

Environmental reclaiming Teckomatorp site
Project update 22 September 2006
Visit from NORDROCKS 2006 Malmö
Lars Bevmo, Project manager
Municipality of Svalöv, Sweden

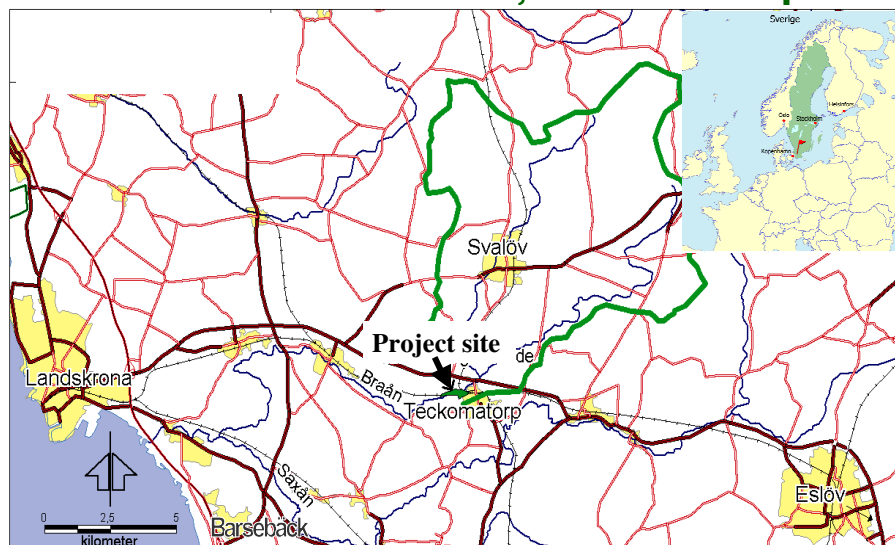


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Location of BT Kemi, Teckomatorp



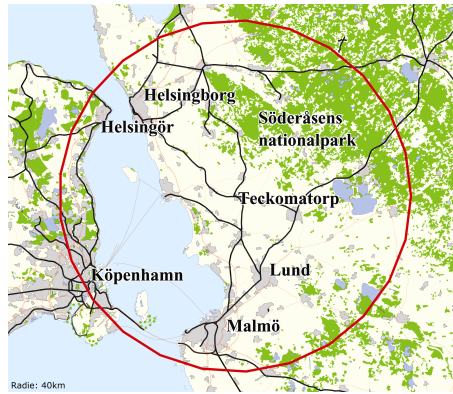
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Potentials of Teckomatorp

- Situated in the centre of the Öresund Region
- Character of an old, small town
- Good communications
- Close to recreational areas

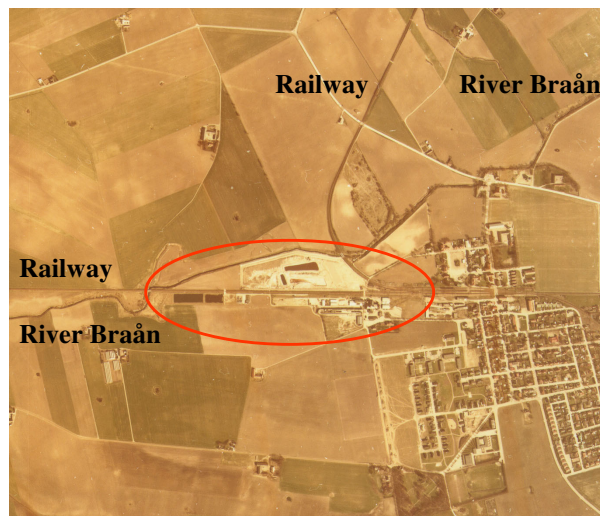


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Ariel photo 1978 over BT Kemi site



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History

1965 Bönnellyche & Thuröe moves the production of pesticides from Malmö to Teckomatorp. The company is taken over by Höganäsbolaget.

1967 - 75 Application for sewage discharge to Watercourt Söderbygden. The new National Environment Protection Board takes over, is sceptical but finally a permit is given in 1975.

1971 Kemisk Vaerk i Köge A/S buys the production of pesticides of Bönnellyche och Thuröes. BT Kemi is created. Waste drums are buried during the nights.

1970-75 Complaints over the water in Braån. Gardener Ahls plants in Billeberga is damaged. Monica Nilsson carry on resistance against BT Kemi. 200 buried drums of waste are found.

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History

1977 Malmö court fines the company to pay 500 000 crowns to Ahl. Landskrona court frees managing director Prawitz from careless handling of poison. However soon afterwards a further hundreds of drums are found causing a big upset in Teckomatorp. Media all over the world are focusing on the case. The Swedish Government orders the factory to close. BT Kemi company went bankrupt.

1978-79 The County Administrative Board and IVL manage the clean up of the site. The factory is demolished and residues dumped in the waste area between the railroads. The drainage water is treated by active carbon. The actions of all the authorities during the scandal is scrutinized by Councillor of Justice.

1982 Treatment of drainage water at site ceases and instead the water is pumped to Landskrona sewage treatment plant. The municipality takes over the Real Estate from the Government. The County Administrative Board will keep the responsibility for the clean up.

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History

1983-98 Several studies indicates that the site is still polluted and different alternatives for remediation are investigated. Dinoseb is found under the floor in one of the new industrial buildings in the south area and dug out 1986.

1998-2002 The responsible authorities and the municipality keep discussing how to perform the final remediation needed. The Government allocates a fund for treatment of polluted sites.

2001 Further soundings and analyses of the grounds are executed on behalf of the County administrative Board. A proposal for guidance values for maximum residual pollution in the soil and groundwater is given.

2002 The municipality of Svalöv finally decides to take responsibility for the clean up of the site presupposing the government will pay the main bill. Funds for a Main Study is established.

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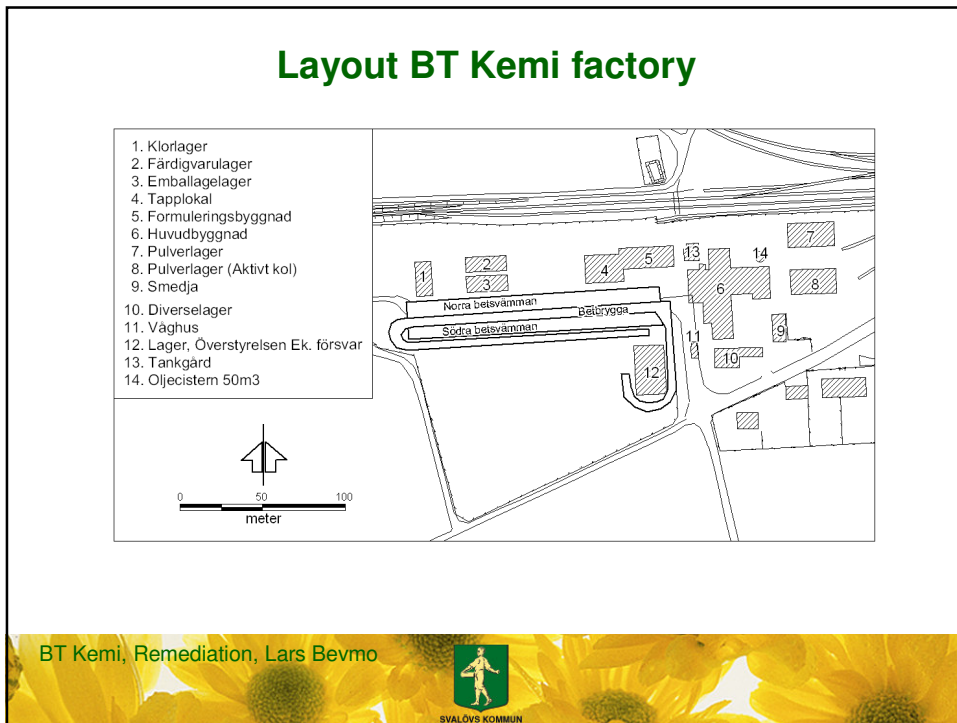
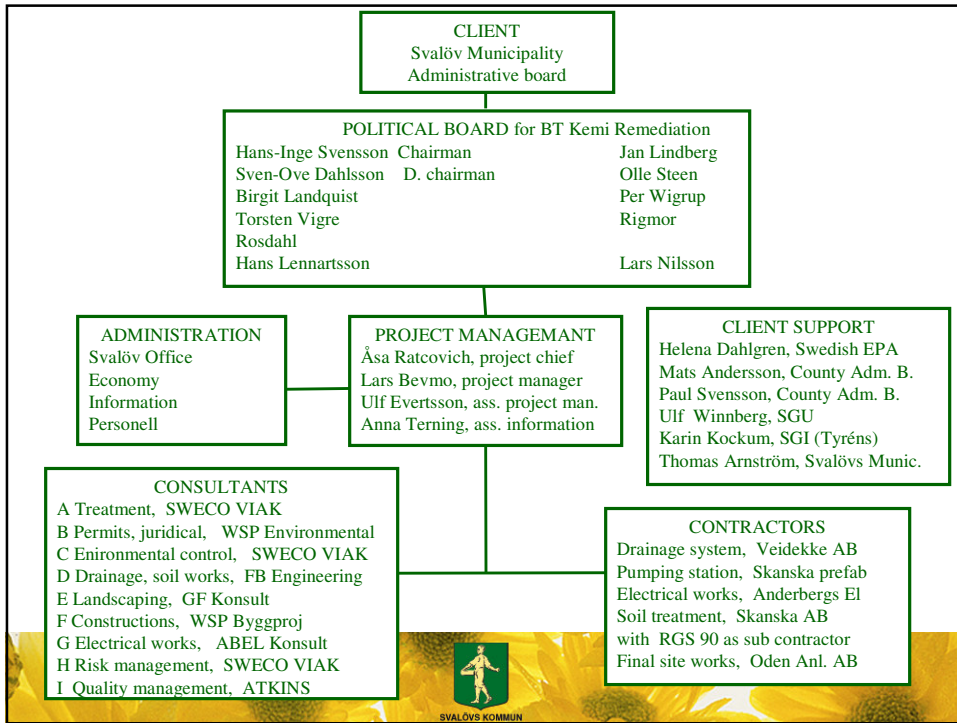


Project goals

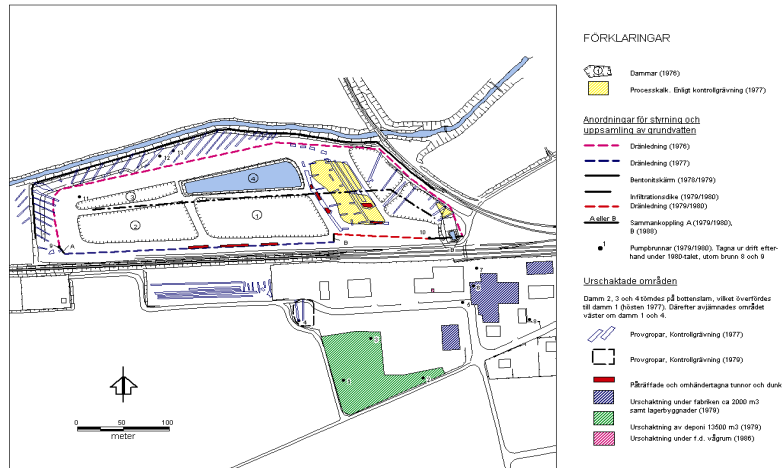
- The area should afterwards be of no danger to the surroundings and shall be efficiently used.
- The area should afterwards be used as green area and for offices and small industry.
- Pumping of drainage water to Landskrona should cease.
- The remediation should be a good example for similar future projects.
- The project should open for scientific research concerning environment, technology, health and social aspects.
- The picture of and attitude to Teckomatorp should not anymore be known as the BT Kemi area.

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Overview of executed works for protection and sanitation up to 1982

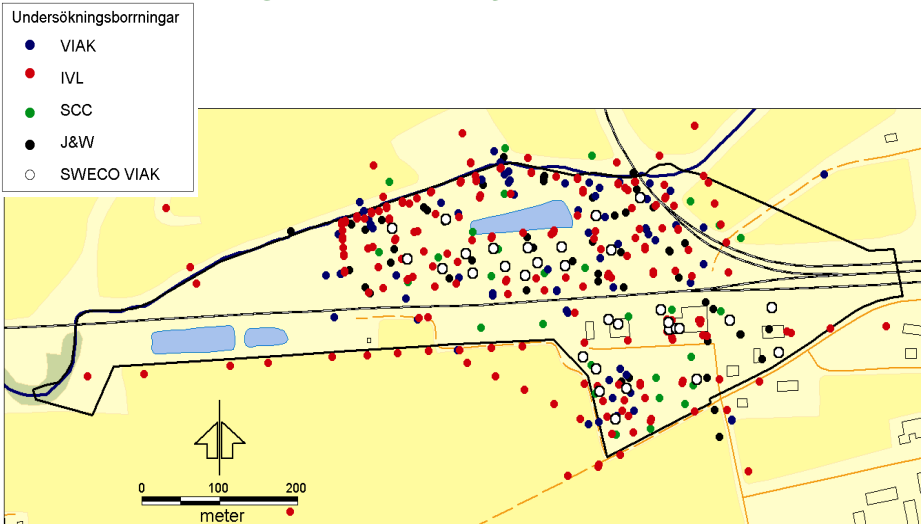


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Soundings and analyses, 1975 – 2004



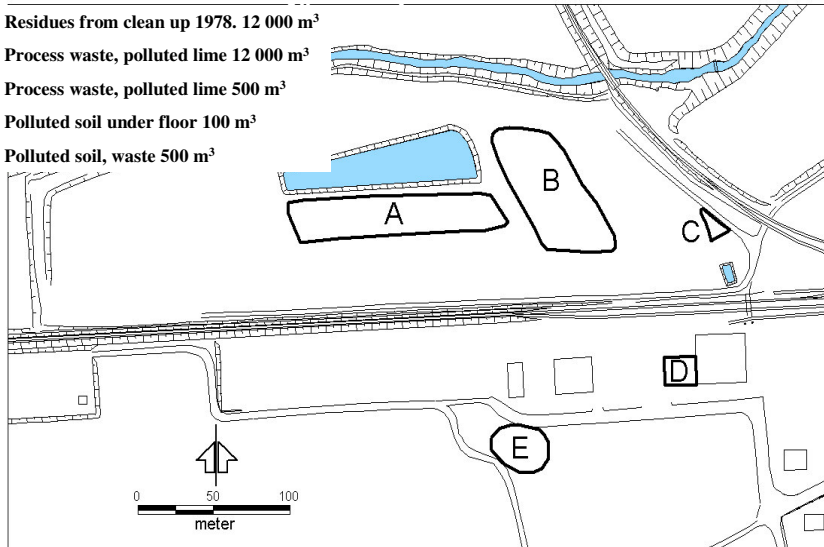
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Polluted areas

- A. Residues from clean up 1978. 12 000 m³
- B. Process waste, polluted lime 12 000 m³
- C. Process waste, polluted lime 500 m³
- D. Polluted soil under floor 100 m³
- E. Polluted soil, waste 500 m³



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Content of main pollutants

Area	Soil volume m ³	Chlorofenoles kg	Chlorocresoles kg	Phenoxiacids kg
North A	12 000	500	500	250
North B	13 000	1300	600	<100
North C	500	100	40	<10
South D	200	<20	<20	<10
South E	1 300	30	20	<5
Total	17 000	2 000	1 200	350
Other areas	120 000	300	200	50

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Main Study

Proposal for local guidance values

Ämne	Platsspecifika riktvärden mg/kg TS (dioxin ng/kg TS) Modifierat förslag						Generella Riktvärden	
	Naturmark			Industrimark			KM	MKM
	0-1 m	1-2 m	> 2 m	0-1 m	1-2 m	> 2 m		
Summa klorfenoler	0,5	5	5	5	5	5	0,5	5
Summa fenoxisyror	0,05	0,5	1	0,3	0,5	1	0,05	0,3
Summa klorkresoler	0,5	5	10	5	10	10	0,5	5
Dinoseb	0,05	0,06	0,06	0,06	0,06	0,06	0,05	0,3
Dioxin (ng/kg TS)	100	400	400	300	400	400	10	250

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Conclusions of Main Study

- There are still a lot of pesticides left in the area. However 80% of the polluted soil is concentrated in five areas and 20% is spread all over the site.
- The main risk is the environmental risk for the river. Health hazard may occur mainly caused by odour when digging in the soil.
- Without pumping of drainage water to Landskrona the river would be heavily polluted.
- Considering the risks from environmental and health point of view, it would be satisfactory if 80% of the pollution was eliminated and if the area would be covered with at least 1 metre of clean soil.
- The technology and cost for cleaning the soil can only be decided based upon turnkey tenders from experienced companies.

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Total costs estimated in main study

Total costs	Estimated MSEK	Possible variation
Treatment of soil	52	35-75
Digging up polluted soil	5	3-7
Final soil works, planting	18	14-22
Consultants	10	7-12
Project management	10	7-12
Unforeseen, 10%	10	5-15
Total project cost	105	70-130

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Proposed remediation measures

- ✓ Construction of a new drainage system in order to protect the river Braån
- ✓ Digging up polluted soil
- ✓ Treatment polluted soil
- ✓ Covering with clean soil
- ✓ Construction of a recreational area
- ✓ Investigations and clean up of the south industrial area
- ✓ Continuance of control of environmental effects
- ✓ Establish a weather station in order to make a model for dust and odour emissions from site.

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Evaluation of realistic treatment alternatives

- Thermal treatment locally
- Thermal treatment externally
- Biological treatment locally
- Landfilling
- Confining the polluted areas at site

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Proposal for overall measurable goal

Total amount of chlorocresoles, chlorofenoles and phenoxiacids shall be reduced by 2,25 ton. The total amount is estimated to be 3 ton of which 80-85 % will be found in three located areas.

Further a reasonable goal would be to get rid of at least 75 % of the total amount of pollution within BT Kemi-area.

Pumping of drainage water to Landskrona should cease as stated in the agreement with the government.

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Proposal for overall measurable goal (cont.)

Discharge of water to the river must not exceed 50 µg/l av chlorofenoles, chlorocresoles and fenoxiacids and in average be less than 25 µg/l.

Peoples attitude to Teckomatorp shall be investigated. At least 80% of respondants shall have a positive picture after the remediation.

In connection with the remediation works or within one year afterwards shall two research projects be started.

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Proposal for measurable goals in soil left

Ämne	Förslag på mätbara åtgärds mål, mg/kg TS				Hela området > 2 m
	Norra området		Södra området		
	0-1 m	1-2 m	0-1 m	1-2 m	
Summa klorfenoler	0,5	5	5	5	Reduktion av ca 80% av föroreningen. Med åtgärds mål max 100 µg/l i dräneringssystem
Summa fenoxisyror	0,05	0,5	0,3	0,5	
Summa klorkresoler	0,5	5	5	10	
Dinoseb	0,05	0,06	0,06	0,06	

Average values for certain quantity of soil shall not exceed values in table..

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Preparation Phase

- Pre-qualification of contractors for treatment of polluted soil within EU.
- Construction of a new drainage system in order to secure the status of the river.
- Turnkey Tender Documents for treatment of polluted soil.
- Detailed Design and Tender Documents for reclaiming the site to a recreational area.
- Preparation for Application of environmental permits.
- Starting up an environmental control system.
- Application to SEPA for financing of the Final Phase.

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Collecting sample of polluted soil



Waste sampling. Half masks was needed because of the odour.



Process waste, polluted lime.

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Odour testing

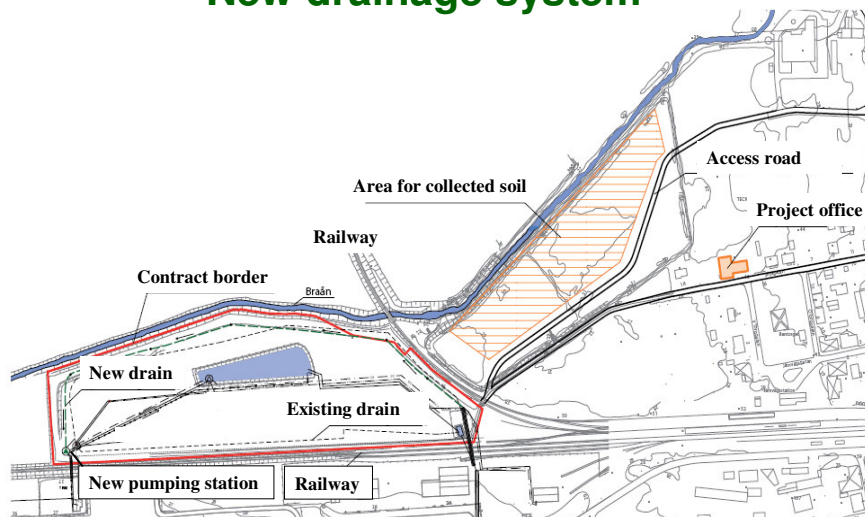


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New drainage system



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Final remediation phase

(October 2006 ? – 2008 ?)

Environmental permits, test treatment and export of polluted soil.

Finalizing of formal detail plans for use of the area.

Thermal treatment of soil at plant in Stignäs Danmark. (Contractor Skanska Sverige AB with RGS 90 as subcontractor)

Final soil works in the north area. (Contractor Oden AnläggningsAB)

Detailed investigations within the south industrial area. Necessary measures to secure that the area is clean. (The works will be performed in close cooperation with client, contractor and the industries. Remuneration will be according to unit prizes and work performed.)

Continual management of drainage system and environmental control.

Information, risk management and quality control.

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Stignäs



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Treatment levels polluted soil

Subject	Desired residue	Minimum residue	Unit (DS = dry solids)
Chlorofenoles	0,5	5	mg/kg DS
Phenoxy acids	0,05	1	mg/kg DS
Chlorocresoles	0,5	10	mg/kg DS
Dinoseb	0,05	0,06	mg/kg DS
Dioxin	100	400	ng TEQ/kg DS

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Estimated Costs Final Phase

Activity	Description	Cost MSEK
Project management	30 months	6
Information	30 months	3
Consultants works	Permits, environmental control	5
Contractor Works in south area	Investigations and clean up of area	7
Contract treatment of soil	Thermal treatment some 45 000 ton	52
Contract Final works north area	120 000 m ³ of soil. Planting 6 ha	9
Drainage system. Authority fees		3
Unforeseen		7
Total governmental funds		92
Local administration, support	Project management, economy	2
Collection and storage of soil	120 000 m ³ of soil	4
Investments in Teckomatorp	Desired projects by inhabitants	2
Extra work	Paths and park equipment	1
Unforeseen		1
Total municipality funds		10

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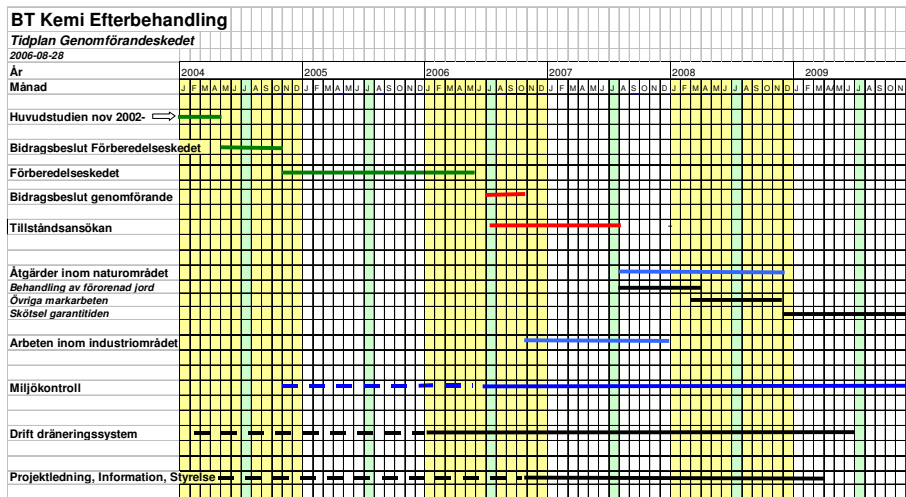
Project risk evaluation	Local thermal treatment	Ext. thermal treatment	External landfilling	Local confinement	Zero alternativ	Covering of area only
Alternative nr	1	2	3	4	5	6
Guarantee for success	4	5	5	4	1	2
Total environmental effects	5	5	3	2	1	2
Lokal environmental effects	3	4	4	3	1	2
Project time	4	5	5	4	5	4
Permits risks public acceptance	3	5	3	2	1	2
Experience of method project risk	4	4	4	3	2	2
Total	23	28	24	18	11	14
Project cost MSEK	97	87	78	90	37	58
Cost per point	4,22	3,11	3,25	5,00	3,36	4,14

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Time plan



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Conclusions

- **Psychology is an essential factor.**
- **Information to public must be open and free.**
- **Investigations should as soon as possible be directed towards possible final solutions.**
- **The involvement of authorities and politicians in the project has been very positive.**



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Total cost remediation measures

Measures	Costs in 1 000 Euro
Remediation 1976 - 1980	~ 3 000
Operation drainage system 1976-	~ 1 000
Investigations 1980-2001	~ 1 000
Main Study 2002-2004	600
Preparation Phase 2005-2006	1 500
Final Phase 2007-2008	9 000
Control and unforeseen	3 400
Total cost for the society	20 000

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