

# **Seveso – Twenty Years After**

**O**n 10 July 1996 it will be twenty years since a major chemical accident occurred near Seveso in Italy's Lombardy Region on the premises of Icmesa S.p.A., a company belonging to the Roche Group. A reaction vessel containing the intermediate trichlorophenol overheated, a development that was unforeseeable at the time. As a result, the disk of a safety valve ruptured under excessive pressure. The rupture released a mixture of chemicals, including the highly toxic dioxin, which settled on large areas of the communes of Seveso, Meda, Cesano Maderno and Desio. In the days and weeks that followed, a number of people reported inflammation of the skin and chloracne. Chickens and rabbits died, and many people had to be evacuated from their homes. ¶ Over the next weeks, months and years, Roche put its scientific and technical knowledge at the service of the community, actively and directly helping alleviate the consequences of the accident. It also contributed substantial sums of money to compensate the damage suffered by private citizens and public bodies. Moreover, the company footed the bill for the medical examinations of the affected population, paying compensation for any damage to health. Since the injuries were fortunately few in number and transient, these compensation payments were modest in comparison with those for property damage. The affected population is still undergoing long-term observation, including regular check-ups. ¶ The forty-one barrels with dioxin-contaminated waste from the reaction vessel went astray in May 1983. Their prolonged odyssey ended when they were finally found in the northern French town of Anguilcourt-le-Sart. In 1985 they were conclusively identified by an independent committee of experts under the su-

pervision of the Swiss government, and their contents were subsequently burned in the Ciba high-temperature incinerator. ¶ In the present documentation, Dr Jean-Michel Weiss, head of Drug Safety at Roche, discusses the health implications of the accident and the company's response to this issue. Dr Hans Künzi, head of Corporate Safety and Environmental Protection, describes the disposal of the dioxin-contaminated waste from the reaction vessel. Dr Bruno Maier from the Corporate Legal Department, outlines the steps Roche has taken to date to alleviate the damage to health and property. This overview is completed by a chronology of events between 1976 and 1996 and an interview with Dr Guido Richterich, Deputy Chairman of the Board of Directors of F. Hoffmann-La Roche Ltd. This five-part documentation is not intended to whitewash or exonerate Roche; rather, it is meant as a source of background information for people who would like to know more about the accident, its consequences and our response to them. ¶ Seveso unleashed a wave of anxiety, fear and criticism in the public; for many people it symbolizes the real or imagined hazards and risks of chemical production. Whether they are right or not is another question. But the fact is: Seveso was a serious accident; its consequences were fortunately limited, but severe enough that they took more than a decade to overcome and cost thousands of hours of work and several hundred million Swiss francs. For years, Seveso kept Roche on edge. The 1976 accident and the efforts to repair the damage have shaped the company, creating among its employees a deeper awareness of safety and environmental protection. Seveso happened; Seveso must not happen again.

# The health situation today

The health of Seveso's inhabitants has been monitored for almost twenty years



**Dr Jean-Michel Weiss**

The chemical analyses of soil, dust and plant samples that were performed after the chemical accident of 10 July 1976 by specialists from Givaudan Dübendorf (Switzerland), a Roche subsidiary revealed high concentrations of the pollutant dioxin that we had to assume might be toxic. As soon as the results allowed them to define the contaminated area, the specialists from Givaudan and Icmesa S.p.A. ordered the immediate evacuation of the population from the affected zone and medical surveillance of all people living there. The accident caused 447 cases of acute chemical burns and 193 cases of chloracne, which are now healed.

## Observations and findings over fifteen years

The inhabitants of Seveso at the time have been observed and examined for almost twenty years as part of a study headed by Professor Pier-Alberto Bertazzi of the Institute for Occupational Medicine of the University of Milan. This longitudinal study enables the physicians to identify any late sequelae of dioxin exposure by comparing people exposed to dioxin with those who were not – or were only slightly – exposed. Below we present some of the findings from the fifteen-year observation period (from 1976 to 1991).

- **Chloracne.** It is well known that dioxin causes certain injuries such as chemical burns and chloracne. These phenomena were also observed in Seveso, affecting 640 persons soon after the accident. All these cases have cleared up.

- **Heart disease.** In the zone with the greatest dioxin exposure, where about 700 people lived at the time, a very slight increase in deaths caused by heart failure has been observed. The reasons for this elevated rate compared with the normal

population are not associated with dioxin exposure. Rather, it is assumed that the insecurity and stress caused by the chemical accident may have affected the cardiovascular system of predisposed and sensitive persons.

- **Cancer.** The number of tumours observed is too small to be able to draw any valid conclusions from the available studies. While these have revealed an increase in certain rare tumour types, they have also shown a decline in a number of common tumour types. As regards the increase in the rare tumours, certain differences were found between people exposed to dioxin and the normal population in the second most heavily exposed zone, where some 4000 people lived at the time. In particular, the incidence of lymphomas, which animal experiments suggest may be associated with dioxin, was slightly higher among the inhabitants of this zone. Evidence of a non-statistically significant increase in soft tissue tumours was seen in the least heavily exposed zone (which had the largest population).

## Keeping track of late sequelae

Many findings from the above-mentioned study are open to question and have not been scientifically confirmed or unequivocally interpreted in order to establish a causality with dioxin. The chief investigator Pier-Alberto Bertazzi and the scientists who are studying dioxin and its effects on health agree that the late sequelae of the Seveso accident cannot be precisely described until the population has been monitored over a twenty-year period. However, it is unlikely that the type of findings or the scale of damage to health will change fundamentally in the remaining five-year observation and investigation period.

Roche is supporting the Bertazzi study. The company is aware of its responsibility and is endeavouring – within the limits set by scientific method – to follow

up and analyse the implications of the Seveso accident for the affected population. An independent epidemiology committee headed by Professor Kenneth Rothman in Boston (USA) has been set up and is acting as a consultant to Roche in connection with the study. We firmly believe that this approach will enable us to deal with any late sequelae objectively, professionally and at the same time humanely.

# Disposal of the contaminated waste

## From the odyssey of the barrels to incineration in Basel



Dr Hans Künzi

In the wake of the accident at Seveso, great emphasis was placed on the technical aspects of clean-up and remediation. Proper disposal of the dioxin-contaminated waste that remained in the reaction vessel was a major milestone in this effort.

### Emptying

Under the constant surveillance of representatives of the Italian authorities, the reaction vessel in which the accident had occurred was opened at the end of August 1982, and work started on emptying it. The dioxin-contaminated waste was removed with the utmost care from the reaction vessel and its installations and was transferred to barrels. During this process, samples were taken both directly from the reaction vessel and from the barrels as they were being filled. Some of these samples were later used to identify the barrels and their contents when they were incinerated in 1985.

### Transport

On the evening of 9 September 1982, 41 barrels stood ready on the Icmesa S.p.A. premises for transport. Of these, 29 contained material from the reaction vessel and 12 auxiliary material such as protective clothing, underwear and tools. The barrels were then transported by truck on 10 September. The freight convoy was accompanied by the Italian authorities as far as the Italian border at Ventimiglia. *Mannesmann Italiana*, a company which had concluded a disposal agreement with Givaudan and Icmesa, was responsible for ensuring the proper disposal of the barrels in an authorized and supervised landfill.

### Odyssey

The disposal, which began on 10 September with the transport of the 41 bar-

rels, failed. To be more precise: all trace of the barrels was lost once they left Italy. Representatives from Roche and Givaudan subsequently learned from *Mannesmann Italiana* that the transport and disposal had been contracted out to two subcontractors, contrary to the original wording of the agreement. *Mannesmann Italiana* also revealed that it did not know the whereabouts of the barrels. The mysterious disappearance triggered a large-scale search, which was finally rewarded with success. On 19 May 1983, all 41 barrels were discovered in a disused abattoir in Anguilcourt-le-Sart, a village in northern France, where they had been illegally dumped.

### Expert committee

Once the barrels had been recovered, the Executive Council of Basel-City and the Swiss Federal Council granted authorization for transfer of the barrels to a secure temporary storage site on the Roche premises in Basel. The barrels arrived at Roche on 4 June 1983 and shortly thereafter another Basel chemical company, Ciba, declared that it was willing to burn the dioxin-contaminated waste in its high-temperature toxic-waste incinerator. In the following months projects were designed for the purpose of incinerating the waste safely. The proposed solutions were studied and approved by the expert committee made up of professional project teams from Ciba and Roche, the head of the Federal Office for Environmental Protection in Berne, the Basel Cantonal Chemist and the head of the Laboratory for Technical Chemistry at the Federal Institute of Technology in Zurich.

### Identification

To ensure that the barrels found in Anguilcourt-le-Sart were really those that had left Icmesa on 10 September 1982, a sophisticated identification procedure had to be devised. Under the supervision of a Basel notary public and in the presence of representatives of the Federal

Office for Environmental Protection in Berne, and the Canton of Basel-City, and a delegate from the Italian "Ufficio Speciale" for Seveso, the contents of the barrels were verified, analysed and compared with samples taken earlier. The Roche employees involved in emptying the reaction vessel at Icmesa and a delegate of the "Ufficio Speciale" had kept a precise record of the barrels' appearance and contents. This information was checked and confirmed on the basis of the guidelines on identification methods drafted by the expert committee in Basel.

### Analyses

The analyses necessary for identification of the barrels were conducted, in accordance with the instructions of the expert committee, at Givaudan Dübendorf and at the same time at the Federal Research Institute for Fruit, Wine and Horticulture in Wädenswil. The samples taken from the reaction vessel were compared with the samples taken from the barrels in Basel, and the two were found to correlate closely. The type, quantity and proportions of the characteristic breakdown products that can be generated by a reaction like the one that occurred at Icmesa leave a typical "fingerprint", which was decisive in identifying the residues. The various results and findings provided incontrovertible proof that the barrels stored in Basel were indeed identical with those filled with dioxin-contaminated waste from Seveso.

### Repacking

On 27 November 1984 and 19 March 1985, two test incineration runs with dioxin-contaminated waste were carried out and both were successful. Owing to the technical features of the Ciba high-temperature incinerator, it was clear from the outset that the barrels with contaminated waste could not be burned in a single step. The waste had to be repacked so that it could be incinerated in the Ciba facility. This procedure was carried out in a custom-built plant under

very strict security. Representatives of the expert committee and the authorities made checks at predefined stages. Immediately before being loaded into the incinerator, the repacked containers were again checked by a government official and released for incineration.

### **Incineration**

Once authorization had been given, the dioxin-contaminated waste from the 41 barrels (plus waste from a forty-second barrel containing residue from the demolition of the building at Icmesa where the accident had occurred) was burned in Ciba's high-temperature incinerator in Basel. The incineration, which took place under constant official supervision and with periodic communiqués for the public, lasted from 17 to 21 June and from 18 to 21 November 1985. It was completed successfully, and the details were set down in a comprehensive final report of the expert committee, which had been involved in the entire campaign. This report was completed and published in May 1986. To quote the report: "The incinerator showed no signs of malfunction during the entire incineration process...in technical terms, the main incineration took place as planned, without any hitch: the temperature in the combustion chamber was 1140°C on average, corresponding to 1530°C in the rotary-kiln."

### **Accusation**

Although virtually complete records were kept of all steps taken to dispose of the waste, various questions were raised, and allegations and insinuations were made about the final disposal of the contaminated waste. In particular, doubt was cast on the identity of the 41 barrels that had been incinerated in Basel. In October 1993, Paul Staes, a Euro-MP, and Ekkehard Sieker, a German TV journalist, demanded that the investigations on the Seveso accident should be reopened. Among other things, they alleged that the dioxin-contaminated waste

from Seveso had been dumped in the Schönberg landfill in the German state of Mecklenburg-Vorpommern. As expected, however, subsequent inquiries revealed no evidence to this effect nor did they bring to light any new facts.

### **Conclusion**

On 30 November 1993 and in mid-January 1994, a group of Roche experts presented all the facts to representatives of the *Landtag* (parliament) and government of Mecklenburg-Vorpommern in Schwerin. In particular, they provided proof that the contaminated waste from the 41 barrels had been incinerated in Basel. Staes and Sieker were unable to produce any evidence for their accusations. Their allegations were rejected by the environmental committee of the *Landtag* and by the Mecklenburg-Vorpommern parliamentary commission. For Roche, the episode "Schönberg landfill" and the topic "disposal of the contaminated waste from Seveso" were thus closed.

# Compensation for damage to environment and property

## Roche has settled claims for virtually all the damage



**Dr Bruno Maier**

Following the Seveso accident, Roche put its scientific and technical knowledge at the service of the community, actively provided direct assistance in alleviating the damage and paid considerable sums of money to settle the claims of private citizens and public bodies.

The direct assistance consisted of the following measures:

- clearing the factory of chemicals and raw materials under official supervision
- decontamination of the houses in the more seriously contaminated zones (a total of 112 houses) by employees from Roche, Givaudan and Icmesa
- providing expert medical knowledge
- conducting soil analyses
- studying and experimenting with methods to break down dioxin in the soil
- providing agrotechnical assistance in remediating the gardens and agricultural land with the help of specialists from the plant protection firm Maag, part of the Roche Group at the time
- remediation of the playing fields and a public swimming pool in the affected communes.

### Settling private claims with no red tape

After the Icmesa factory was closed, an office was opened in the centre of Milan in September 1976 that had the task of settling claims for damages made by private citizens. More than 7 000 claims were settled out of court rapidly and unbureaucratically. When a case was closed, payment was made directly to the person who had suffered the damage. Compensation payments thus totalled more than 70 million Swiss francs. The main damage categories were:

- losses in agriculture and horticulture resulting from a temporary ban on cultivation and land use
- loss of property and buildings in the core dioxin-contaminated zone, which has now been turned into a park
- losses in commerce, trade and industry as a result of temporary or permanent business closures and loss of property
- losses on construction projects as a result of the temporary ban on building
- losses from precautionary destruction of furnishings and other household goods in the more seriously contaminated zones
- compensation for the expenses and costs incurred in connection with the temporary evacuation of the population from particular zones
- costs of claimants' own efforts to decontaminate gardens and agricultural land.

Roche also covered the cost of medical examinations and paid compensation for damage to health. These payments, however, were modest in comparison with compensation paid for property damage because relatively few injuries were reported (e.g. chloracne), and they were mostly transient in nature.

### Substantial damages paid to the Italian Republic, the Lombardy Region and the communes

The payment of compensation to public authorities (the Republic of Italy and the Region of Lombardy) was settled by negotiation. In a transaction reached with the Republic of Italy and the Region of Lombardy on 19 December 1980, Givaudan and Icmesa agreed to pay 7.5 billion lire (about 15 million Swiss francs at the then current exchange rate) to the Republic of Italy and 40.5 billion lire (about 81 million Swiss francs at the then current exchange rate) to the Region of Lombardy. These sums were paid as compensation for the costs which these two bodies had incurred in carrying out

a legally prescribed action program to alleviate the consequences of the accident.

Furthermore, Givaudan and Icmesa undertook to bear the costs of measures that could not be started until after the transaction had been reached. These ultimately came to 90 million Swiss francs, of which 20 million went to the Region of Lombardy for monitoring the health of the affected population and related measures. Most of the remainder was spent on decontamination work, in particular the construction of two huge basins, which were filled with dioxin-contaminated soil from the core zone.

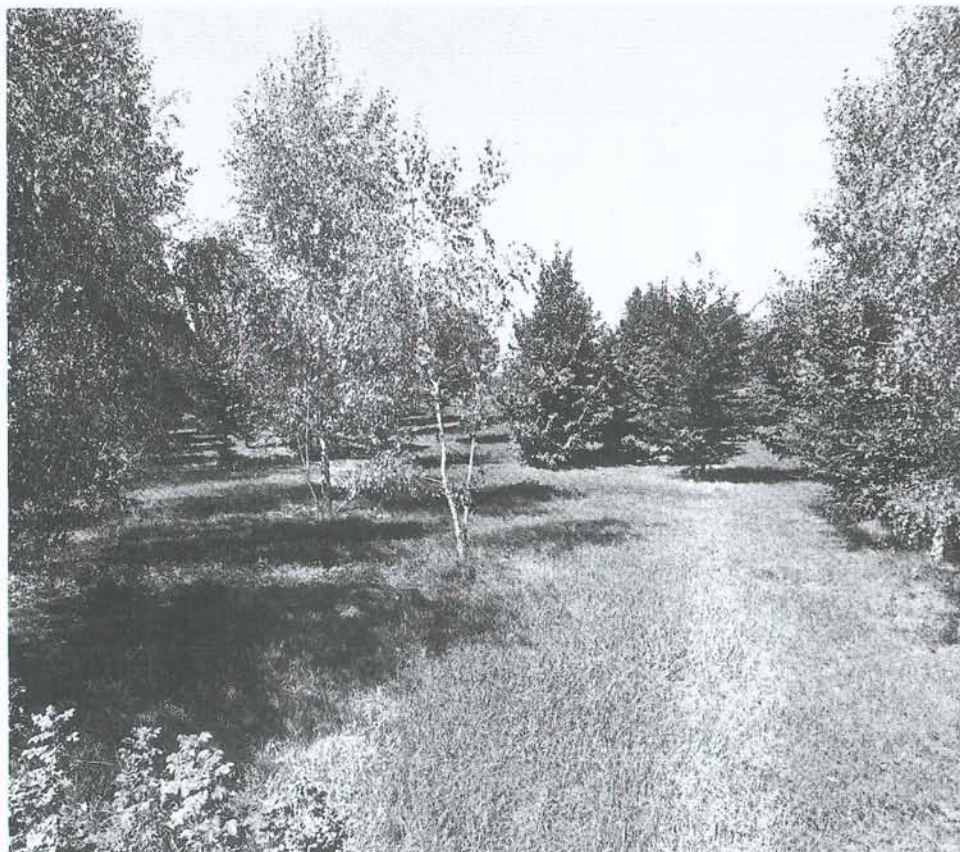
Lastly, Givaudan and Icmesa agreed to pay the sum of half a billion lire (about one million Swiss francs at the then current exchange rate) to a foundation created by the Region of Lombardy to promote environmental protection. They also undertook to buy all the property in the contaminated core zone (the site of today's park) and make a gift of this land to the foundation.

### To date more than 300 million Swiss francs have been disbursed

In addition to the transaction with the Republic of Italy and the Region of Lombardy, Givaudan and Icmesa also reached agreements in 1981 and 1982 with the communes affected by the accident. These transactions provided for compensation payments of 2 million Swiss francs for the commune of Meda, 2.8 million Swiss francs for Desio, 5.4 million Swiss francs for Cesano Maderno and 15 million Swiss francs for Seveso.

Disbursements for the reparation of the damage caused by the Seveso chemical accident now totals over 300 million Swiss francs. Still pending are 24 civil lawsuits in the courts of Monza and Milan and the Supreme Court in Rome. The suits are claims for damage or amends by private citizens, the basis or amount of which is contested by Givaudan and Icmesa.

The two cases before the Supreme Court in Rome concern the definitive decision whether grounds for a claim of compensation of injury of individual inherent rights exist if there is no damage to health and, if so, what conditions must be fulfilled (e.g. restrictions on activity, submission to health check-ups, risk exposure, etc.) to establish such a claim. Depending on the decision of the Supreme Court (and assuming that the cases do not fall under the statute of limitations), a larger number of claims could be made. It should be pointed out, however, that Roche has settled virtually all damage to property with the exception of the few mentioned above (and this is a very small number compared with the 7000 cases settled out of court). What is up for discussion are claims for compensation of injury of individual inherent rights.



*The former contaminated site has been turned into a park*



*View of the park with clubhouse*



*Playing fields have now been built on the former site of the Icmesa factory*



*Park wall with the inscription of the Region of Lombardy*



*Entrance to the landfill basin containing the contaminated soil*

*The photographs were taken at the end of 1995.*

# A chronology of events

## Alleviating the consequences of the accident: milestones between 1976 and 1996

### Prehistory

#### 1963

Roche acquires the fragrances and flavours firm Givaudan S.A. in Vernier, Geneva.

#### 1965

Givaudan acquires a majority stake in Icmesa S.p.A. (Industrie Chimiche Meda Società) in Meda near Milan, Italy.

#### 1969

Givaudan acquires the remaining share capital of Icmesa, which manufactures intermediates for further processing in the Group (fragrances, flavours, cosmetics and pharmaceuticals).

#### 1969–1970

Icmesa starts trichlorophenol (TCP) production. Givaudan needs high-grade TCP for the production of hexachlorophene, a disinfectant used in medicinal soaps.

#### 1970 to July 1976

Rising TCP production, all of which is delivered to Givaudan.

### 1976

#### Friday, 9 July

14.30 hours

*Seveso/Icmesa.* Dr Paolo Paoletti, director of production at Icmesa, discusses the production programme with the various foremen, including the one responsible for *Building B*. As usual in Building B, trichlorophenol (TCP) was to be produced. Trichlorophenol is an intermediate used in the production of the disinfectant hexachlorophene.

16.00 hours

The TCP reaction vessel is filled with the various starting materials.

#### Saturday, 10 July

02.30 hours

*Icmesa.* According to the temperature diagram the reaction is completed.

04.45 hours

The foreman in charge gives the order to interrupt a distillation which is not completed. The heating is turned off and the vessel contents mixed for a further 15 minutes. The last measured temperature is 158°C.

06.00 hours

The night shift is over. The workers leave the factory, and only the cleaning and maintenance crew remains behind.

12.37 hours

The rupture disk in the safety valve bursts as a result of excessive pressure, caused by an exothermic reaction in the TCP vessel.

A chemical mixture in the form of an aerosol cloud escapes into the air in a south-easterly direction. It is later learned that the mixture falls mainly on the communes of Seveso, Meda, Cesano Maderno and Desio.

13.00 hours

A foreman present at the plant telephones Dr Clemente Barni, the deputy head of production, who is on standby call that day.

13.10 hours

Dr Barni arrives at the Icmesa plant.

13.45 hours

A foreman turns on the cooling system, thereby stopping the escape of the mixture.

14.30 hours

Dr Barni inspects the area immediately surrounding the factory but notices nothing out of the ordinary.

17.45–18.30 hours

Dr Barni inspects the immediate surroundings of the factory and warns the inhabitants not to eat any local vegetables or fruit.

19.00 hours

The factory porter is instructed by Dr Barni to reach the *ufficiale sanitario*, the local health officer for Seveso and Meda, Professor Giuseppe Ghetti. He is absent, and it is not possible to find out who his deputy is.

20.30 hours

Dr Barni telephones the *carabinieri* of Meda and reports the incident. He inquires whether damage has been reported and requests that any such reports should be transmitted to Icmesa.

#### Sunday, 11 July

08.00–10.30 hours

*Icmesa.* Dr Paoletti and Dr Barni inspect the surroundings for signs of damage to plants.

10.30–11.25 hours

The Icmesa management tries unsuccessfully to reach the *ufficiale sanitario* or his deputy.

14.05 hours

Dr Paoletti reaches Herwig von Zwehl, the Technical Director of Icmesa, who had gone away for the weekend. They decide on the following procedure: they would first see the *ufficiale sanitario* or his deputy; then visit the mayor of Meda, Fabrizio Malgratti and the mayor of Seveso, Francesco Rocca; they would again contact the *carabinieri* and then collect samples for analysis from the vessel and in the surrounding area.

14.15 hours

Von Zwehl telephones Dr Jörg Sambeth, the Technical Director of Givaudan in Geneva, the parent company of Icmesa. They decide to send the samples the same evening by courier for examination in Switzerland.

15.00 hours

Dr Paoletti again unsuccessfully tries to reach the *ufficiale sanitario*.

16.10 hours

Dr Paoletti and Dr Barni visit the mayor of Seveso and request that the inhabitants of the presumably affected areas be warned not to eat or even touch fruit and vegetables. They also request an interview with the mayor of Meda.

17.00 hours

At the *carabinieri* station in Meda, two repre-

representatives of Icmesa meet with the mayor of Meda, the chief surveyor of the commune, the officer in charge of the Meda police station and a municipal policeman (*vigile urbano*). The Icmesa representatives request that the population be warned not to eat or even touch fruit and vegetables. They also state that in all likelihood the aerosol mixture which escaped consists of sodium trichlorophenate, caustic soda and solvent, but possibly other toxic substances as well.

18.00 hours

Dr Barni, together with a *carabiniere* and a *vigile urbano*, go around the area of Meda and warn the inhabitants. It is not possible to do the same in Seveso as the mayor cannot find any *vigile*.

#### Monday, 12 July

05.30 hours

Icmesa. Dr Barni closes off Building B.

10.30 hours

Dr Uberti, the deputy of the *ufficiale sanitario* of Seveso, inspects the factory premises. Givaudan Dübendorf. Arrival of the first samples. The laboratories work round the clock and produce the first results on 14–15 July.

#### Tuesday, 13 July

Icmesa. Dr Paoletti and Alfio Marcolini, the commercial head of Icmesa, learn that some small animals have died.

#### Wednesday, 14 July

Icmesa. The first signs of skin inflammation occur in children.

23.00 hours

Dr Sambeth informs von Zwehl that the samples contain traces of dioxin (TCDD). The precise quantity of dioxin that escaped could not be determined after the accident. Estimates by experts vary from a few hundred grams to a few kilograms at most.

#### Thursday, 15 July

09.00 hours

Icmesa. Marcolini tries unsuccessfully to arrange a meeting with the mayors of Meda and Seveso.

11.15 hours

The factory doctor, Dr Ernesto Bergamaschini, examines the affected inhabitants and all Icmesa factory workers, first of all those who were involved in the TCP production process. He finds no signs of toxicity in the factory workers. In the neighbourhood families, however, he finds some cases of acute skin inflammation, particularly in two children. All those affected are hospitalized.

18.15 hours

A meeting is held at the communal offices of

Seveso. The Icmesa representatives again ask the population not to eat or touch fruit or vegetables. Von Zwehl points out that the substance which escaped is highly toxic. The need for evacuation of the area is discussed. The mayor of Seveso issues decree No. 43, declaring the area of San Pietro, to the south of the Icmesa premises, contaminated. Warning signs are to be put up and the danger zone fenced off. The mayor of Meda issues decree No. 2 in which the area of San Pietro is declared to be contaminated. This zone includes area of the communes of Seveso and Meda. He also prohibits consumption of fruit or vegetables from this zone. Switzerland. Dr Sambeth and Dr Bruno Vaterlaus, head of research at Givaudan in Dübendorf travel to Roche Basel to discuss the situation with the Technical Director, Reto Schett. Dr Giuseppe Reggiani, director of Clinical Research at Roche Basel, is instructed by the management of Roche to investigate the possible effects of the accident on the health of the Icmesa employees and the local population and to take all necessary measures to prevent or treat any damage to health.

#### Friday, 16 July

18.15 hours

The mayor of Seveso and his deputy, Dr Uberti, as well as eight further members of the communal executive meet. Dr Uberti reports that between 12 and 16 children have been hospitalized. The evacuation recommended by Icmesa is postponed. Professor Ghetti, the *ufficiale sanitario*, is called back from his holidays for consultation on this question.

19.00 hours

Dr Barni and Dr Bergamaschini visit the families in the neighbourhood and recommend that they voluntarily evacuate their houses. The occupants of two houses are evacuated.

#### Saturday, 17 July

Icmesa. The management orders the factory to be closed as a precautionary measure. Dr Reggiani arrives and arranges for four of the twelve hospitalized children to be transferred from the local hospital to the Niguarda Hospital in Milan, which has special equipment. On Sunday, 18 July he gives the doctors in Milan and Desio all available documentation on the toxicology of TCDD.

19.30 hours

Icmesa. Discussion with representatives of the Italian health authorities (including Professor Ghetti and Dr Aldo Cavallaro, head of the provincial Laboratory for Hygiene and Prophylaxis). Von Zwehl announces that in

the accident TCDD was released. The official sanitario questions the extent of the danger presented by this substance.

#### Sunday, 18 July

10.00 hours

Seveso. The mayor of Seveso has called a further meeting in which the Icmesa representatives, Dr Cavallaro, Professor Ghetti, the district judge Salvatore Adamo and representatives of the works council participate. Professor Ghetti and Dr Cavallaro decide to travel to Givaudan in Dübendorf to have the results of the analysis directly confirmed by the chemists and to familiarize themselves with the methods of detecting TCDD.

16.00 hours

The factory is officially closed and the entrance to Building B sealed.

#### Monday, 19 July

Milan. Professor Ghetti and Dr Cavallaro receive documentation on the methods used for detecting TCDD.

#### Tuesday, 20 July

Dübendorf. The Givaudan chemists confirm for Professor Ghetti and Dr Cavallaro that TCDD was found in the samples. They receive a map showing the places where dioxin was found.

#### Wednesday, 21 July

Icmesa. During a meeting on the premises of Icmesa with Rocca and the works council members, von Zwehl is arrested. In the courthouse of Desio he meets Dr Paoletti who has also been arrested for causing an accident. They are questioned by the district judge Adamo. Milan. Professor Ghetti and Dr Cavallaro inform the prefect of Milan and the provincial health officer that the initial analyses have revealed relatively high amounts of TCDD. The prefect calls a meeting of the health board of the Region of Lombardy, to which experts from the ministry of Health in Rome and the Istituto Superiore di Sanità are invited. Part of the area of the communes of Cesano Maderno and Desio are also found to be contaminated. Measures similar to those for Meda and Seveso are taken. Basel. Dr Reggiani contacts experts from the firms Coalite (Great Britain), BASF (West Germany), Philips-Duphar (Holland), Chemie Linz (Austria) and Dow Chemicals (USA), which have all had dioxin accidents. All the experts recommend evacuation of the population. Although the extent of the contaminated area is not yet known, Dr Reggiani decides to recommend to the Italian authorities that the

inhabitants should be evacuated and travels to Milan for this purpose.

#### Friday, 23 July

*Milan.* The specialists invited the previous day by the prefect of Milan to a meeting are of the opinion that no further protective measures are necessary. Vittoria Rivolta, the Minister of Health of the Region, declares on television that the measures taken are sufficient. Dr Reggiani, who has already spoken with the mayor of Seveso in order to have the population evacuated, tries the same morning to speak at the meeting at the prefect's office in Milan to recommend this urgent measure. He is turned down because he cannot prove that he is an official emissary of Givaudan and Roche. *Seveso.* Towards the evening, Dr Reggiani succeeds in speaking to Rivolta in the communal offices of Seveso. He tries to persuade him of the necessity of evacuating the population. Rivolta then declares his willingness to call another meeting the next day.

#### Saturday, 24 July

*Milan/Evacuation.* In place of Dr Reggiani, who has returned to Switzerland on learning that he is being sought by the Italian police, Dr Vaterlaus appears with an authorization from Givaudan. He gives the authorities a map with details of the contaminated area southeast of the Icmesa premises. In the accompanying letter Dr Guy Waldvogel, Director of Givaudan SA and member of the Board of Directors of Icmesa, strongly urges that the contaminated area should be evacuated. The same evening Dr Cavallaro confirms that the responsible Italian laboratory has found traces of dioxin in soil samples. Evacuation has become unavoidable. *Medical monitoring.* Givaudan recommends to the Italian authorities that the medical supervision of patients should be continued even after symptoms have regressed and should be extended to all persons living in the contaminated areas.

#### Sunday, 25 July

*Seveso.* The evacuation is prepared and the population informed. The area to be evacuated is fenced off. Dr Cavallaro travels to Zurich with Professor Franco Pocchiari, head of the Istituto Superiore di Sanità and other representatives of the health authorities to discuss matters with European dioxin experts and representatives from Givaudan.

#### Monday, 26 July

*Evacuation.* To start with, 208 people from 37 houses leave the contaminated area. In order not to take the poison with them, they are al-

lowed to take only those personal effects which were in closed containers at the time of the accident. Before they arrive at their provisional quarters in the Hotel Leonardo da Vinci in Bruzzano, they are examined by a doctor. On the basis of new analyses, Zone A is extended. *Animal deaths/ slaughter.* Approximately 3 300 animals perish, mostly poultry and rabbits. Emergency slaughtering is decreed to prevent TCDD from entering the food chain. By 1978 some 77 000 animals will have been slaughtered.

#### Wednesday, 28 July

The health authorities of the Region of Lombardy create four committees to deal with the following problems: medical monitoring of the population, analysis, decontamination of the site and veterinary medicine. A further 19 persons are evacuated. A total of 40 houses have had to be abandoned.

#### Friday, 30 July

*Zone plan.* The contaminated area is divided into three zones. Zone A has the highest degree of contamination (more than 50 micrograms per square metre). The contamination is less severe in Zone B (5-50 micrograms per square metre), while in Zone R no TCDD or only slight traces (less than 5 micrograms per square metre) are found. Zone A is further divided into 7 subzones according to the severity of contamination. The number of people affected in Zone A is 736 (they are all evacuated), in Zone B, about 4 700 and in Zone R, about 31 800.

#### July - August

*Health.* 1600 people of all age groups are examined at the outpatient clinic in Seveso. 447 of them are suffering from acute skin lesions, presumably caused by the escape of chemicals. The patients recover within two to three weeks. The first cases of chloracne are recorded at the end of August.

#### Monday, 2 August

*Evacuation/monitoring of health.* New analyses make it imperative to evacuate a further 500 people from 90 houses in Zone A. After a medical examination, they are housed in the AGIP motel in Assago near Milan. A total of 736 persons have now been evacuated. The health authorities decide that children and pregnant women should leave Zone B during the day to minimize the danger of contact with TCDD. *Abortion.* The regional health authorities permit pregnant women in the contaminated zones to decide freely whether they wish to continue their pregnancy to the full term.

#### Tuesday, 3 August

*Advice centre for pregnant women.* In Seveso an advice centre for pregnant women is set up. At this point, the doctors are unable to tell the women with any certainty whether TCDD is teratogenic or not.

#### August

*Abortion.* In view of the risk of giving birth to a deformed child, some women decide to have an abortion.

#### Wednesday, 4 August

*Cimmino Commission.* The Italian government sets up a technical-scientific commission reporting to the Ministry of Health. Its task is to work out and propose decontamination measures for the affected area. This commission will later be known as the Cimmino Commission, after its chairman, Professor Aldo Cimmino.

#### Thursday, 5 August

*Lombardy.* The government of the Region of Lombardy issues Decree No. 25 on 'Regional measures to aid the affected population'. A committee is created, under the chairmanship of the Regional Health Minister, to co-ordinate all activities in the Seveso area.

#### Tuesday, 10 August

*Rome.* The Italian government grants a loan of 40 billion lire to the Region of Lombardy to finance reclamation of the contaminated area as well as medical and welfare payments.

#### Wednesday, 11 August

*Basel.* Dr Adolf W. Jann, Chairman of the Board of Directors of Roche, and Dr Waldvogel give a press conference. The Roche group commits itself to covering the costs of the damage.

#### Friday, 13 August

*Milan.* The government of the Region of Lombardy sets up the Giovanardi Commission (named after its chairman, Augusto Giovanardi, the former Director of the Milan Institute of Hygiene). This Commission is to implement the proposals of the Cimmino Commission.

#### Tuesday, 24 August

*Decontamination proposal.* Givaudan submits an initial decontamination plan worked out by the British engineering firm Cremer & Warner.

#### September

*Milan.* After closing the factory, Icmesa opens an office in the centre of Milan to en-

sure efficient contact with the regional authorities. *Seveso, Zone A*. In spite of the guards, people are continually entering the off-limit Zone A. The area is thus sealed off with more stable, higher fences. *Lombardy*. The Region grants Givaudan authorization to decontaminate houses in Zones A6 and A7.

#### Autumn

The Region of Lombardy studies the possibility of constructing a high-temperature incinerator in the heavily contaminated zone in order to destroy the contaminated earth and buildings. The project meets with the opposition of the local population.

#### Tuesday, 23 November

An agreement reached between the Region of Lombardy and Givaudan governs the use, removal and disposal of chemicals and raw materials from the factory.

## 1977

#### January

*Lombardy*. The regional government approves five *programmi operativi* (action plans): 1. analysis of the contamination of soil, water and vegetation as well as measures to decontaminate and reclaim the soil and buildings. 2. Aid and medical monitoring programmes in the health sector. 3. Aid in the social and educational fields. 4. Reclaiming public buildings and facilities such as athletic grounds; and restoration, where possible, of the area to its state before the accident. 5. Aid for the trade and industry in the affected area which suffered damage as a result of the accident.

#### February

*Milan/Compensation*. The Milan office of Icmesa pays the first compensation payments to private individuals, farmers, tradesmen and businessmen.

#### May

*Decontamination*. The decontamination work on the houses and gardens of Zones A6 and A7 are completed on time. The insides of the buildings are cleaned with equipment for sucking up dust and water and the outsides with a special soap solution. The contaminated waste water is collected in special containers. In the gardens plants are removed and the surface soil cleared away. The success of the decontamination work is assessed by means of wipe tests.

#### June

*Seveso*. The *Ufficio Speciale for Seveso*, a special bureau of the Region of Lombardy, sub-

sequently with at times as many as 100 employees, is opened. It is responsible for putting the five action plans into practice and for coordinating all measures. Antonio Spallino is named head of this special bureau.

#### 17 June

*Health monitoring*. A programme of systematic epidemiological health monitoring of 220,000 people is launched.

#### 10 July

*Seveso*. First anniversary of the accident. In the meantime 7 000 soil analyses have been made. A high, 4 000 metre long fence now surrounds subzones A1-A5, while subzones A6 and A7 are sealed off by a smaller fence. The soil of subzones A6 and A7 is decontaminated. 112 houses, including gardens and yards, in subzones A6 and A7 are decontaminated. This also applies to schools and factories.

#### September

*Comitato Internazionale dei Garanti*. The International Steering Committee is founded to assess the toxicological and epidemiological data and findings of the health monitoring programme. The committee has renowned experts from all over the world.

#### 14 September

*Commission of investigation*. The *Commissione Parlamentare d'Inchiesta* (parliamentary committee of investigation) is set up to determine the causes of the escape of toxic substances on 10 July 1976 at Icmesa and the potential risk to health and the environment by the industry. The committee consists of 15 members of parliament and 15 senators and is chaired by Dr Bruno Orsini, a doctor and member of the Christian Democratic Party.

#### 15-16 October

*Return*. The first evacuated families return to their decontaminated houses. By year end a total of 511 persons can reoccupy their homes. Those houses in Zone A which are heavily contaminated are to be demolished and new houses built in another residential area of Seveso.

#### November

The decontamination work begins in Zone B.

## 1978

#### Spring

*Seveso*. The programme for reclaiming farm land in zone B is started. The fields are ploughed and feed crops planted. The harvest

is to be analysed and then destroyed. The dioxin content of the soil is also to be monitored.

#### 2 June

*Rome*. The special loan of the Italian Republic is raised from 40 to 115 billion lire.

#### July

*Icmesa*. Removal of all chemical substances from the Icmesa premises is complete.

#### 25 July

*Report of investigation*. The parliamentary commission of investigation publishes an extensive report in which both Icmesa and the local and regional authorities are criticized.

#### September

*Milan*. Settlement of claims for damages with private individuals is continued. Most cases are settled amicably out of court.

## 1979

#### Spring

*Spring planting*. On the basis of the previous year's positive analysis results with feed crops planted in Zone B, cereals and garden produce are planted for experimental purposes.

#### June/July and October/November

*Rome*. In Rome official discussions are held between representatives of the Region of Lombardy and Givaudan to consider the possibility of settling claims for damages by negotiation.

#### November

*Seveso*. The head of the *Ufficio Speciale*, Antonio Spallino, is succeeded by Senator Luigi Noè.

## 1980

#### January

*Meda*. The important feeder road from Meda to the Milan-Como motorway is decontaminated and opened to traffic.

#### February

*Special disposal site*. The Cimmino Commission approves the construction of a special disposal site in Zone A, a carefully planned and sealed basin with a volume of 85,000 cubic metres. The contaminated material from subzone A1 (vegetation, debris and earth) will be placed in it.

#### March

*Lombardy/Geneva*. Initial basic agreement is

reached between the Region of Lombardy and Givaudan/Icmesa on a negotiated settlement of claims.

#### **Spring/summer**

*Seveso.* Decontamination work in subzone A1 is begun.

#### **October**

*Seveso.* One third of Zone R, or about 417 hectares, is released for agricultural use and horticulture.

#### **19 December**

*Rome.* In Rome, the agreement on the settlement of claims which had been reached between the Region of Lombardy and the Italian Republic on the one hand and Givaudan/Icmesa on the other is signed in the presence of the Italian prime Minister, the President of the Region of Lombardy and representatives of Givaudan/Icmesa.

### **1981**

#### **July**

*Desio/Compensation.* An out-of-court settlement is reached with the commune of Desio, according to which Givaudan pays the commune 1.45 billion lire.

#### **September**

*Cesano Maderno/Compensation.* Givaudan also reaches an agreement with the commune of Cesano Maderno for an indemnification of 2.85 billion lire.

#### **October**

*Building B.* At the request of the *Ufficio Speciale*, Givaudan commissions the Italian Atomic Energy Commission (ENEA) to work out a plan to dispose of Building B (where the accident took place).

#### **November**

*Zone R.* With a few exceptions, all parts of Zone R are approved for agricultural use.

### **1982**

#### **Spring**

*Disposal.* Before the reaction vessel in Building B can be emptied, the residues must be disposed of. No viable solution can be found in Italy or in Switzerland. The negotiations subsequently conducted in various European countries are not successful. No one wants to dispose of the waste from Seveso, even though special waste disposal sites and high temperature incinerators are available. In the spring of 1982 the Italian authorities recom-

mend the firm Mannesmann Italiana, which had worked for the Italian Republic in the past. Mannesmann Italiana then submits a disposal plan, in which the company undertakes to ensure transport and disposal of all waste containing dioxin from the reaction vessel in a suitable and authorized site and to obtain all necessary Italian and foreign permits. On account of the origin of the residue, Mannesmann Italiana makes it a condition that the disposal site should be kept secret from Givaudan.

#### **May**

*Seveso.* Construction begun of a second special disposal site for contaminated material from subzones A2-A5. Total capacity: 160 000 cubic metres.

#### **June**

*Meda/Compensation.* An out-of-court settlement is reached with the commune of Meda. Givaudan pays an indemnification of 1.3 billion lire.

#### **29 June**

*Disposal tender.* Mannesmann Italiana submits a written tender to Givaudan/Icmesa in which it affirms that it will ensure disposal at an authorized and supervised disposal site. At the request of Icmesa, it also declares its willingness to have the correct completion of the disposal certified by a notary public.

#### **20 July**

*Tender accepted.* On 20 July Givaudan accepts in writing the tender of Mannesmann Italiana.

#### **July – September**

*Icmesa/Emptying the reaction vessel.* When the official permits have been obtained, volunteers from Roche Basel begin the extensive task of emptying the vessel in a carefully planned operation conducted under strict safety precautions. By the evening of 9 September, 41 barrels are ready for transport.

#### **10 September**

*Transport of the barrels.* The contaminated residue from the reaction vessel, packed in 41 barrels, leave the Icmesa premises. The truck has an official escort as far as the Italian border at Ventimiglia by the Italian authorities.

#### **14 October**

*Milan.* Giuseppe Guzzetti, President of the Region of Lombardy, informs the *Consiglio Regionale* that 41 barrels with residue from the TCP reaction vessel have been collected

from the Icmesa factory premises and have left Italy.

#### **13 December**

*Notary's sworn statement.* A notary public in Milan provides the Region of Lombardy and Givaudan with a sworn statement to the effect that the barrels have been disposed of at an unnamed, approved and supervised disposal site.

### **1983**

#### **23 February**

*Search for the barrels.* The French Swiss television programme 'A bon entendeur' reconstructs on film the journey of the 41 barrels to St-Quentin in France. After that, all trace of them is lost. Various hypotheses on the whereabouts of the barrels are put forward.

#### **9 March**

*Letter of confirmation.* In its letter dated 9 March 1983 to Icmesa, Mannesmann Italiana again declares that the barrels have been disposed of at an approved and supervised site.

#### **25 March**

*France.* The magazine *Science et Vie* publishes an article on the whereabouts of the barrels, mobilizing the French authorities and public opinion. Various sites are suggested.

#### **March**

*Paris/Bonn.* The French Minister of the Environment, Huguette Bouchardeau, writes to the West German Minister of the Interior, Friedrich Zimmermann, because she suspects that the barrels are in the Federal Republic of Germany. The search for the barrels is then taken up at German disposal sites.

#### **30 March**

*St-Quentin.* Bernard Paringaux, head of the disposal company Spelidec in Marseille and the second subcontractor of Mannesmann Italiana, who had arranged the transport of the barrels, is arrested in St-Quentin. He refuses to make any statement on the whereabouts of the barrels.

#### **7 April**

*Kloten.* Representatives of Roche and Givaudan learn from Mannesmann Italiana that the transport and disposal contract, contrary to the agreement, had been passed on to two subcontractors, Wadir in Geneva and Spelidec in Marseille, and that the final disposal site is not known to Mannesmann Italiana.

## 21 April

*St-Quentin.* The examining magistrate of St-Quentin in northern France questions two representatives of the Roche management on the whereabouts of the barrels. They confirm that they know nothing of the matter.

## 22 April

*Basel.* In a press release Roche appeals to any persons knowing the whereabouts of the barrels to give information and break their silence. It also undertakes, at its own expense and in cooperation with governments and authorities, to dispose of the barrels, once they are found, at a supervised disposal site or to destroy them in an authorized incinerator.

## 19 May

*Northern France.* The 41 barrels are found in an unused abattoir in Anguilcourt-le-Sart, a village in northern France. The barrels are transferred the very same evening to a military base near Sissonne.

## 1 June

*Berne/Basel.* The Executive Council of Basel-City and the Swiss Federal Council grant the authorization for transfer of the dioxin barrels to a secure temporary storage site on the Roche premises in Basel.

## 4 June

*Basel.* The 41 barrels arrive in the early morning by truck in Basel and are placed in a prepared protected room at Roche Basel.

## May/June

*Basel.* Ciba-Geigy AG declares its willingness to incinerate the residue in its recently renovated high temperature incinerator provided the necessary preliminary tests are positive.

## 15 July

*Berne/Basel.* On 15 July 1983 the authorities of the Swiss Confederation and of the Canton of Basel-City announce the organizational measures and the division of responsibility for the work involved in destruction of the waste.

## July 1983 – March 1984

*Planning.* Plans for the safe incineration of the dioxin waste are worked out. The proposed solutions are approved by the advisory board and by the federal and cantonal authorities.

## September

*Seveso/Compensation.* Givaudan also settles out of court with the commune of Seveso.

The indemnification amounts to 15 billion lire.

## 24 September

*Criminal proceedings.* The Criminal Court of Monza sentences five former employees of Icmesa and Givaudan to periods of imprisonment ranging from 2 1/2 to 5 years. The five accused all appeal against the conviction, claiming that the accident could not have been foreseen.

## 1984

### February

*Health.* In its final report, the International Steering Committee points out that, with the exception of chloracne (a total of 193 patients), no ill effects can be attributed to TCDD.

### April

*Zone A.* Decontamination of the most heavily contaminated area, Zone A, is completed. The second special disposal basin is covered and sealed. The Region of Lombardy has a park laid out over it. *Basel/Incineration test.* In the high temperature incinerator of Ciba-Geigy initial experiments are made with a test substance which has chemical and physical properties similar to those of TCDD, but is less toxic.

### 26 April

*Identification of the barrels.* In order to ensure that the barrels which were found are really those which left the Icmesa premises on 10 September 1982, they must be identified. Under the supervision of a notary public from Basel and of representatives of the Swiss Confederation, the Canton of Basel-City and the *Ufficio Speciale*, the inner barrels are removed from the outer barrels and provisionally identified.

### May

*Zone B.* Zone B is authorized for construction, but not yet for agriculture or small livestock.

### 16 October

*Identification of the barrels.* In the presence of the Basel notary public and representatives of the Confederation, the Canton of Basel-City and the *Ufficio Speciale*, the inner barrels and their contents are identified. The weight and the inscription on the inner barrels are checked. The contents of the barrels are analysed and compared with samples from earlier analyses. On the basis of the findings, it is certain that these barrels are in

fact those containing reaction residue from Icmesa.

## 27 November

*Test incineration.* The first test incineration of about 10 kilograms of dioxin-contaminated waste is carried out.

## 1985

### 19 March

*Test incineration.* On the basis of the positive analysis results of the first test incineration of dioxin-contaminated residue, a second incineration test, involving 360 kilograms, is approved. This takes place on 19 March 1985.

### 14 May

*Criminal proceedings.* The Court of Appeal in Milan finds three of the five accused not guilty. Two of the accused are given conditional sentences of two and one and a half years respectively. They are found guilty of having caused an accident by negligence. The two accused file a precautionary appeal to the Supreme Court in Rome.

### 7 June

*Basel/Press conference.* The impending incineration of the main batch of dioxin residue is announced at a press conference. The authorities also announce that a 42nd barrel will arrive from Icmesa, containing waste from the demolition of the building where the accident occurred. Its contents will be incinerated with those of the other 41 barrels.

### 17 – 21 June

*Main incineration.* As the results of the second test are also positive, the incineration of the main batch can be carried out as planned. Ongoing analysis of flue gases ensures that no TCDD escapes into the atmosphere during incineration.

### 18 – 21 November

In the Ciba-Geigy high temperature incinerator material with trace contamination is burned. This consists of analytical material, tools, protective suits and other material used in repacking the residue.

### 25 November

*Berne/Basel.* The federal and cantonal authorities announce in a press release that the material has been burned in the Ciba-Geigy high temperature incinerator and promise that a final report on the waste disposal will be published in the second quarter of 1986. *Icmesa site.* In 1985 the remaining buildings on the Icmesa premises are demolished. Subse-

quent use of the land is still under discussion. Part of the premises have been given to the Region of Lombardy, while negotiations continue on another part, on which the commune of Meda would like to set up athletic facilities. A third part will be reintegrated in the construction zone and sold to third parties.

## 1986

### 22 May

The Region of Lombardy sets up a foundation to study the relations between man and his environment. This foundation is based on the agreement of 19 December 1980 between the Region of Lombardy and the Republic of Italy on the one hand and Givaudan/Icmesa on the other. As part of this agreement, Givaudan and Icmesa undertakes to donate all property in Zone A plus a start-up capital of 500 million lire to the foundation to be set up by the Region of Lombardy.

### 23 May

The Supreme Court in Rome, the highest court of Italy, confirms the judgment of the Court of Appeal in Milan against the two remaining accused, even though the prosecuting attorney had called for their acquittal. This marks the end of the criminal proceedings in the Seveso case. In civil law, the Supreme Court confirms the disqualification – decided earlier by the Court of Appeal – of the trade union as a legitimate party in any civil suit. Further claims in civil law may be asserted for a limited period of time.

### 11 June

The final report of the expert committee on the incineration of the dioxin-contaminated waste from Seveso in the Ciba-Geigy incinerator is presented to the public at a press conference in Basel.

## 1993

### October

A Euro-MP and a German TV journalist demand that the investigations into the accident at Icmesa should be re-opened. It is alleged that the dioxin-contaminated waste from Seveso has been landfilled in the Schönberg landfill in the German state of Mecklenburg-Vorpommern. Roche counters these unfounded allegations by issuing full documentation. As expected, no new facts are unearthed by the additional inquiries. The 41 barrels with the dioxin-contaminated waste from the reaction vessel were definitely identified and properly disposed of in Basel in 1985 under the supervision of an indepen-

dent expert committee and the surveillance of the government of Switzerland.

### 30 November

A group of Roche experts presents all the facts at an open session of the environmental committee of the *Landtag* in Schwerin before representatives of the parliament and government of Mecklenburg-Vorpommern and then at a media conference. In particular, they provided evidence for the incineration of the 41 barrels containing reaction vessel waste in Basel and for landfilling of the contaminated plant parts and rubble in basins in Seveso.

## 1994

### January

In mid-January the parliamentary commission in Schwerin that had been set up to investigate the "Schönberg landfill" conducts a hearing lasting several days. Roche accepts the invitation to participate in order to completely clarify matters. Further documents and film material are submitted. On January 14, Heinz Holliger, an eyewitness to the identification and disposal that took place in Seveso and Basel, testifies before the commission and confirms his testimony upon oath. No evidence to support the claims and allegations of the Euro-MP and German TV journalist is presented.

### Autumn

The Schwerin parliamentary commission is dissolved at the end of the legislative period in the autumn of 1994. The "Schönberg landfill" commission set up by the new parliament is concerned solely with issues relating to the change of ownership after the dissolution of the GDR and to environmental liability. For Roche this marks the end of the "Schönberg" episode. The allegations are rejected both by the environmental committee of the Mecklenburg-Vorpommern *Landtag* and by the parliamentary commission.

## 1995

*Epidemiological studies.* The team from the University of Milan's Institute for Occupational Medicine headed by Professor Pier-Alberto Bertazzi continues to conduct epidemiological investigations among the Seveso population. The studies are to continue over the coming years. A detailed analysis will have to await the publication of a full report. At the University of Milan, Professor Paolo Mocarelli, together with the *Center for Disease Control* in the United States, is investigating

blood samples from the period following the accident.

*Civil lawsuits.* Lawsuits claiming compensation of injury of individual inherent rights (without any damage to persons) are still pending. In one such suit, Icmesa won the case. In another, both parties have appealed to a higher court.

# "Seveso is just as much part of Roche's history as our successes"

**Interview with Dr Guido Richterich, Deputy Chairman of the Board of Directors of F. Hoffmann-La Roche Ltd.**



**Dr Guido Richterich**

*Mr Richterich, twenty years have passed since the accident in Seveso. How do you see this event in the context of Roche's one-hundred-year history?*

The Seveso accident is just as much part of the history of our company as the scientific achievements of our research scientists, the commercial highlights and the relatively good record on job security. Twenty years ago, Seveso was a shock for all of us; management had been accustomed to success and was confronted for the first time with negative publicity. Seveso suddenly revealed to us the importance of central responsibility in a company for everything that happens within the Group, even if Group management has little direct influence. We became acutely aware of the limits of delegating responsibility because the media and the public put the blame squarely on senior management. And obviously, Seveso was an accident that concerned us deeply and that was a genuine setback for our company's reputation and credibility. As I see it, Roche has shown great commitment and deployed substantial resources to make compensation for damage to environment and property in Seveso and to regain lost confidence. We can never be certain that we've reached this goal, so Seveso is not only a reminder but also a challenge.

*Various incidents and accidents, some of them a lot more serious, have struck other companies both before and after Seveso. Yet Seveso has come to symbolize the risks associated with the chemical industry. Can you explain that?*

I can't really explain why this accident - which fortunately did not claim any lives - is still considered such a key event. Seveso is certainly different from other industrial accidents whose impact is per-

ceived as immediate and limited in scope. They are therefore very soon supplanted in people's mind by similar incidents. The Seveso accident, however, didn't cause much visible damage such as devastation or fire. Instead, the population was confronted with a barely perceptible substance whose impact on man and animals was poorly understood. Owing to this lack of knowledge, it was some time before a definitive assessment of the damage could be made, thus naturally exacerbating the anxiety and concern in the population affected. Nor should we forget the political dimension of the event. The ecology movement was then in its infancy and used the Seveso accident to further its cause. The slogan "Seveso is everywhere" clearly illustrates this point. But we're not here to assess the political aspect.

*Before the dioxin-contaminated waste was incinerated in Basel, the 41 barrels - as we all know - went on an odyssey across half of Europe. What did Roche learn from this incident?*

Roche had commissioned a specialized company to dispose of the waste. However, we underestimated the risk and waived our right to monitor the disposal and thus to ensure that it was carried out according to the letter of the agreement. What we learned from this is not new, but the lesson is clear: trust is good, supervision is better. But we shouldn't forget the pressure under which we had to make this decision - which we subsequently considered wrong. The regional authorities wouldn't accept any further delay in transporting the waste, and, since Roche was unable to organize disposal, these same authorities more or less obliged us to call on Mannesmann Italiana, which was then responsible for the barrels going astray.

*Seveso was in the headlines again in 1993, seventeen years after the accident. What were, in your opinion, the reasons for the*

*allegations and the supposedly new accusations of the German TV journalist Ekehard Sieker?*

There are a number of reasons in my view. The starting point was the opening up of the former GDR. For the first time, the Schönberg landfill in Mecklenburg-Vorpommern came under political scrutiny. What was at stake was more than just environmental issues; local politicians were also settling accounts. In rummaging through old government files, journalists discovered documents that were connected with an official request for disposal of rubble from Seveso. A number of them followed up this clue on the Seveso waste. Interested journalists from serious publications contacted us and came to the conclusion that no Seveso waste could have been landfilled in Schönberg and that the documents in question referred to projects that were never carried out. The above-mentioned TV journalist, however, simply ignored the official documents and other evidence. He had a clear goal in mind: he wanted to awaken public awareness of the environmental hazards of the Schönberg landfill by raising the spectre of "Seveso poison".

To succeed, he needed high viewer ratings, and this in turn meant that he had to mount an attack on the company that was responsible for Seveso and whose name was associated with the temporary loss of the 41 barrels. The journalist tried to create a sensation by simply denying all the well-known facts that had been confirmed by the courts and the authorities. In the short term, he got the high viewer ratings he wanted, but responsible media workers, fearing for the credibility of their profession, were scathing in their judgment.

*What does Seveso mean for you personally? What thoughts, feelings and reactions does it trigger in you today?*

My strongest feeling is one of powerles-

ness, which I experienced twice. The first time was when the whole world and some of our own people understandably enough refused to believe that the Executive Committee didn't know the whereabouts of the lost barrels. The second time was in 1993 when I experienced how easily television viewers can be deceived and how difficult it is to explain to this public, with objective arguments, that it is being duped. But I've also never forgotten the unwavering dedication of those Roche employees who, under difficult conditions, magnificently helped clean up the damage and dispose of the waste in Seveso and Basel. Last but not least I gratefully remember our colleagues at Ciba who burned the barrels in their high-temperature incinerator.

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