

WESER SALT

A charge is brought
against:

1 The Accused

Concern "Ernst Thaelmann" of Merkers (GDR)

Concern "Einheit" of Dorndorf (GDR)

Concern "Marx-Engels" of Unterbreizbach (GDR)

None of these concerns are privately owned.

Besides these industries the Staatsrat (a body comparable with the Central Committee in the Soviet Union), represented by its chairperson, Erich Honnecker, is charged as being politically and morally responsible.

The charged concerns produce potassium which pollutes the river Werra with considerable quantities of salt. The pollution takes place in Eastern Germany near the border of West Germany. At Minden the rivers Werra and Fulda flow together and form the river Weser. From Minden to Bremerhaven on the North Sea the Weser measures 432 kilometres. With the Rhine, Elbe and Danube the Weser is one of the largest rivers in West Germany (FRG).

Quantity and composition of the waste waters of every single potassium plant are quite different. The composition of the waste waters is especially dependent on both the kind of raw salts (carnallite, salt rock, sylvinit) used and their composition, and on production methods and products made.

2 Waste Water Composition

In 1840 Justus von Liebig recognized the importance of potassium as a nutritious substance for plants. Originally liberated as waste at the mining of rock salt (common salt), the emphasis has shifted nowadays. From the salts shown in table 1 the potassium is enriched and sold as an additive to fertilizers - the salts remaining in great quantities after processing form the main bulk of the waste water.



Table 1 Mean composition of the potassium salts concerned

Raw salts	Minerals	Chemical Formula	Percentage
Sylvinitite	sylvite	KCl	20 - 30%
	salt rock	NaCl	60 - 70%
	anhydrite	CaSO ₄	2 - 3%
Rock Salt	sylvite	KCl	15 - 25%
	salt rock	NaCl	60 - 70%
	kieserite	MgSO ₄ .H ₂ O	10 - 25%
Carnallite rock	carnallite	KCl.MgCl ₂ .6H ₂ O	50 - 55%
	salt rock	NaCl	26 - 40%
	Kieserite	MgSO ₄ .H ₂ O	3 - 17%
	anhydrite	CaSO ₄	1 - 2%

Source: Seifert. F (1952)¹

The quantities of raw salts processed annually by the three concerns amount to 11 million tonnes². As there is an increasing demand for raw salts, the GDR, where the salts can be found, increased the processing of carnallite mixed salts. The potassium concerns in the GDR are not only economically interested in the mining of potassium chloride, but also in the enriching of magnesium sulphate (kieserite). Kieserite can further be used for the production of magnesium and potassium sulphate (potassium fertilizers for plants sensitive to chloride like potatoes). The mining of potassium does not produce as large quantities of waste water as the process of separating kieserite.

The composition of the waste water of the potassium works in the GDR is not revealed by the concerns. West German experts have made the following estimates for 1979:

Table 2 The composition of the waste water of the potassium mines in the GDR

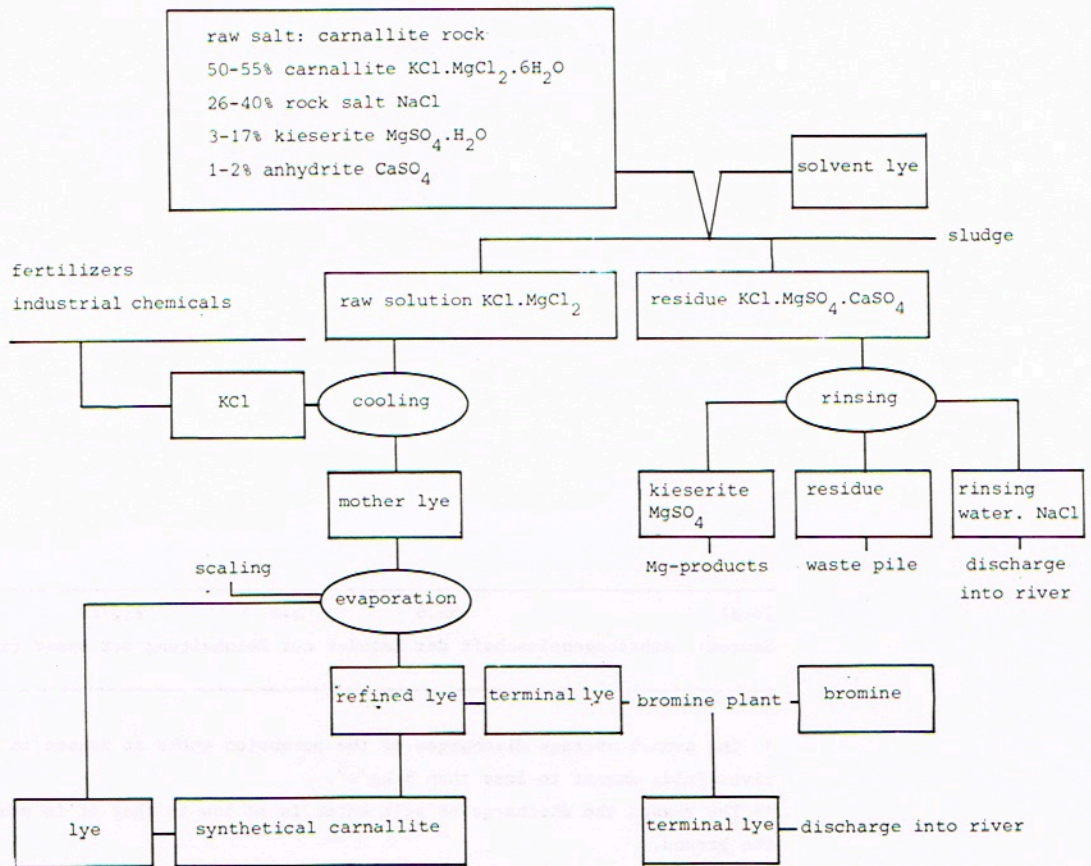
substance	chemical formula	concentration
potassium chloride	KCL	12 g/l
magnesium chloride	MgCl ₂	34 g/l
sodium chloride	NaCl	219 g/l
magnesium sulphate	MgSO ₄	12 g/l

Source: Uhde (1981) (3)

Figure 1 gives a survey of how carnallite is processed in the concerns that are charged.

According to table 2 the elements, especially ions of sodium, magnesium and chloride, form the main part of the noxious salt discharges by the defendants. Die Hessische Landesanstalt fuer Umwelt, Aussenstelle Kassel, in West Germany is responsible for the indication and the supervision of the discharges, a task that is considered a matter of routine.

Figure 1 Outline of carnallite processing⁴



3 Other polluters

Table 3 shows the quantities discharged by all potassium producers into the Weser river basin in 1976:

Table 3 Discharge potassium producers in Weser (1976)

Origin	discharge rivers into the Weser 1976 in mil m ³	salt burden 1976 in the Weser mil t Cl ⁻	average daily burden 1976 t Cl ⁻	average burden 1976 kg/s Cl ⁻
3 potassium works Thuringen	85	5.2	14,000	165
2 potassium works Hessen *	2.2 **	0.4	1,130	13
6 potassium works Lower Saxony	1.4	0.2	580	6.8
Total	88.6	5.8	15,710	184.8

Source: Arbeitsgemeinschaft der Laender zur Reinhaltung der Weser (1982)

* The annual average discharges of the potassium works at Hessen on the river Fulda amount to less than 5 kg/s⁵.

** The reason the discharge of salt water is so low is that it is pressurized into the ground.

The annual average chloride burden of the Weser in front of the River Aller in 1977 was caused by the defendants for about 84%, by concerns at Hessen for about 10%, by concerns in Lower Saxony for about 6%⁵.

4 Historical Development

At joint meetings (1947, 1951) representatives of the FRG and the Russian occupied area of the GDR, united in the potassium waste water committee, agreed on a proportional distribution of the allowable burdens to be produced by the single concerns. With the increase of their production in the last few years the concerns care increasingly less about the limit values established by the potassium waste water committee. The salt concentrations and consequently the salt burden have increased in particular since 1978. While in the FRG the kieserite waste water containing large concentrations of chloride is pressurized into the ground on a large scale (see table 3, note **), the potassium works in the GDR discharge them directly into the Werra. Till 1978 the GDR also pressurized them into the ground, but the salt came up again and the ground water salinized, which is why the new method of getting rid of the chloride was introduced. The annual average in 1976 (a dry year) of the chloride concentration at the borders of the GDR amounted to about 11,000 mg/l, in 1977 (an average amount of rain) the concentration was about 7,000 mg/l⁵.

Table 4 Directives and limits for chloride in mg/l

	directive	limit
IAWR ⁶	100	200
DVGW ⁷	100	200
EG ⁸	25	200

sources: Internationale Arbeitsgemeinschaft der Wasserwerke im Rheineinzugsgebiet (6) Deutscher Verein des Gas- und Wasserfaches e.V. (7) Common Market (8)

Because of discontinuous discharges of waste water containing salt from the concerns, there are considerable fluctuations per hour and day, which are most striking in the Werra and the Oberweser, as could be expected: 250 - 8,500 mg/l chloride⁵. These fluctuations are mainly caused by discontinuity in the production (weekends, nights etc). Despite pressure by the FRG the defendants refuse so far to dig buffer basins or storage basins to put at least an equable burden on the Werra and the Weser. Besides the high salt content the periodical fluctuations of the concentrations mean a serious additional risk to flora and fauna and also to the consumers whose drinking water comes from the Weser. The natural content of chloride in the Weser is 20 - 50 mg/l⁵.

Accusation

The salt discharges of the accused concerns have (seen from a moral, ethical and sanitary stance) mainly two consequences, which are at the same time our accusations:

1. Destruction, impoverishment and alteration of a whole river biotope.
2. Endangering and injuring the health of almost one million people in the Federal Republic of Germany through their drinking water.

Destruction of a biotope

The effect of the salts from the potassium waste water on the aquatic life in the river is mainly based on the fact that the osmotic conditions of the creatures are changed so that the necessary drainage of every organism is disturbed. Plants and animals are therefore exposed to a continuous physiological stress, which in the long run makes them weak and sensitive to illness, damages their reproductive power, thus bringing in a selective factor. In 1932 for instance there were still 14 orders of plants whereas in 1950 only 4 orders of plants could be found⁹.

Health and Drinking Water

In 1978 nearly one million inhabitants of the FRG consumed drinking water which had been burdened with salt discharges by the concerns we accuse, partly in quantities that exceed the limits established by West German and European law regulations (see table 4).

The salination of the drinking water caused by the concerns has totally, partly or temporarily affected the following cities: Eschwege**, Witzenhausen**, Wahnbeck, Beverungen**, Fuerstenberg, Hoexter, Holzminden, Emmerthal, Hameln**, Hesslingen-Fuhlen-Lachen, Bueckeberg**, Vlotho**, Bad Oeynhausen**, Minden, Petershagen, Schuesselburg, Nienburg**, Drakenburg and Bremen⁴.

Cardiac-arterial diseases and dangers to new-born babies

A high percentage of salt in drinking-water proportionally increases the general salt absorption of people. High salt absorption is considered a risk factor for cardiac and arterial diseases¹⁰.

In the sixties and seventies there was an increased demand for ready-made baby-food that has been diluted with milk and water. High concentrations of sodium are noxious to a healthy growth of the baby. As a consequence the pollution is

** Parts of the places yielding salt had to be closed down



a risk factor for cardiac and arterial diseases and also impairs the health of new born babies.

Heavy metal burden

The strong fluctuations of the salt percentages lead to increasing corrosion of the water mains. This corrosion has not only undesirable noxious technical effects (ruptures of the mains, premature renewal of the systems), but sanitary conditions became also precarious. During the process of corrosion the material from which the mains are made mixes with the drinking water. Dependent on the materials used the drinking water mix with higher concentrations of heavy metals. The galvanized iron mains normally used in houses are hazardous, because the zinc layer always contains considerable quantities of cadmium and lead. Furthermore the lead pipes which are still used mean a considerable source of lead for the consumers of the drinking water because of this corrosion process. The high concentrations of lead due to increased corrosion in the lead water mains is a particular threat to the health of new-born babies in the first months of their lives, because of the proportion of liquid absorbed to body weight is unfavourable¹¹.

The danger of inducing cancer

In 1979/80 the city of Bremen had to close down its water works "Auf dem Werder". The water filtrate from the Weser had to be mixed with clean ground water and served for years as drinking water for about 300,000 to 400,000 people. The reason for closing down the water works was the discovery of a side effect of the salt discharges by the defendants. The discharges of sodium chloride which also contain bromide (proportion bromide to chloride 1:700) effect a simultaneous increase of the bromide concentrations in the Weser. As bromides are not removed by normal process of water purification, they stay in the drinking water. Bromide as such is harmless, but the filtration, respectively bankfiltrate is and was chlorinated to be on the safe side and bromide reacts with chlorine and becomes hypobromite. This hypobromite in its turn forms brominated compounds with organic substances from the drinking water, especially Tribromomethane. For chemical reasons hypobromite reacts quickly (faster than hypochlorite for instance) and preferentially which has the consequence that the mixed drinking water of Bremen contains 50 µg/l of such trihalomethanes*¹².

Trihalomethanes are suspected of being mutagenous and carcinogenous; according to experiments with animals, short-term mutagenity tests and epidemiological research indicate the suspected forms of cancer are those of the alimentary canal, the ureter and the liver¹³. Because of the discharges of the defendants about 300,000 to 400,000 inhabitants of Bremen have been exposed for years to a chronic health risk, the gravity of which cannot exactly be estimated by any toxicologist at the moment. In this context it is striking how many cases of cancer of the colon have been encountered in the area of Bremen which scores by far the highest level in West Germany¹⁴. A causal relation cannot be proved because hardly any medical research has been carried out.

Even after the closure of the water works in Bremen the discharges of the charged concerns have resulted in the fact that the previously mentioned cities and villages will have water with an increased concentration of damaging organic substances containing bromine levels depending on the purification methods. This involves 300,000 people more in the Federal Republic of Germany.

* Compounds of bromine and chlorine: (chloroform), dichlorobromomethane, chlorodibromomethane and tribromomethane.

40 microgr. tribromomethane/l

70 microgr. other trihalomethanes/l

6 Alternatives

The discharges can be avoided in a two-phase programme:

- 1 measures at the salt works themselves
- 2 construction of a pipeline for the draining of salt through the German Federal Republic to the North Sea.

Since the main burden comes at the mining of kieserite technical improvements of the methods of separation could reduce the quantity of waste water. The Potassium Research Institute Hannover of the Potassium and Salt Ltd has developed a system of dry separation, in which the raw salts are exposed to an electrostatic field and are separated in particles (ESTA procedure)¹⁶. The electrostatic preparation supplies the purest kieserite. The high content of magnesium chloride (8%) and the proportional high percentage of crystal water in the mined raw salts form technically surmountable difficulties at the application of ESTA-procedure³.

There is a second procedure to reduce the quantities of waste water, that is based on the separation of kieserites by flotation. The kieserite flotation can directly be applied on the raw salts without preliminary developing work. At the application of kieserite flotation the introduced amounts of salt already could have been reduced from 8.5 million tonnes to about 1 million tonnes in 1979⁴. The costs of this method amounted to 50 - 60 DM per tonne of Kieserite³ at that time.

The remaining waste water can be transported through a pipeline (500 - 750 mm in section) to the North Sea. The length of the pipeline will be about 460 km. A rough estimate shows that investments of about 1 billion DM will be required⁵.

As the deposits of the charged concerns will be exhausted in about 30 to 50 years¹⁷ which will mean the works will be closed down, one can imagine the defendants will be unwilling to make these investments, and play for time. This is unacceptable for environmentalists and for the consumers of the drinking water.

As a consequence of a political situation between the GDR and the FRG the administrative or diplomatic possibilities of forcing the GDR to halt the pollution of the Werra-Weser are not available. The authorities of the GDR even hold the opinion that the costs (for measures within the concerns themselves and for the construction of the pipeline) should be paid wholly or for the greater part by the FRG. This view is incompatible with the elementary national law (Section 1a, para. 1 Wasserhaushaltsgesetz of the Federal Republic of Germany). This view contradicts respects for human beings and for nature. If accepted by the FRG this will mean in political terms abandoning the principle of the originator of the pollution and could also be used as a precedent by polluters.

7 Summary

The concerns "Ernst Thaelmann", "Einheit" and "Marx-Engels" yearly discharge approximately 30 million m³ heavily salted waste water into the Werra-Weser river system.

As shown above it is technically possible and financially realizable for the three concerns in the GDR to stop the discharges of waste water with a high content of salt. For purely economic reasons no measures were taken up until now, despite year-long pressure of representatives of the FRG. As a consequence the elementary, ethical and moral standards were affected for purely economic reasons. For purely economic reasons the health and well-being of hundreds of thousands of West German people were endangered or impaired and a once clean aquatic environment system was nearly annihilated.

The salt contamination of the Weser is a problem for the reliability of drinking water in northwest Germany¹⁸. High percentages of salt in drinking water are suspected to incur cardiac-arterial diseases. A high percentage of sodium seems not to be conducive to an optimal healthy development for young babies.



The fluctuations of the salt concentrations in the unmanufactured water eventually lead to an increase of the heavy metal burden for the drinking water consumers and the bromide percentages (related to the chloride quantities, both penetrating into the drinking water company) become a serious chronic health risk during a technically normal drinking water preparation (brominated organic compounds are formed).

The water pollution caused by the accused concerns and their responsible chairperson of the Staatsrat of the GDR, E. Honnecker, is a serious offence against the "individual responsibility" of the Declaration of Rotterdam¹⁹.

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