins with very hard criticisms of the regional government: Seveso is a tragedy. Until now the whole matter had been dominated by uncertainty and unwise optimism (20, p. 18).

Subsequently, the approach suggested by V. Rivolta i.e. continuation with what had been done so far was approved. The most serious question, however, was that of the threshold to be observed concerning the dioxin. In his report the president of the Health-Ecology commission reminded the assembly of the two opposing demands : the theoretical and the practical :

*The communities in the neighbourhood of Icmesa had 220,000 inhabitants.

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Our duty is to conduct ourselves as if the most serious risks (resulting from dioxin) had been proved. This would mean, theoretically, to reject any safety threshold if there were not the practical and valid requirement to establish a conventional threshold which in accordance with the recommendations by the epidemiological commission was established at 0.01 micrograms/m² for areas of the inhabitable zones and 5 micrograms/m² for open spaces (36, p.92).

The "Proletarian Democracy" (party) with Mario Capanna wanted to maintain strictness in practical measures:

There is only one way of being sure not to suffer the attacks of dioxin and that is to ascertain that its level is zero i.e. that it does not exist, that it cannot be measured even with the most sophisticated apparatus (36, p. 92).

All parties other than Proletarian Democracy sided with the proposals made by the Region: in the end it was decided to institute an "acceptable" level of pollution: a choice of "unheard of" gravity according to Mario Capanna, a necessary choice according to Laura Conti who sided with the idea of this threshold while knowing the ambiguity of the measure: the cup had to be drained to the dregs; one should not have produced a substance that involved the risk of leading to such a profound drama faced with which one was helpless. Now that it had happened one could not get out of it easily, not even with radical measures. The "socially acceptable" still has to be looked at:

Are we wrong or are we right? It is difficult to tell. Nevertheless, if someone wants to criticise us the following has to be taken into account: if we had chosen another path, for instance considering the dioxin too dangerous to allow acceptance of even the most minimal concentrations measurable by apparatus (between ten and five hundred times lower than those established) then we would have had to envisage the evacuation of about 12,000 people. Where would we have accommodated them? If after three months one can establish that the people suffer from being uprooted even if they are put up in luxurious dwellings, near their usual place of habitation, what kind of existence would it have meant for 12,000 people in a tent village, far from where they used to live? What difficulties of adaptation would have emerged? What problems for the education of the children?

We accepted the threshold of 1 part in 10 billion (5 micrograms/m²). I would do it again if it had to be done again. But is frightening to take such a decision. It was frightening because we knew very well that a 'safety threshold' did not exist. There is no quantity of dioxin, no matter how small, of which one could be certain that it carried no danger to the receiving organism. This happens with all 'mutagenic' substances, i.e. those capable of causing mutations in the inheritable cell substance (patrimoine hereditaire). These mutations, if they occur in the cells of the ovaries of the testicles, can cause either sterility or the birth of diseased children; if they occur in the cells of the bone marrow they can cause leukaemia, even after many years.

If we had known that dioxin is definitely mutagenic for the human species, I do not know what our conduct would have been. However, the mutagenic property of dioxin has been proved only on bacteriae, and consequently the substance is considered to be probably mutagenic or carcinogenic in man. We found ourselves, in a manner of speaking, in the presence of a 'probability to the second power' (square). The organism which lives on polluted soil does not have a certain but only a probable expectation of swallowing a substance of which we do not know for sure whether it can be carcinogenic for man.

Choosing the solution of leaving 12,000 people in zone B i.e. on polluted soil meant choosing a remote probability that some child might one day be attacked by leukaemia rather than put 2,000 children definitely in a situation of disorientation, of psychological and affective bewilderment.

If one day I am told that there is a child in zone B that has leukaemia — then, perhaps, a painful feeling of having been wrong may grow up within me: terribly, irreparably wrong, and I shall have to carry this wrong with me for the rest of my life (37, pp. 47-48).

On that day everybody rallied around the proposition of 5 micrograms/m². The limits for zone B were subsequently reduced which led to the adoption of the second map. That map, by the way, looks rather arbitrary: it seemed to be based much rather on community limits or geographical facilities (roads, rail tracks) or again on economic 'understanding' (factories and workshops left outside the zone) than on the presence of dioxin. This accounted for the number of factors that had caused the incredulity of the inhabitants of the zone. These, who had been the object of the headlines of the world news, subjected to often contradictory information and measures and spectators of the impotence of the authorities vacillated between weariness, fear and dejection.

October 10: the 'mutiny' of incredulity and refusal

On October 10 the protests of some 700 evacuees, who despite promises had not yet been rehoused near their normal dwelling places (but were staying at the Agip motel, luxuriously but not satisfactorily) blew up in dramatic fashion. During the first hours of the morning of that Sunday, October 10, the disaster victims took their cars and went off on the road to Seveso, forced the barbed wire fences and retook possession of their houses. For several hours the evacuated zone was to be the unreal scene of a gigantic theatrical performance: the actors in the drama played a particularly black comedy; they played to a real world in this universe which showed no sign of disaster: the houses, the gardens, the area, the greenery all appeared so welcoming. They invited each other for meals, for picnics. It needed the police, the constabulary, the provincial and regional authorities to stop such 'true' performance. The regional authorities undertook the task of informing the disaster victims yet again and of starting sanitation with the help of volunteers.

At the end of October, three months after the disaster, the decision was taken to remove the contaminated soil. At the beginning of November one had not got beyond this decision: it remained to be organised and put into action. As regards the treatment of the contaminated equipment, four months after the escape of the poison no decision had yet been taken. The political crisis that developed in Lombardy was not such as to favour a solution of the problem: once more one had enough to do with the institutional and political issues in order not to be able to take the necessary interest in the dioxin problems.

4th: 1976 - 1980: the burden of Seveso. Those responsible chose to deal with people's troubles rather than with the danger. The people demanded compensation, silence and oblivion.

The month of November 1976 appears as a turning point for the population of the contaminated area: they reduced the problem to a matter of compensation; and reducing the drama to a private and personal dimension contributed to Seveso being locked into its solitude.

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The first results, after five months, were luckily not as severe as one might have feared. If there were still tens of persons under treatment all those who had been hospitalised had been discharged. Even if this first experience had not been reassuring for the future it permitted a feeling of relief as to the effect of the contamination: there had been no deaths; there had been no slaughter. But what might the future hold as regards malformations at birth and cancers? One did not know yet. The danger remained. The dioxin was still there. What to do?

On December 5 a big meeting was organised to establish a decontamination policy; the agreement reached shows a certain abandon; the improvement should be realised within an expected period of nine months provided that no circumstances intervened that would impede implementation (23, p. 158).

Thus a demand for sacrifices which would inevitably have gone with improvements was avoided: a step backwards was taken. Choosing between danger and discomfort, discomfort was tackled.

During the first three months of 1977 the situation got worse; psychoses, diverse alerts, confusion, as the secretary of the Health-Ecology Commission notes again :

Chloracne was found where no presence of dioxin had been proved and even where, on the basis of previous searches, its presence had been excluded. This shook the population again. Rightly so: dioxin can act in minimal quantities, and the cases of chloracne were a denial of the misleading assurances by the public authorities. The type of information that had been given previously turned public opinion not against the authorities but against science and the scientists; such was the fear and distrust of all scientific achievements (23, pp. 165-166).

The confusion continued into the second quarter of 1977 with births of malformed children; with denied information; with retorts to the lack of responsibility of the analyses carried out and even to the refusal to put them to work etc. In short: the disinfection of the soil and the buildings in zone B went on; economic activity in Seveso was slowed down, the population no longer knew what to think of it all. It was to down tools and, disguised as an anniversary celebration, close the books on the memory of the drama:

A year had passed at Seveso: one preferred to forget. The inhabitants did not want to celebrate the first anniversary of the dioxin cloud which had poisoned their lives, in every sense of the word, since July 10, 1976. This day of remembrance was rather the day of voluntary oblivion. The mayor was on holiday, many of his citizens had gone fishing or gone to cafes. The curate in his sermon took care not to make the least reference to the disaster. Nevertheless, the situation had not changed: one still did not know how to fight the dioxin pollution and one did not know the long term effects (38).

In October one hundred and twenty people (out of the eight hundred evacuees) were able to reoccupy*their houses; others were readmitted in December. However, there was still no question of restarting agriculture or of playing in the gardens: the children had to be taught accordingly.

*Zone A was subdivided into 7 sectors: sectors A6 and A7, the least polluted, were reopened.

It was getting close to the second anniversary. The industrial owners and official circles were relieved by the results achieved, especially in May 1973 by the study of Professor Tuchmann-Duplessis. One had expected the worst, and in the end:

The contamination had been relatively moderate because with the exception of the cases of chloracne found in a small number of children no important pathological changes were discovered ... The frequency of abortions in the contaminated area remained clearly below the figures usually registered in Europe ... The number of malformations, while higher for the year 1977 (1.36%) than for the preceding year (0.13%), remained clearly below the frequency of 2.5 to 3 per cent which are generally found in western countries. The number of malformations registered in 1977 does not reflect the real increase in prenatal development troubles but an improvement in medical enquiries ... The postnatal development of the children seemed normal (15, pp. 5, 8, 11).

Others, such as a people's committee close to the Italian communist party, showed more scepticism and accused the authorities of having discouraged the collection of pertinent data. The population had chosen, once again, to forget, as Joëlle Kuentz reports :

You, do you see the poison?

There were no deaths and no abnormal births.

You would say, wouldn't you, that all this was very exaggerated?

Just look how green everything is around here. You have worried us, you have predicted the end of Seveso, you said the women would have to abort if they didn't want to give birth to monsters. The feminists came from Rome to spread their claptrap. Then came the priests and took the matter up. They told us to accept the monsters as the will of God. But basically all these things were political manoeuvres, and they continue. So, we have had enough of journalists and politicians; Excuse me, I have to go.

Fear, yes: it's still present but one must forget it. Look how beautiful this garden is. And look on the other side of the fence which surrounds the most polluted area: it's just as green as here. Well, one really asks oneself where the dioxin is. My sister, she continues to worry herself. She preaches every day to her children: don't do this, don't do that; What is it good for? You know, there are also many things in this story which one doesn't understand. Take the cemetery, for instance. It was in zone A, the most polluted. That means one wasn't allowed to enter it without a mask and special clothing. Well, today "they" have given free access: without having done anything. It seems that dioxin has been discovered at on the other side of the factory. Now, the community of Meda refused to be put within the poisoned zone because it didn't suit the people there. You realise something from that, do you?
... before remarking:

It's true: one is astonished at the map. The outlines too often follow the communal borders, too often leave out certain roads and railway lines so that one cannot discover from it much more than the fantasy forms of the toxic cloud, the reflection of a myriad of interests which don't have much to do with the rigour of scientific experiments ...

The women in zone B who were not allowed to breast-feed received a 'milk allocation'. The children between three and fourteen years of age in zone B and the so-called 'suspected' zone (where the quantities of dioxin had not been experimentally measurable) received the equivalent of 600 ffrs.

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per annum if their parents moved them from Seveso for twenty days. On the other hand, the children who lived outside these zones, even within a metre of the demarcation line and who went to school in the polluted zones received nothing. In the same way the families of the B zones benefited from receiving an amount corresponding to their expenses for fruit and vegetables since they could no longer cultivate their gardens while households located in the suspected zone who no longer had the right of using their vegetable gardens received nothing.

In the end nobody believed in the presence of dioxin any longer (39). However, nobody could tell whether the dioxin had left the scene. During the whole year of 1977 there was controversy about the registered malformations. To do justice to all, let us say the margin of uncertainty was perhaps very large but that in any case on the one hand there was no slaughter of the civilian population, on the other hand it would still be unwise to close the files. This is, by the way, the decision of the court: to judge on the basis of the facts known today with this first phase not prejudicing at all what might be found subsequently. With a product like dioxin there is no final point; at best the outcome is in suspense ...

4. BALANCE SHEET

1st: Health

The Hoffmann-la-Roche company drew up the following balance sheet in 1978; it was to include these encouraging points which were proven during the following months :

- The skin affections were benign; they affected only the most sensitive fraction of the population i.e. the children and the adolescents. In the majority of cases they disappeared without leaving a trace.
- The peripheral nervous system was not affected in its functions; the contamination with dioxin caused no repercussions in this respect.
- The livers of the people affected never produced attacks such as result from hepatic insufficiency or, for that matter, any other affection.
- No anomaly was found in the blood, the organic functions and the metabolic process in the cases examined.
- Pregnancy, embryonic development as well as the development of the children did not show any disturbances.
- Examination of the cellular structures responsible for heredity did not reveal any anomaly (40).

As concerns malformations there has been great controversy between the authorities and the "people's committee" which comprised citizens close to the Italian communist party who read the official statistics differently. Here are the two statistics (41) :

	1974	1975	1976	1977	1978
Authorities	-	-	4	38	53
People's committee	2	9	34	122	157



SEVESO: The inconsequence of the measures taken after the accident. Translation of the poster: Polluted zone. Close windows and air ducts.

The Hoffmann-la-Roche company explained that neither set of figures is wrong: there were just different methods of analysis and greater attention given to the cases of malformations after the accident than usual in similar circumstances. The opponents contested the figures supplied and noted that the studies made covered the whole area of the eleven communities near Icmesa — i.e. 220,000 people — and not only the area most affected by the accident; due to this there was no significant difference from the usual figures for malformation; it would have been necessary to study the affected areas separately. The Democrazia Christiana, conclude these opponents, wanted foremost to let the drama be forgotten. And since Italy was strongly up against the economic crisis ...

On other subjects — spontaneous abortions, birth-rate, death-rate — the same remarks can be made. There had not been a disaster. But, based on the

figures made available, there is divergence between the official publications which while recommending a follow-up on the situation do not give alarming figures and the opponents who, like Laura Conti, say that the necessary researches have been shirked.

2nd: Territory

Zones B and R had never been evacuated. Zone A, divided into seven sub-zones, could be partly recovered (sub-zones A6 and A7). Thus, out of the 95 hectares that were most affected 60 could be reopened to the population which means for five hundred and eleven people out of seven hundred and thirty six evacuees (152 families out of 212). This was achieved in autumn 1977. For zones A1, A2, A3, A4 and A5 the prognoses are given with some reservations and range from optimism to most severe pessimism: some ascertain that the most contaminated territory must be erased from the map (16, pp. 238-240).

3rd: Economy

-Agriculture: 61 farms; 4,000 family vegetable gardens; damage to cultures; slaughtering of animals; operation forbidden.

-Industry: 2 businesses in zone A (10 in zone B).

-Artisans: 37 businesses in zone A (121 in zone B).

-Population: help given to disaster victims.

-Sanitation plan

In 1978 the Commission of Enquiry gave an initial sum claimed by the region: 27 billion Lire (136 million ffrs.) remarking, however, that no final figure could be given before court procedures were concluded. Still, this is just an approximate estimate. If one takes into account all that the Region had to set up in the way of funds for dealing with the issue (researches, diverse interventions) one arrives at a figure of 120 billion Lire (600 million Ffrs.), find, of course this figure does not include what might appear in the future since the evil has not altogether disappeared (16, pp. 258-264).

5. SEVESO - TO AVOID OBLIVION

So, there has been no slaughter in Lombardy, neither in 1976 nor afterwards. This observation does, by the way, not constitute a recognition of the duality of the established balance sheets. But it is true that there has been no great disaster as had been feared at the time the evil was diagnosed.

Some derive from this an argument to claim that in this affair there has only been exaggeration, pollution of minds, phobia entertained by the press and some marginal groups. One cannot let such blinding of the public take place easily. The actors in the drama knew it well: even if they are not quite prepared to follow Dr Reggiani who is respected by everybody for his courage and honesty and who made this remark: for nearly two weeks one did not know in Basle whether one had to demand — and for how many years? — the evacuation of Milan. Whence perhaps the caution of the industrial owners in summer 1976 (2).

whence also the impossibility of smiling when Seveso is invoked: on Saturday, July 10 1976 "something happened" truly at Meda; something that concerns all of the world's chemical industry and doubtless also all people who might one day be affected by the factories of this industry.

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