106 PDR
LPDR - WM-16 (2)

WASTE MANAGEMENT CONTROL CENTER

86 DEC 29 A10:54

Battelle
Pacific Northwest Laboratories
P.O. Box 999
Richland, Washington U.S.A. 99352
Telephone (509)
Telex 15-2874

December 22, 1986

WM Record File 106
WM Project 16
Docket No.
PDR ✓
LPDR ✓
Distribution:
Galson
Johnson
Linehan
(Return to WM, 623 SS)

Mr. D. Galson
Mailstop 623 SS
U. S. Nuclear Regulatory Commission
Office of Nuclear Materials, Safety
and Safeguards
Washington, DC 20555

Dear Mr. Galson:

Enclosed are copies of the two documents on Gorleben in response to your telephone call. If there is anything else we may help you with please feel free to call.

Sincerely,

L. T. Lakey

L. T. Lakey, Manager
International Support

LTL/aj

Enclosures: 1) Handout, DBE summary on the status of the Gorleben facility
2) Foldout, Gorleben photographs

8702130188 861222
PDR WASTE
WM-16 PDR

1519

Deutsche Gesellschaft
zum Bau und Betrieb
von Endlagern für
Abfallstoffe mbH (DBE)

DBE

Presentation

GORLEBEN

DBE Exploratory Investigations of the Gorleben Salt Dome

Status: 01.10.1986

Under the provision of the German Nuclear Legislation (Atomgesetz) the Federal Government is reponsible for the disposal of radioactive waste.

The PTB (Physikalisch- Technische Bundesanstalt, Federal Office of Technology) is entrustet with the management of the disposal on behalf of the government. It thus shows responsible for the planing, construction and operation of facilities for safeguardin as well as for final disposal of spent radioactive fuel or reprocessing waste (Paragraph 23 I 2).

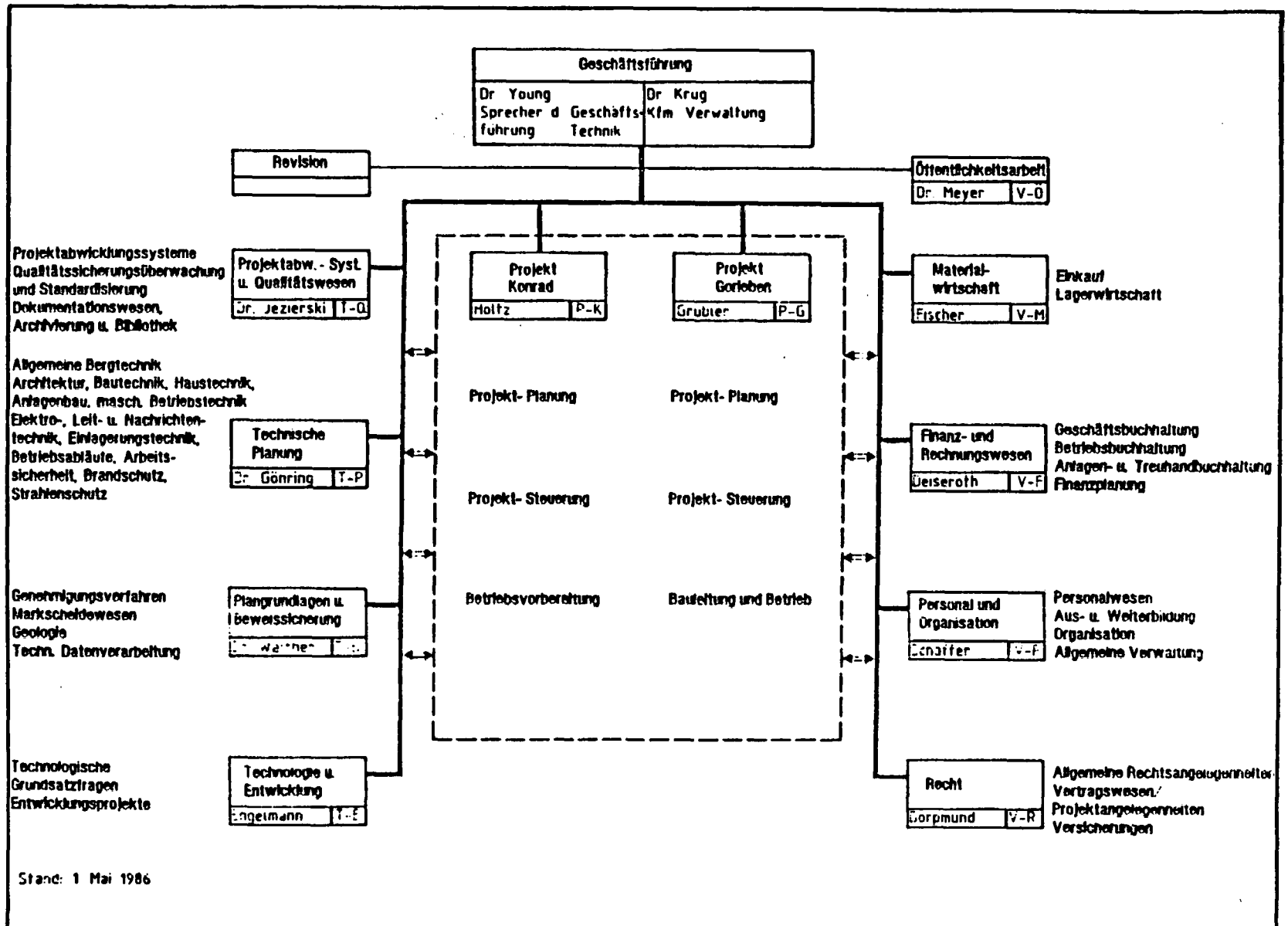
The PTB has involved a "Third party", namely DBE (Deutsche Gesellschaft zum Bau und Betrieb von Endlagern für Abfalistoffe mbH, German Corporation for construction and operation of repositories for waste, Inc.) under an operating agreement for the implementation of the above task.

September 11, 1979
DBE is incorporated. Parent companies are three government controlled corporations.

- Industrieverwaltungsgesellschaft (IVG) mbH
- Saarberg Interplan GmbH and
- Salzgitter Maschinen und Anlagen AG

July 1984
As a fourth group DWK (Deutsche Gesellschaft für Wiederaufarbeitung von Kernbrennstoffen mbH, German Reprocessing Company) joins the consortium. The participation of DWK gives DBE direct access to data regarding the nuclear waste materials of the utilities.

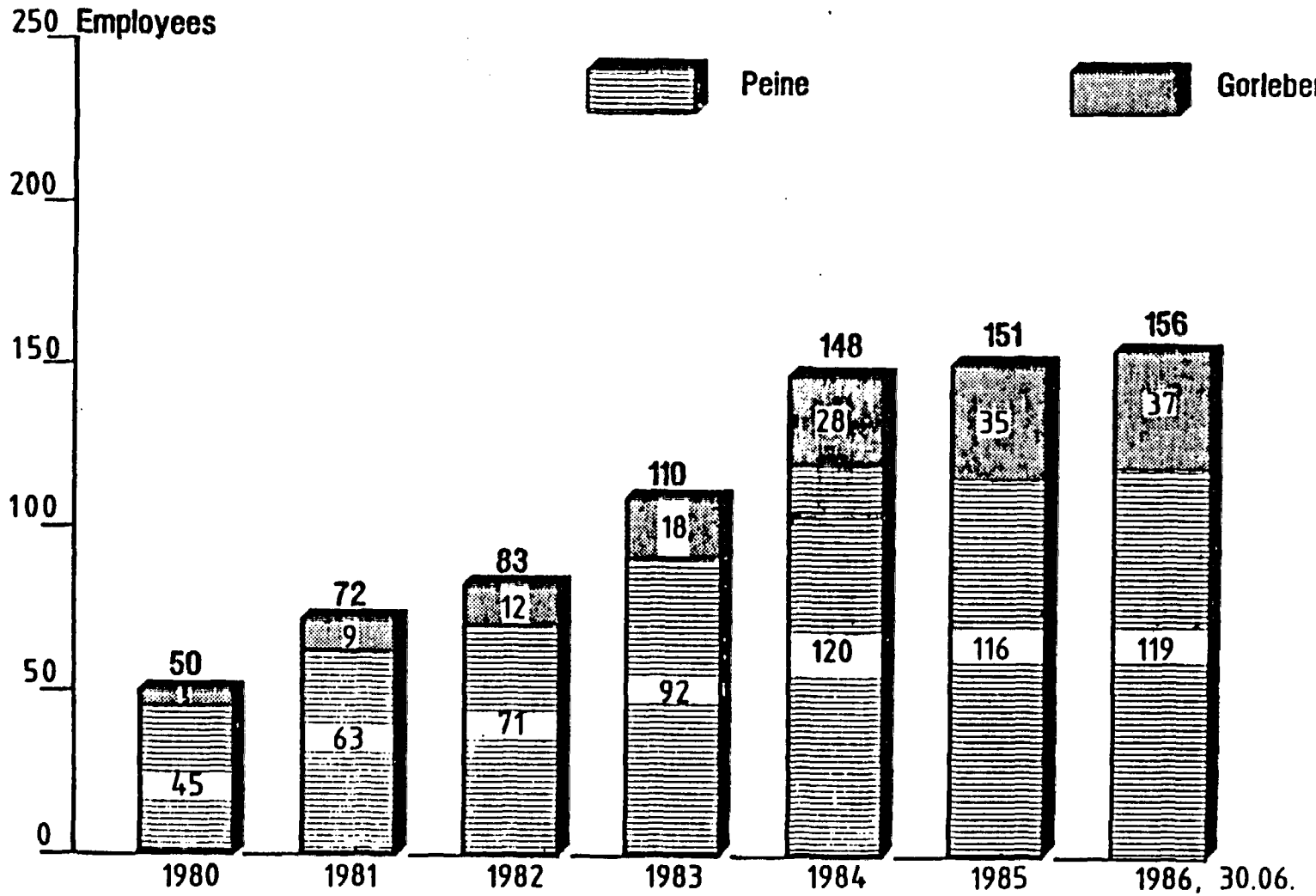
	DBE Incorporation and Parents	1985 / P - G



Organogram of D B E

P - G

1985



Development of DBE - Personnel

P - G
1986

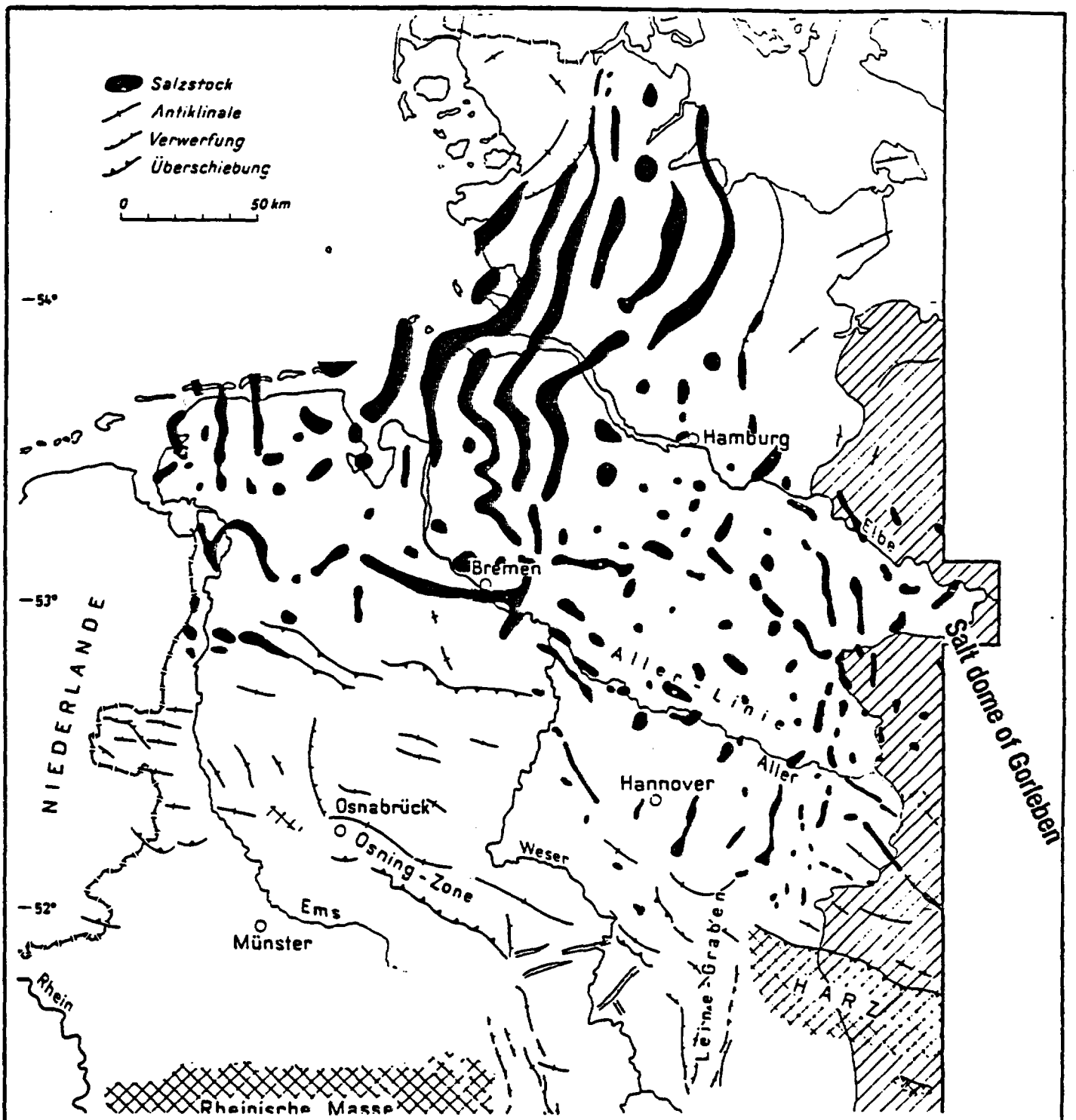
- Conceptual design of repositories
- site investigations
- construction of surface and underground facilities for repositories
- thermomechanical and geomechanical repository lay out
- development of emplacement techniques
- construction of emplacement machinery
- risk assessments
- safety analysis for the operation phase and for the post operationsphase (long term calculations)
- Design and construction of technical barriers (i. e. dam constructions, plugs and sealings for boreholes and tunnels, backfilling techniques)

	Main Objectives of DBE	T - E / 1986

Deutsche Gesellschaft
zum Bau und Betrieb
von Endlagern für
Abfallstoffe mbH (DBE)

2 GORLEBEN

DBE Exploratory Investigations of the Gorleben Salt Dome



Salt Structures in Northern Germany

1985

P - G

The salt dome Gorleben has been under investigation for its potential suitability as a repository for radioactive waste since 1979.

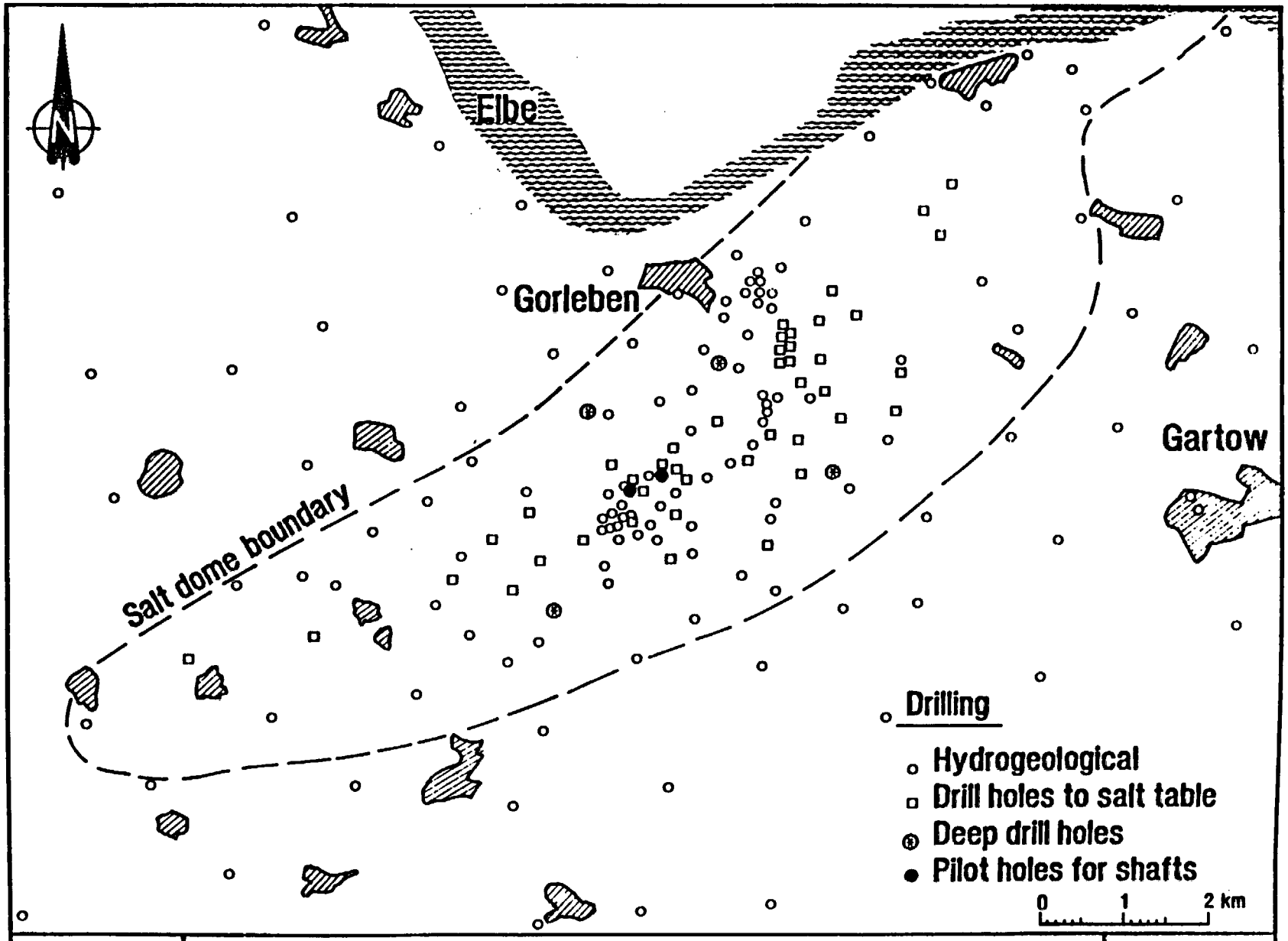
A surface investigative program comprised:

- hydrogeological base line studies
- geophysical investigations
- a deep drilling program

In the course of these surveys the following work was undertaken:

- 321 ground water test wells
- 17 surface water monitor stations
- 44 drill holes to salt table
- 4 deep drill holes
- 2 pilot holes for shafts
- 1 stratigraphic drill hole (Tertiary)
- 156 km seismic profile lines

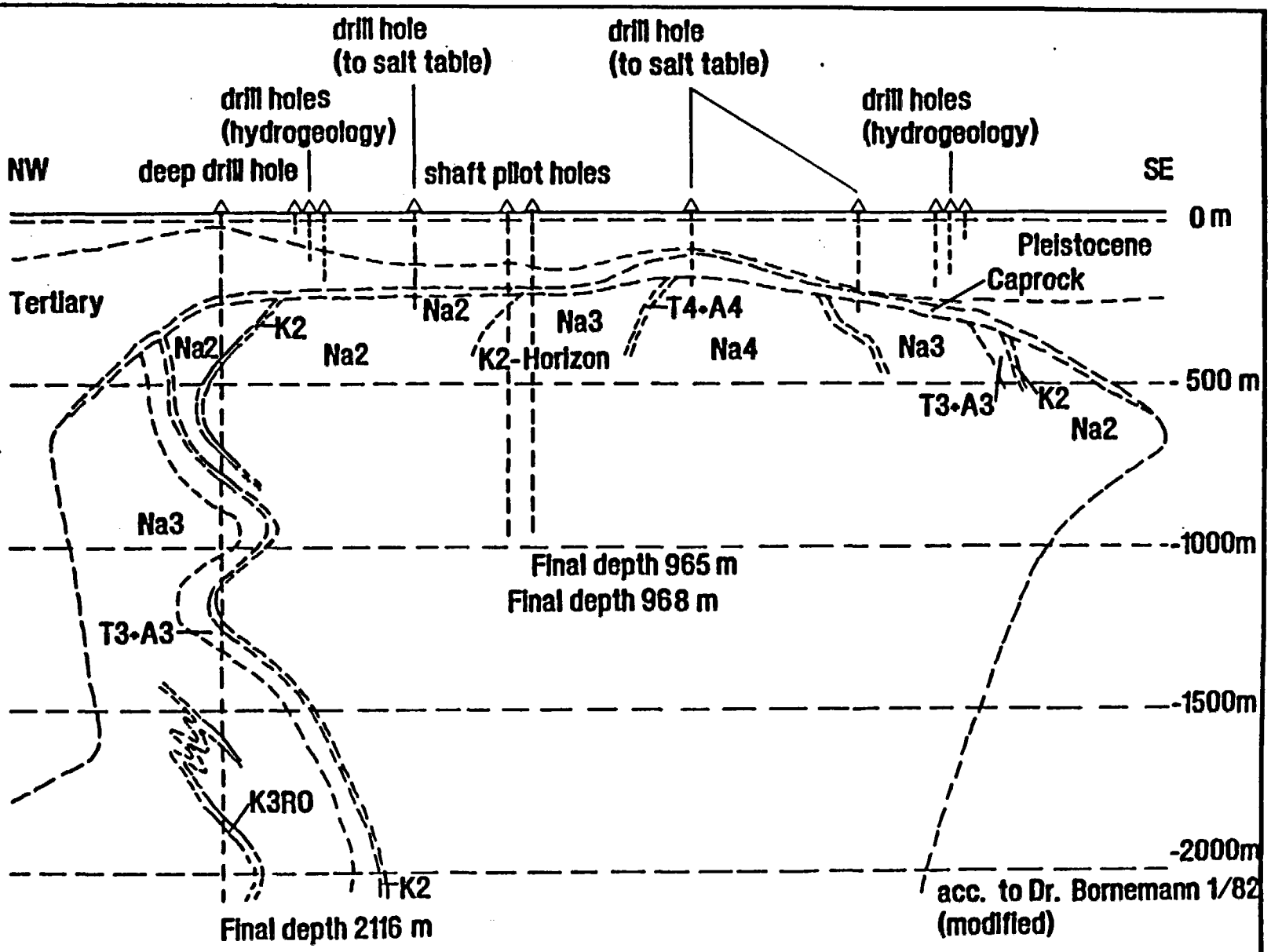
	Site Investigation Type and Extent of Surveys	1985 P - G



Areal Extent of Surface Investigations

P - G

1986



Cross Section of Salt Structure Gorleben

P - G

1986

Tätigkeit vor Ort — Planung — n = Ende des n'ten Monats

Jahr	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Erläuterungen Nr.	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99

	Nr.
Übertägige Standorterkundung	1
2 Schachtvorbohrungen (geologische INFO-Veranstaltung)	2
Rahmenbetriebsplan	3
Vorbereitung Schachtabteufen	4
Eventuelle weitere Standortsuche für Schächte falls Schachtvorbohrungen erfolglos	
Schachtabteufen	
1. Schacht	
Infrastruktur Schachtabteufen	5
Einrichten des Abteufplatzes	6
Abteufen der Gefrierbohrlöcher	7
Gefrieren	8
Abteufen	9
Umrüsten, Maschinenmontage, Vorbohren	10
Schachtabteufen	
2. Schacht	11
Infrastruktur Schachtabteufen	5
Einrichtung des Abteufplatzes	6
Abteufen der Gefrierbohrlöcher	7
Gefrieren	8
Abteufen	9
Maschinenmontage, Vorbohren	10
Untertägige Erkundung Auffahren der Untersuchungsstrecken u. Grubennebenräume u. Erkundungsbohrungen	12
Endlagerbergwerk Detailplanung endgültige Genehmigung ◆ (Planfeststellung) Errichtung	
HAW-Glasblocklager (Sicherstellungslager für Cogema-Abfälle)	13

1. Ergebnisse Vorbohrungen

was-wieviel-wohin? Störfälle Salzstock spez.

Beschluß der Regierungschefs von Bund und Ländern zur Entsorgung der Kernkraftwerke, 28.9.79

Entscheidung über andere Entsorgungstechniken (4)

Entscheidungen über den Salzstock Gorleben (6)

1. Standort HAW-Glasblocklager
2. Deckgebirge
3. Störfälle, allgemein
4. Erste quant. Aussagen über Endlagermöglichkeiten

Ziffer

General Schedule

PTB/DBE

1.7.1981

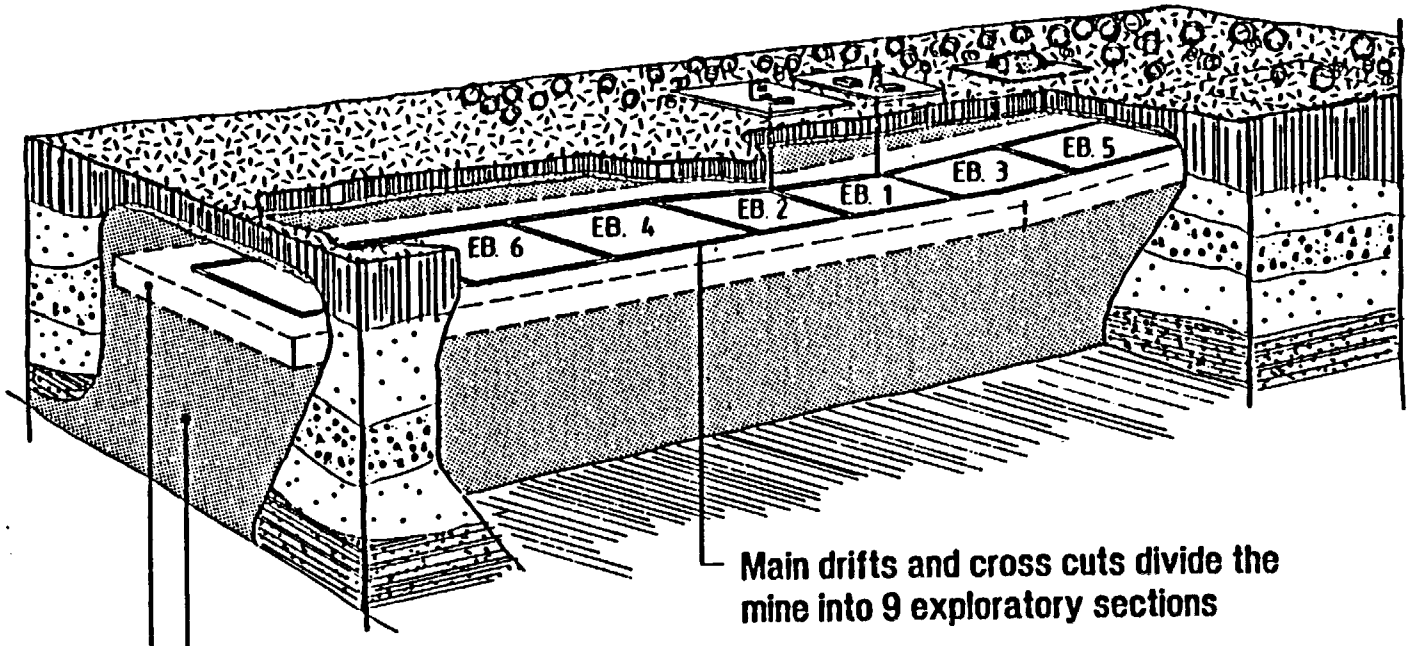
Underground Exploration

1. Objectives

The underground exploratory program is aimed at obtaining data for confirmation is required on the geometry and internal structure of the horizontal plain at the repository level of the salt dome for its total length as well as across the dome up to the lateral safety pillars.
In addition data are required for parts of the area to a vertical depth of 300 m below this level.

2. Work Schedule

Two shafts will be sunk and connected by a drift. Two parallel drifts, approximately one kilometer apart, following the long axis of the salt dome will be mined and cross- cuts will be driven. Exploratory core drilling will be driven. Exploratory core drilling will be performed to the flanks, into the central parts and to depth.
Drilling and geological interpretative work will be enhanced by varioun geophysical surveys, e. g. HF measurments.



Main drifts and cross cuts divide the mine into 9 exploratory sections

Salt dome

Extent of salt dome to be investigated by drifting cross-cutting and drilling

Underground Reconnaissance Gorleben

1985

P - G

Parameters for Selection of Shaft Locations

1. Geological and rock mechanical parameters

- evaluation of various Zechstein series as the host rock for optimal shaft location from the view-point of geology and mining geology

- evaluation of drill core for rock mechanical properties to achieve maximum shaft stability

Resulat: Selection of specific Zechstein series and salt type for shaft location

2. Underground and mine specific parameters

- effects of and thru the underground workings

- operational considerations for shaft vicinity and infra- structure area

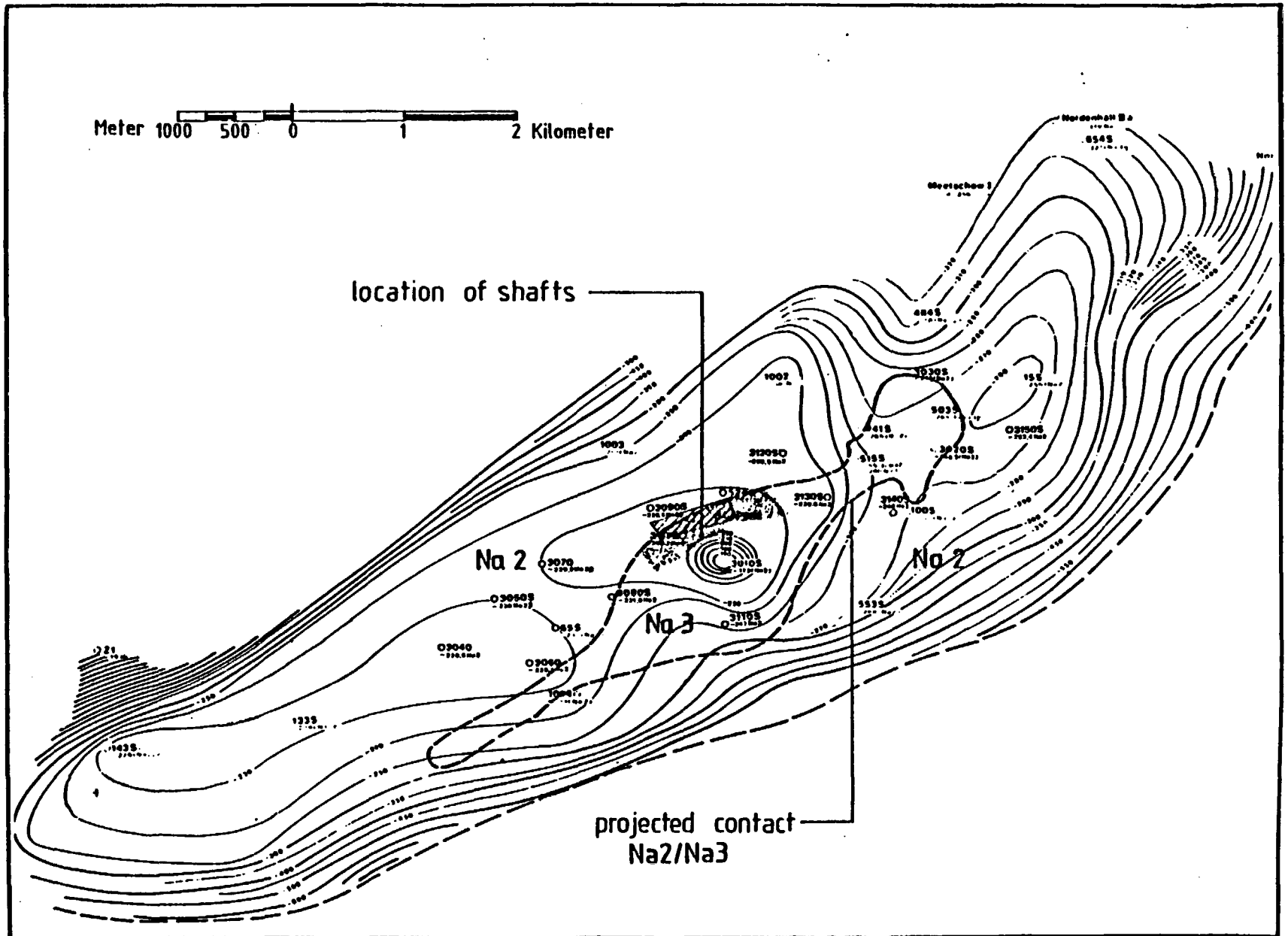
Result: Operational requirements on shaft location

3. Surface factors and parameters of overlying rock formations

- topography, environmentally sensitive areas, habitation, land use, land ownership

- depth to salt, stratigraphy, composition of overlying rocks

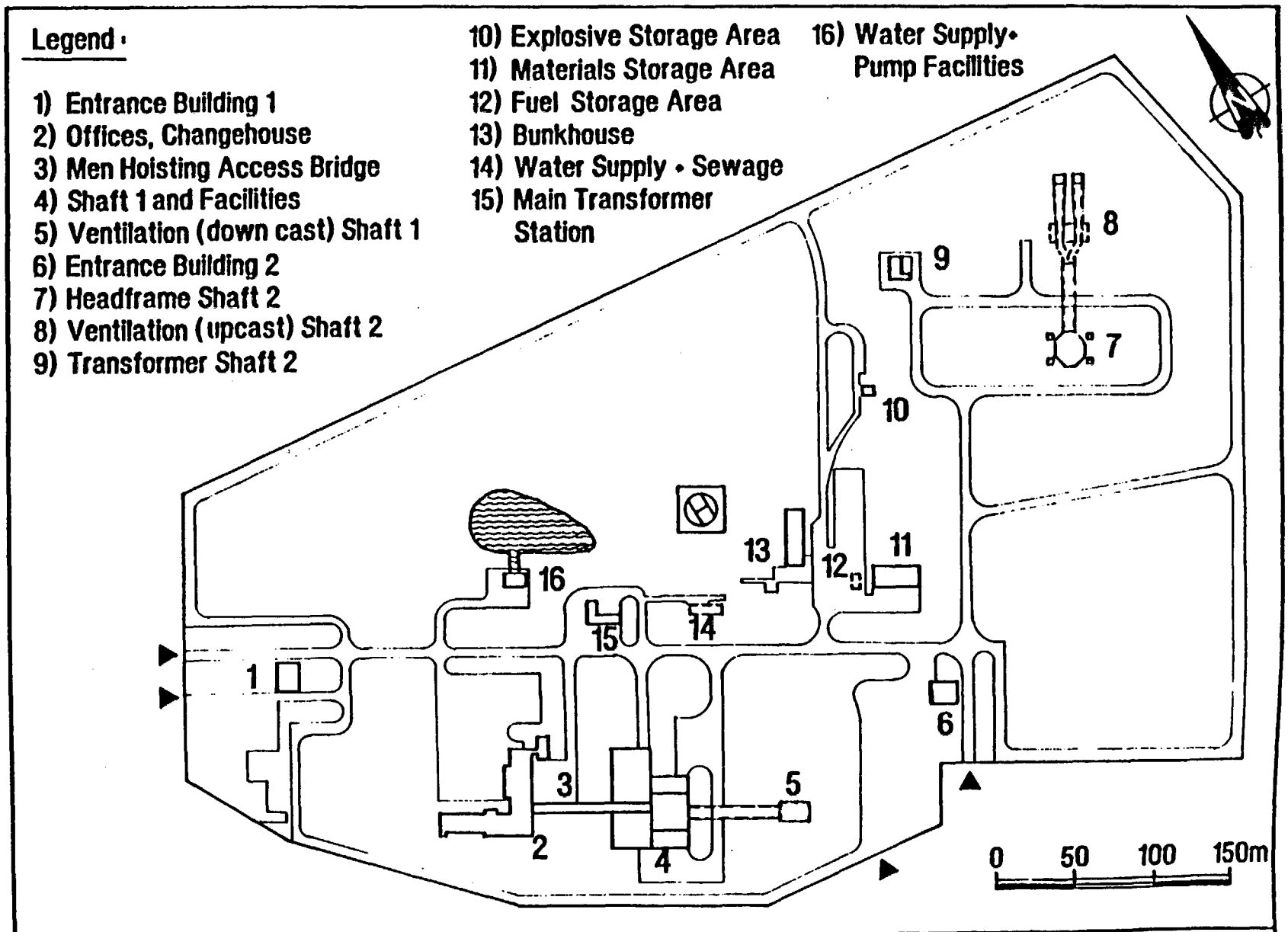
Result: General requirements for shaft location



Shaft Locations - Map

1985

P - G



Surface Facilities - Gorleben

P - G
1986

1. Site Preparation

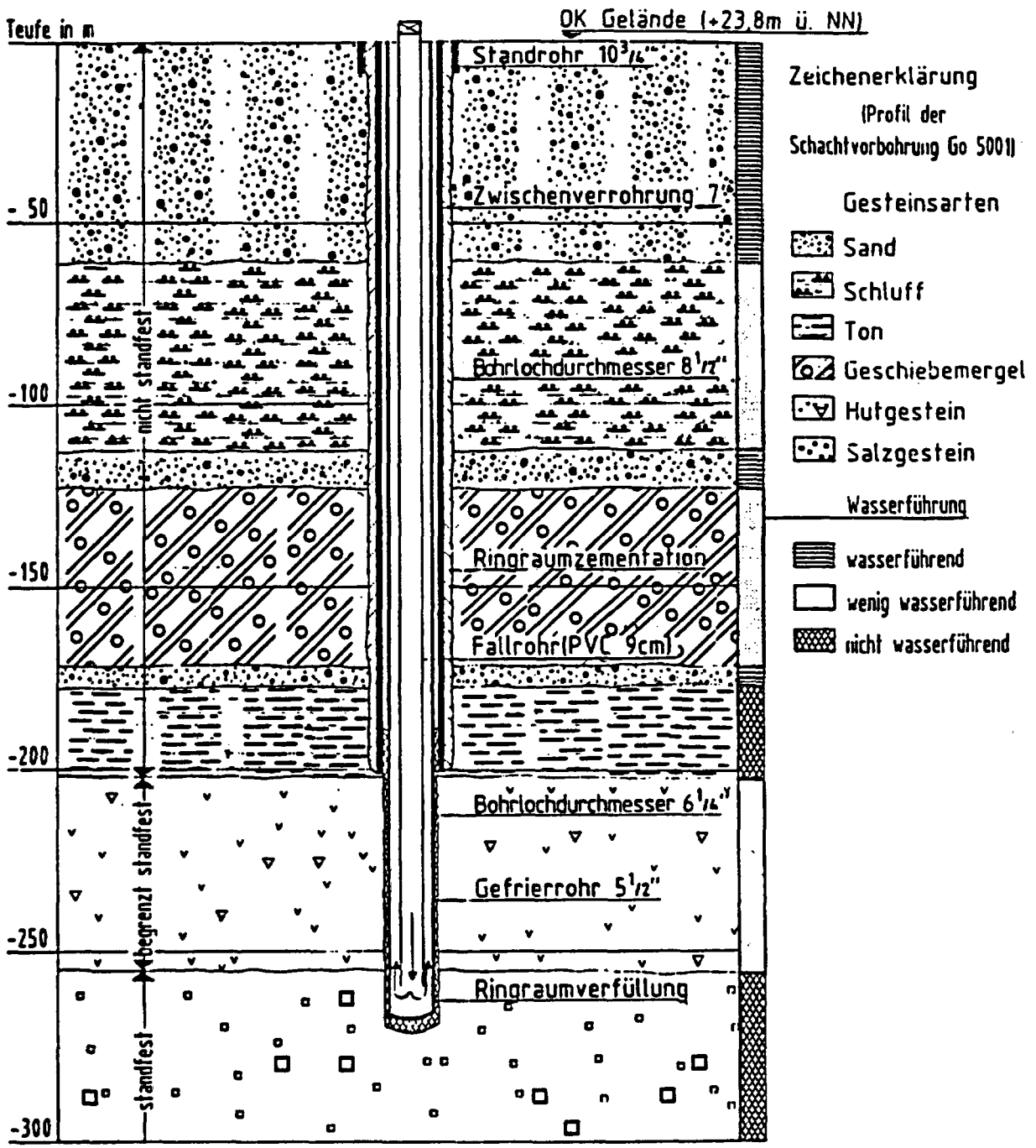
Preparation of shaft site, construction of service buildings and support facilities, access and road construction.

2. Development of Frost Wall

Drilling and preparation of freeze and temperature control holes, set- up and hook- up of refrigeration plant, freezing process.

3. Shaft Sinking

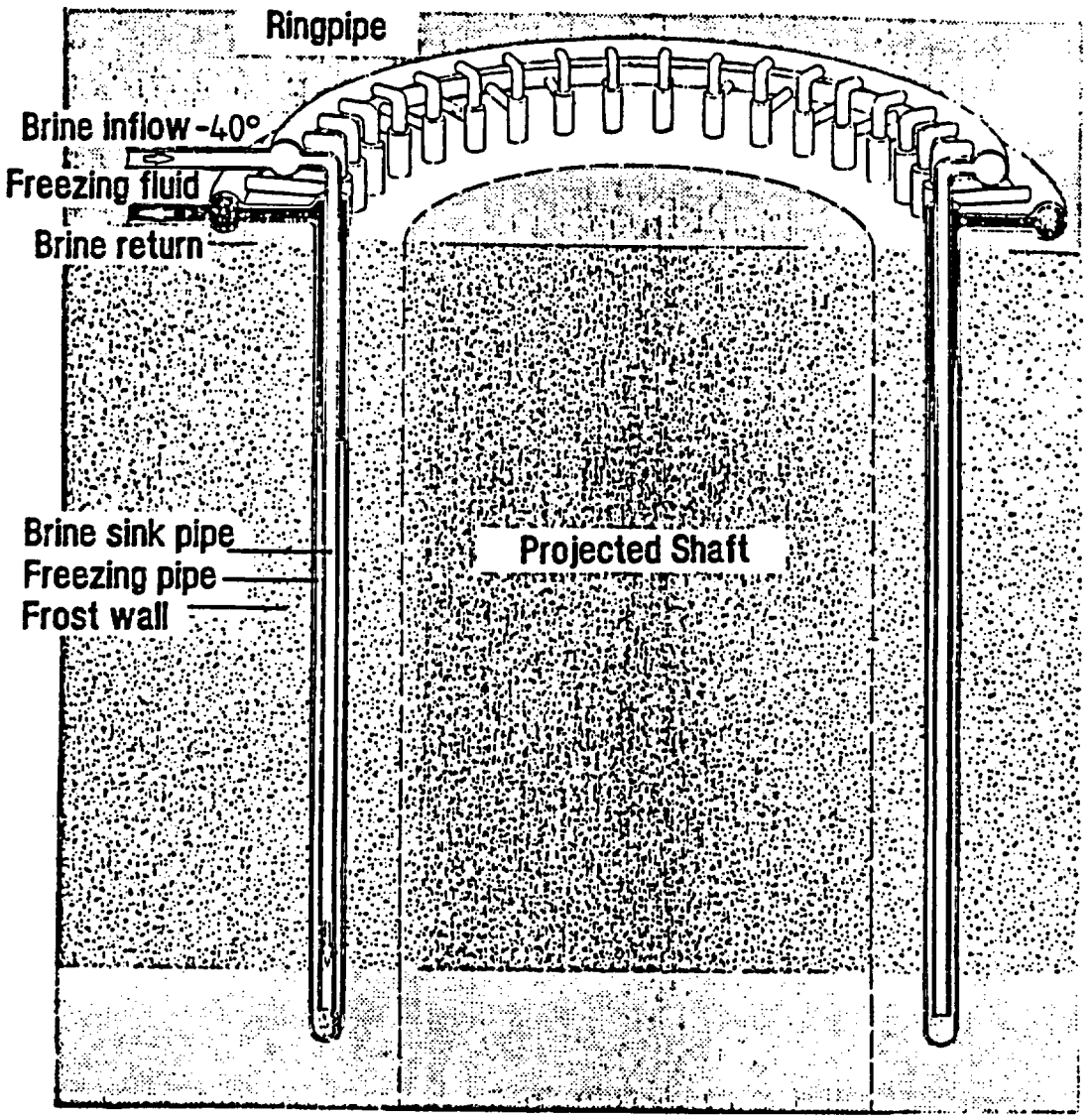
Set up, assembling of sinking hoist, winches and auxiliary equipment, shaft sinking in protective frost body, contemporaneous preliminary lining of shaft walls, after penetration of frost body construction of final concrete and steel lining, shaft sinking in salt formation and gradual thawing of frost wall, preparation of bottom shaft station, sinking in salt formation and gradual thawing of frost wall, preparation of bottom shaft station, sinking to final depth, test of facility and commissioning.



Freeze hole and geological profile

1985

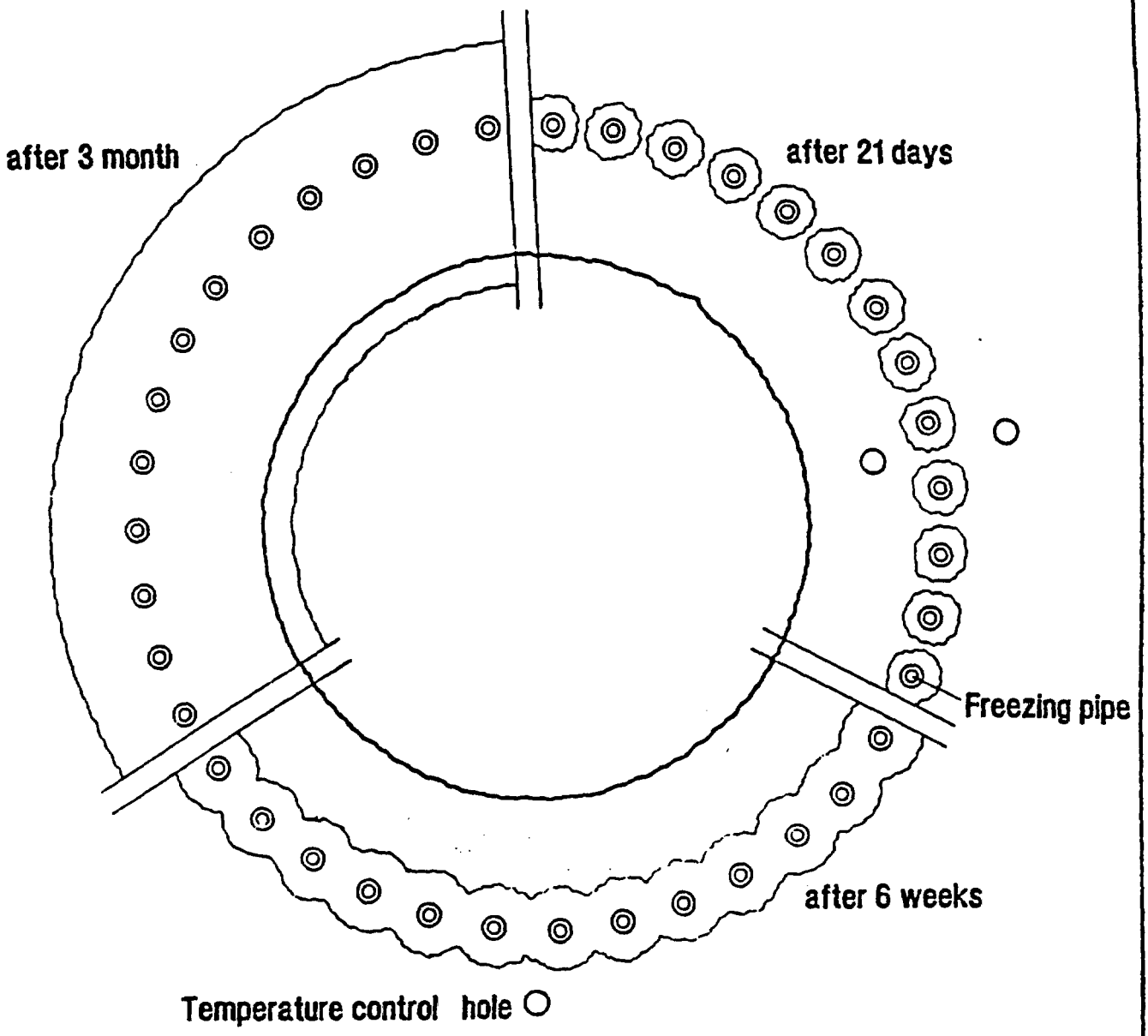
P - G



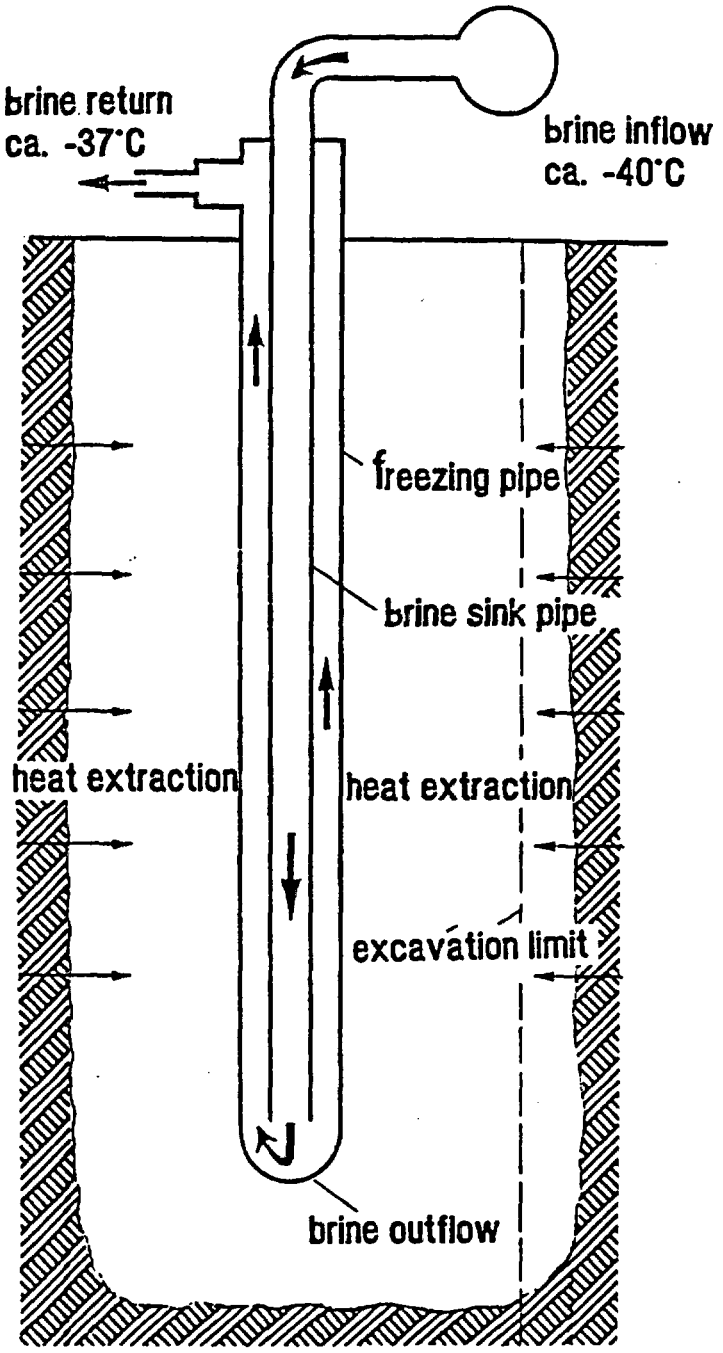
Freezing Process

1985

P - G

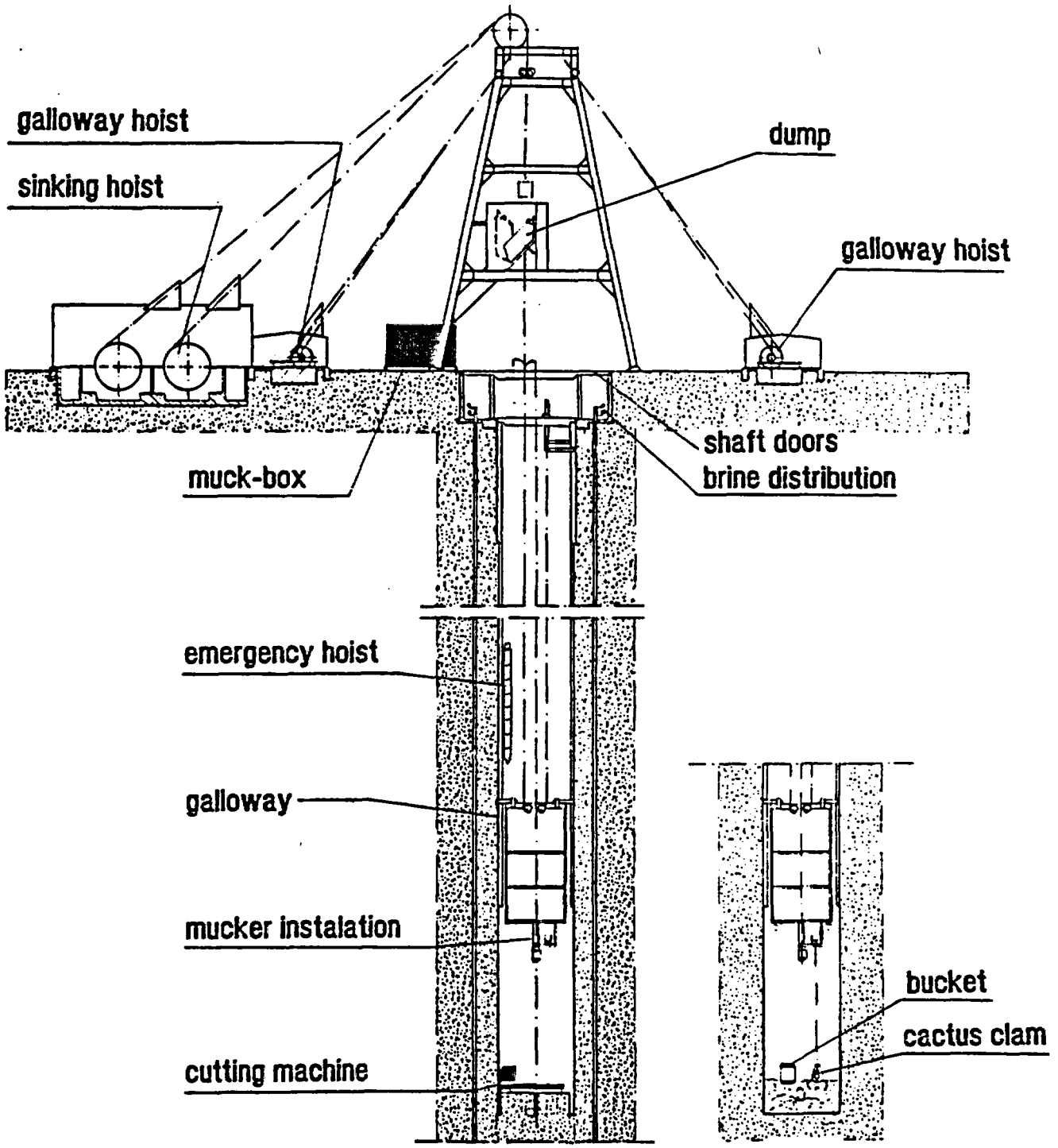


	Build - up of Frost Wall	1985 P - G



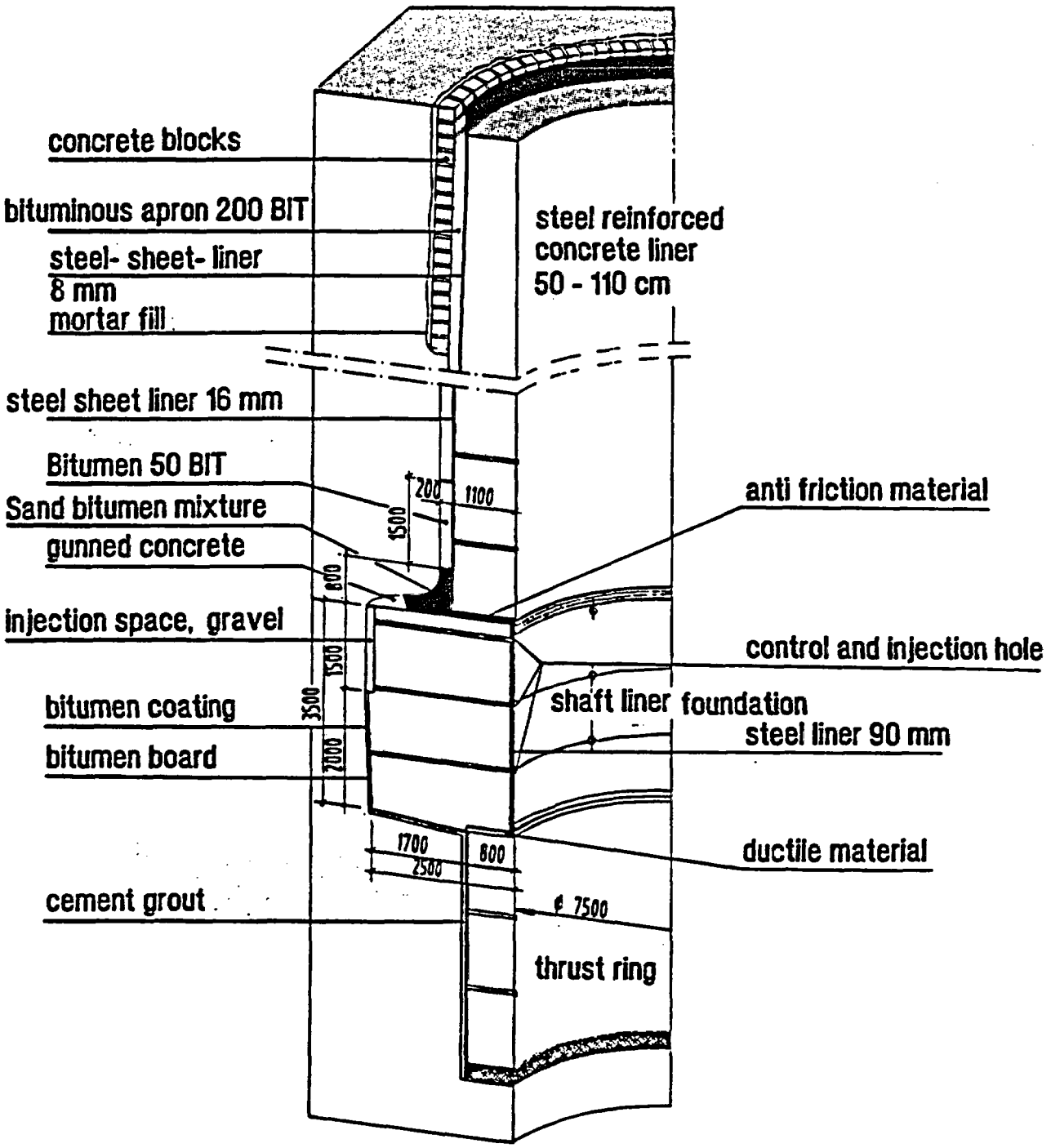
System of freezing fluid circulation

1985
P - G



Shaft sinking equipment

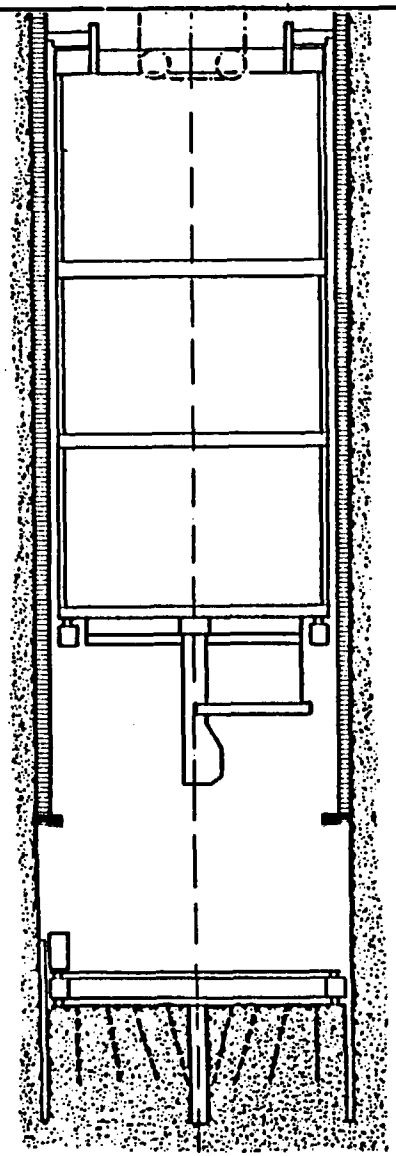
1985
P - G



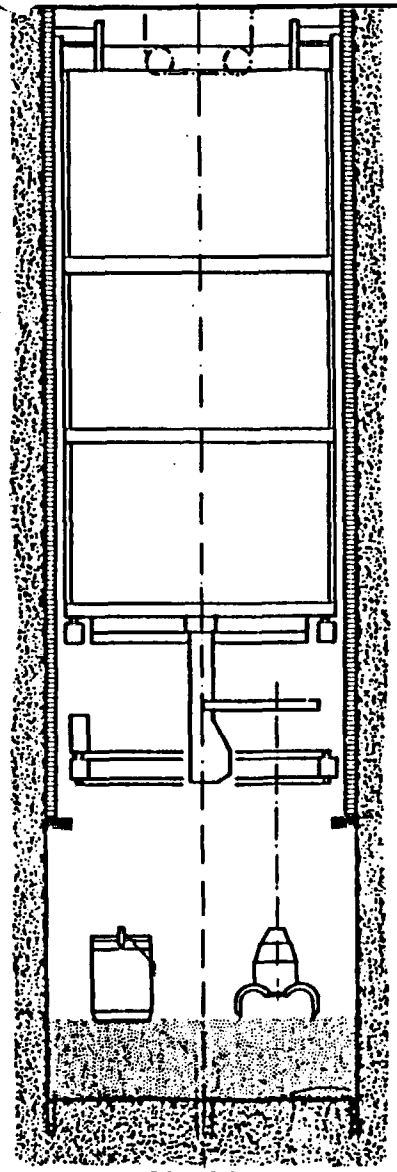
Final lining of freeze shaft

1985

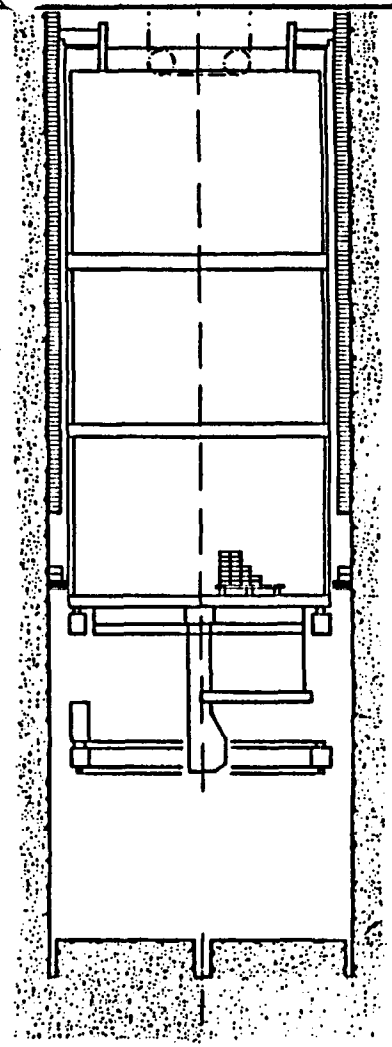
P - G



Cutting and drilling



Mucking

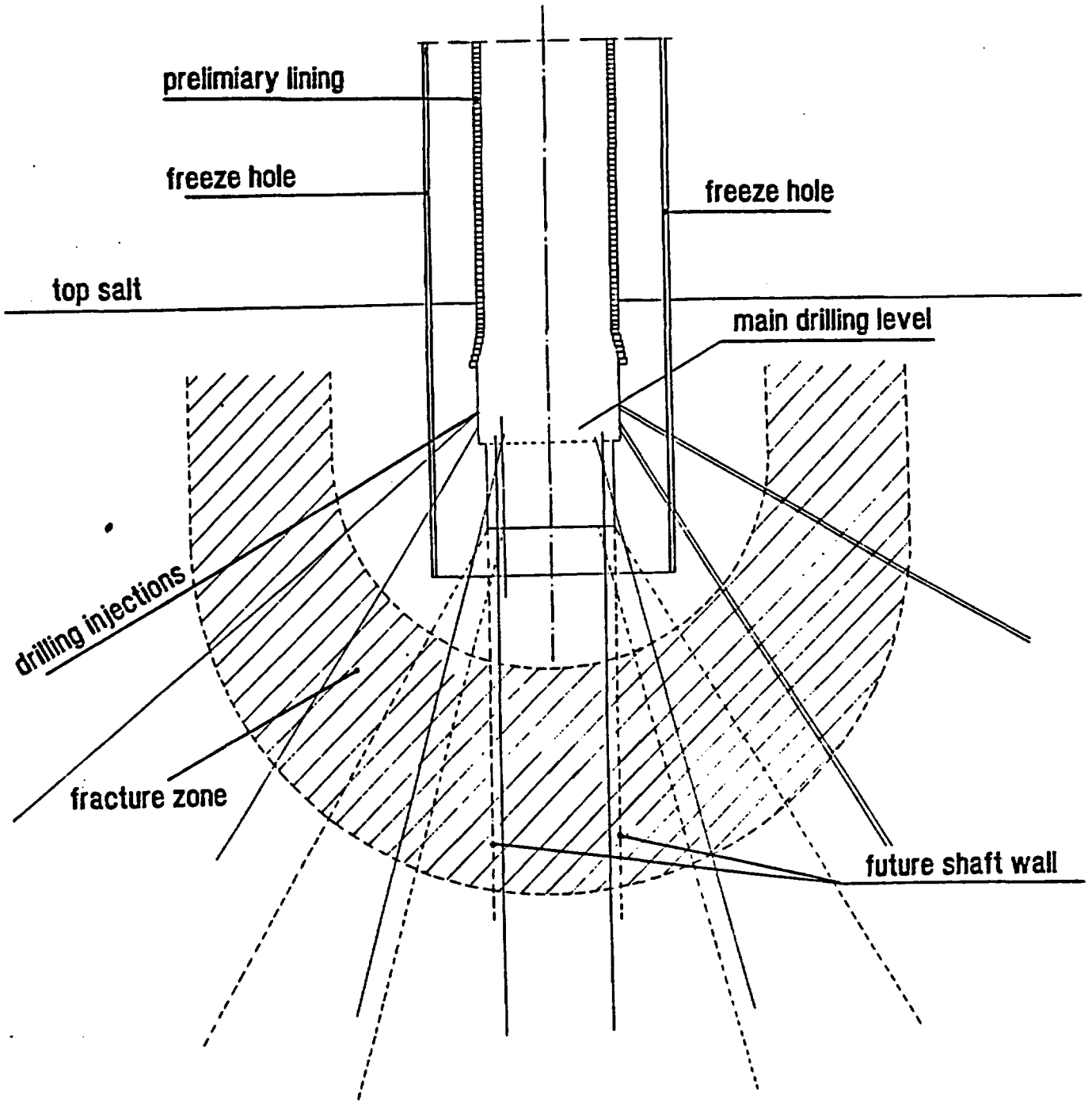


Preliminary Lining

Shaft Sinking Procedure

P - G

1985



Freeze shaft in rock salt

(from: Kali und Steinsalz)

1985

P - G

Excavation and Construction of Facilities in the Infrastructure Area

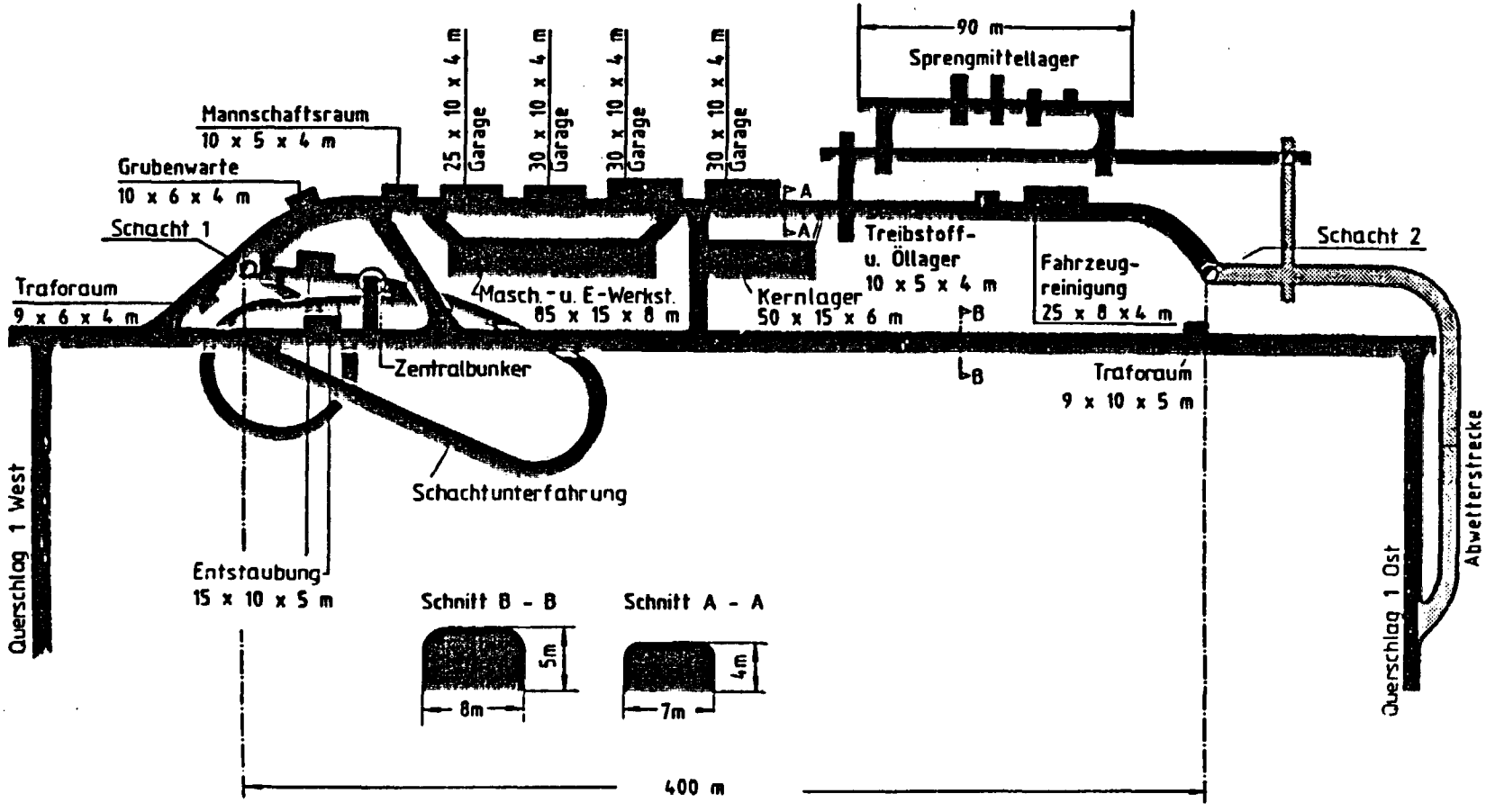
Following the shaft sinking and the interconnecting of the shafts, the surrounding areas of the salt dome will be investigated by horizontal core drilling.

The rooms and drifts for operation and supplies will be excavated by standard drill and blasting techniques.

Salt mined in this process will be transported to the surface for disposal using the facilities of shaft 2.

Contemporaneously shaft 1 will be prepared for men, material and salt hoisting.

Following the excavation of operational rooms and supply storage areas, the facilities will be equipped and activated.



Infrastructure Areaplan

1985

P - G

Underground Exploration

1. Objectives

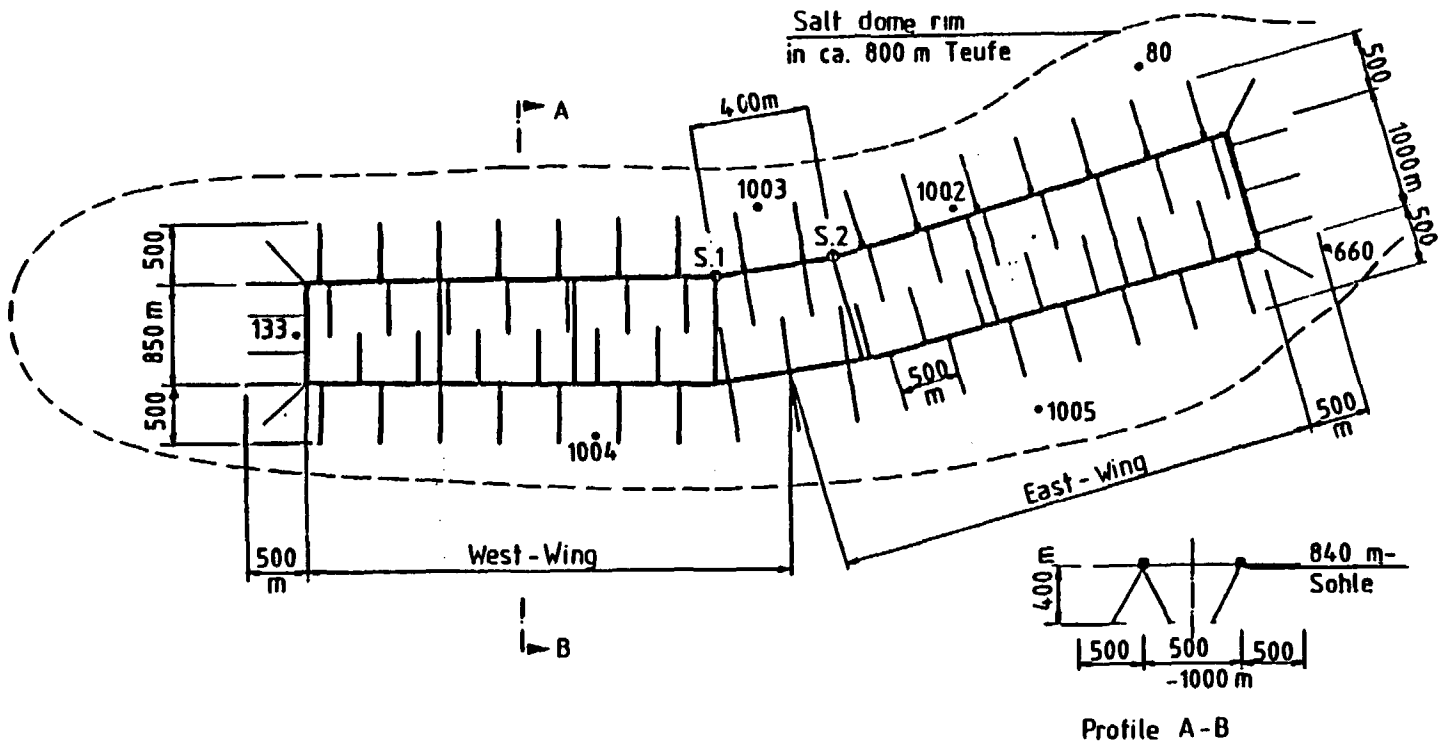
By means of drifting, core drilling and geophysical surveys an area comprising 18 km^2 will be investigated in detail.
Along strike of the salt dome 9,4 km will be evaluated, with of the area will be 1,85 km in the western and 2,0 km in the eastern part of the salt structure.

2. Work Schedule

The east and west wing will be subdivided into specific exploration areas. Work will proceed from the infra- structure area in the vicinity of the shafts to the out- lying areas.

Work will entail:

- exploratory drilling for selection of length and of direction of drifts
- drifting (main drifts and cross- cuts)
- exploratory drilling of central fields, to the flanks and to depth



Profile A-B

Exploratory Drilling - Drifts

1985

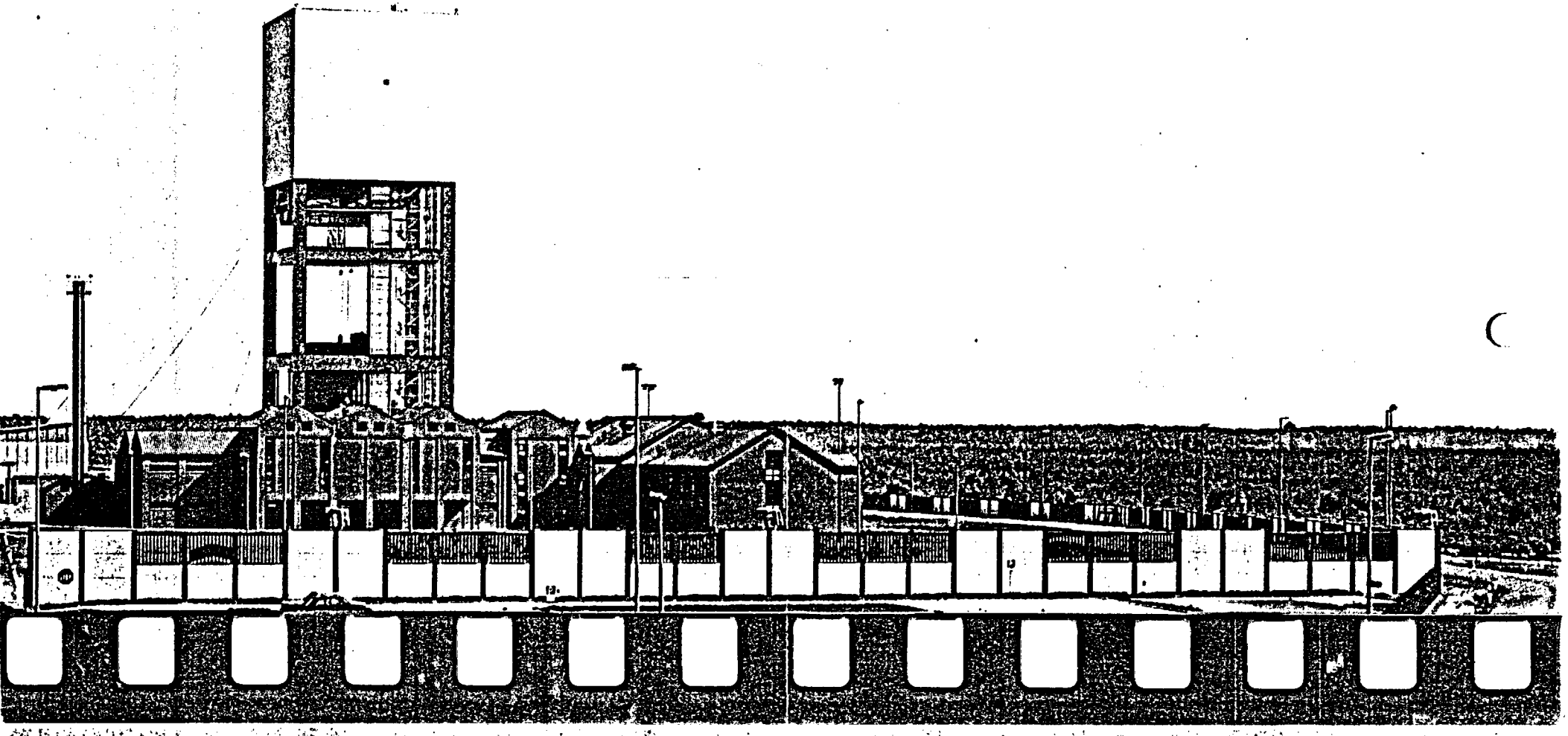
P - G

GE 11. Gorleben

BERGWERK ZUR ERKUNDUNG DES SALZSTOCKES GORLEBEN

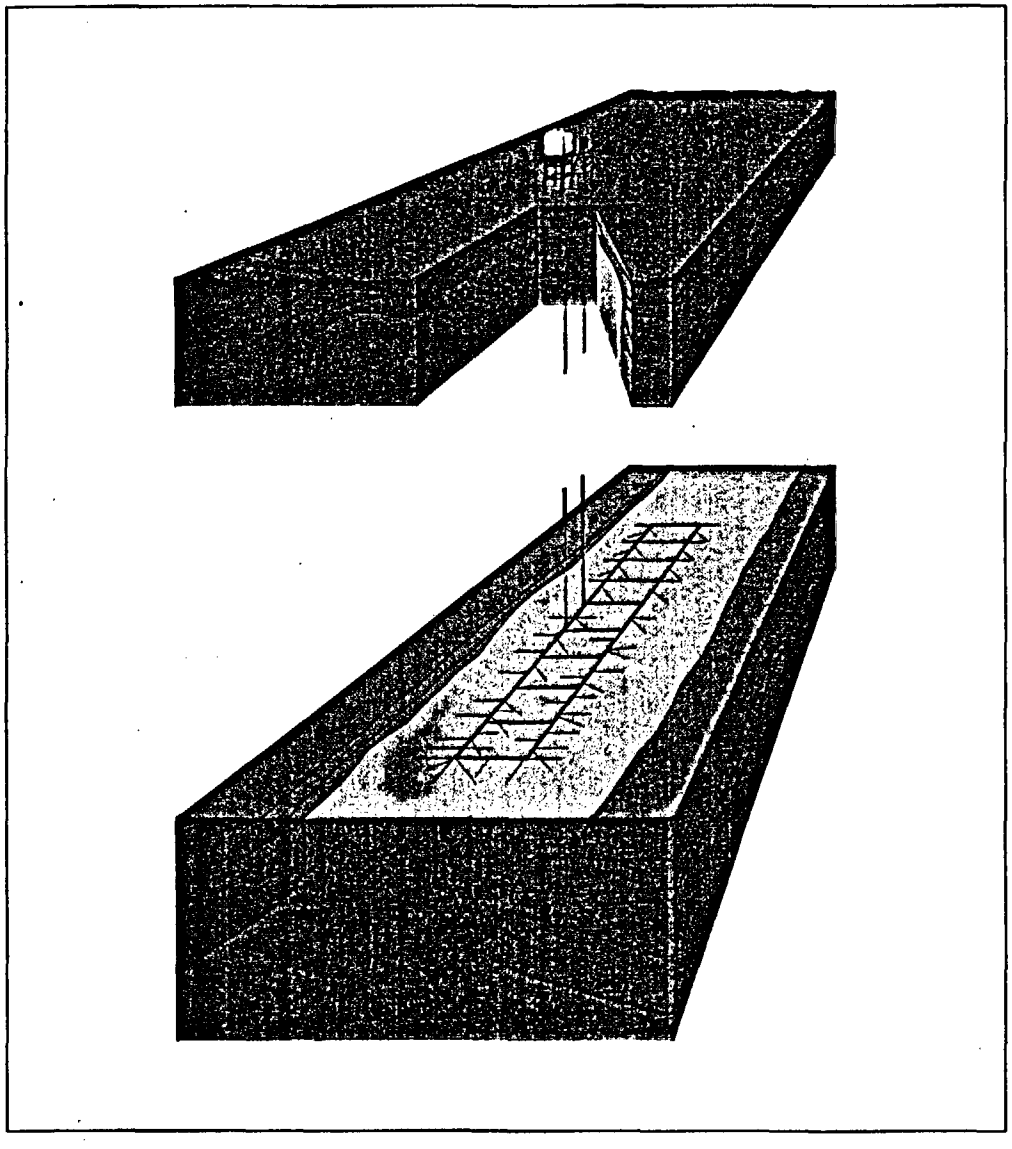
Physikalisch-Technische
Bundesanstalt (PTB)
Bundesallee 100
D-3300 Braunschweig
Telefon: 05 31 / 59 20
Telex: 9-52 822 ptb d
Telegramme: bundesphysik braunschweig

PTB



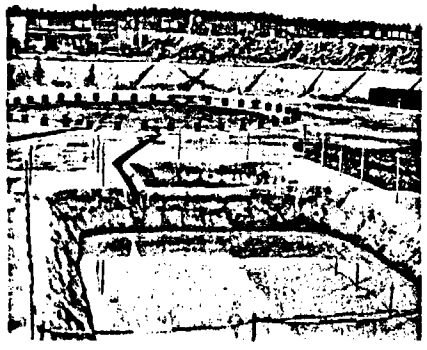
Die untertägige Erkundung des Salzstockes Gorleben

wurde von der Bundesregierung am 13.07.1983 beschlossen und umfaßt das Abteufen von zwei Schächten, das Auffahren von Erkundungsstrecken und das Herstellen von Kernbohrungen im Salzstock in der Teufe von ca. 840 m.



Zeitablauf nach Rahmenterminplan 1983 – 1992

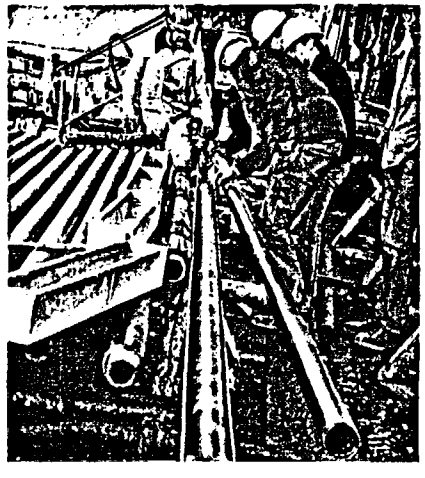
Diese Arbeiten wurden bisher durchgeführt, . . .



An dem Schachtstandort wurde eine Bohrplattform aus Beton gegossen, auf der

die Bohrmaschinen aufgestellt wurden, die die Gefrierbohrlöcher herstellten.

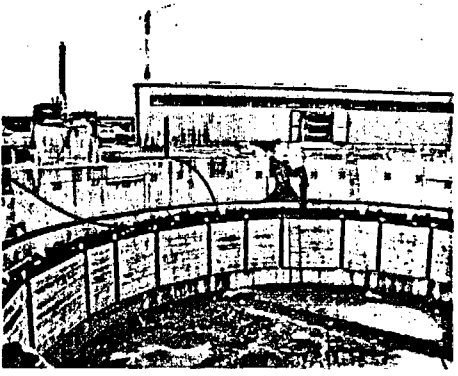
Die Bohrarbeiten

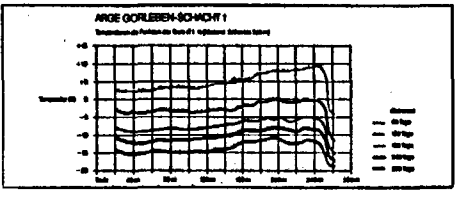


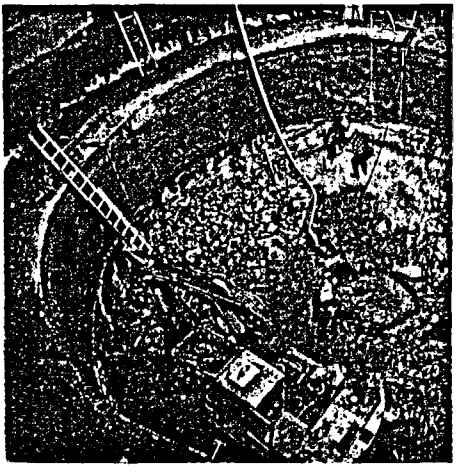
wurden geologisch, gesteinsmechanisch und vermessungstechnisch ausgewertet.

Bohrarbeiten Schacht 1: 16.10.1984 bis 18.10.1985

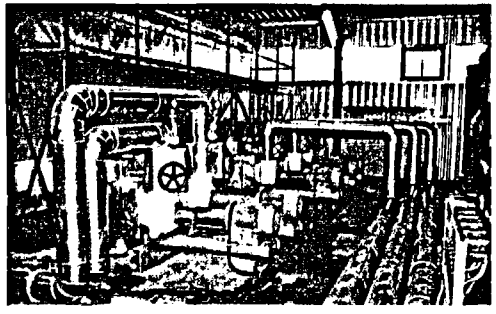
. . um den Frostkörper und den Vorschacht herzustellen







Nach Fertigstellung der Gefrier- und Temperaturmeßbohrlöcher wurde der Gefrierkeller gebaut und die Gefrierleitungen zu den Gefrierbohrlöchern verlegt.



Gleichzeitig wurden die Gefriermaschinen installiert, die Temperaturüberwachungseinrichtungen angeschlossen, und der Gefrierprozeß gestartet.

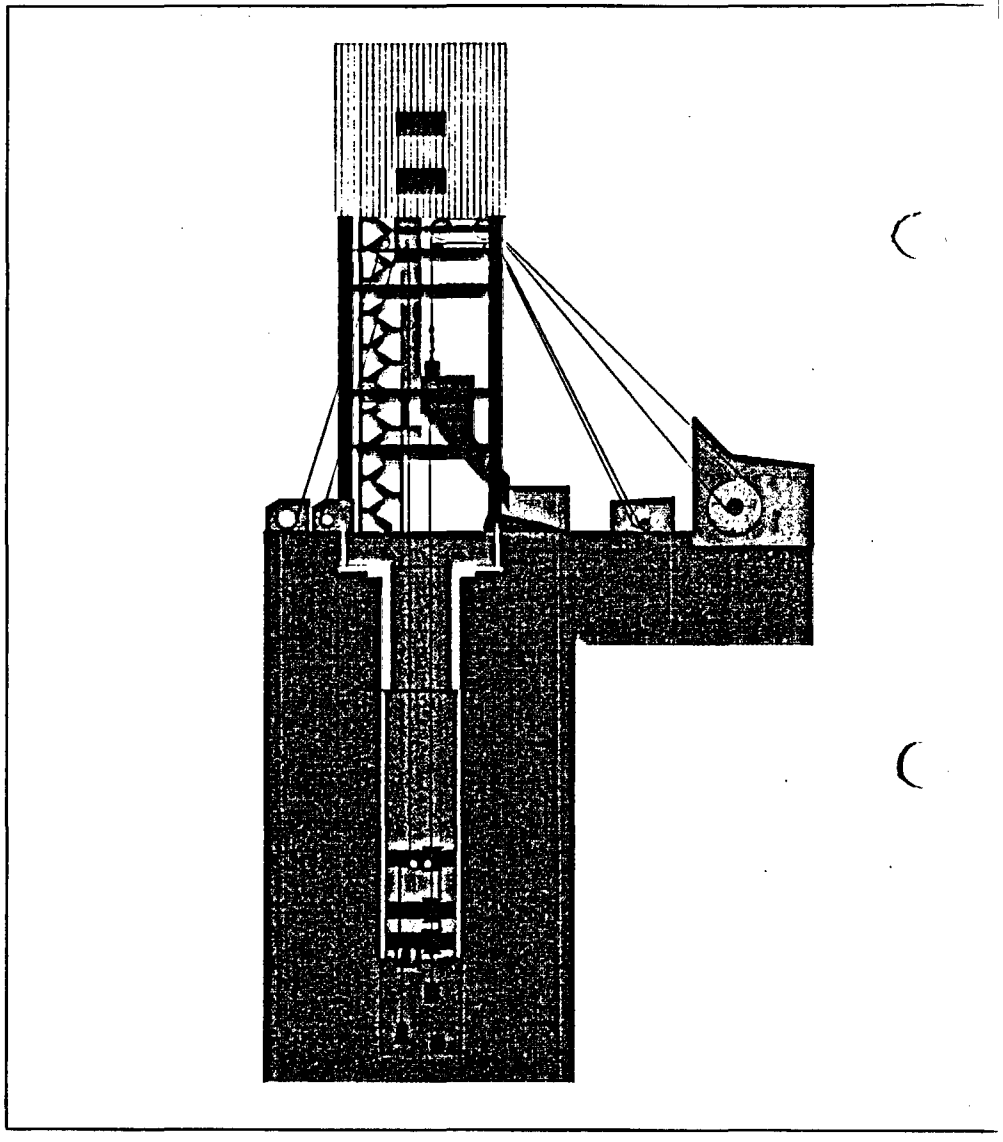
Das Teufen des Vorschachtes wurde im Schutz des Frostkörpers in „offener Bauweise" durchgeführt.

Beginn Gefrieren 24.10.1985

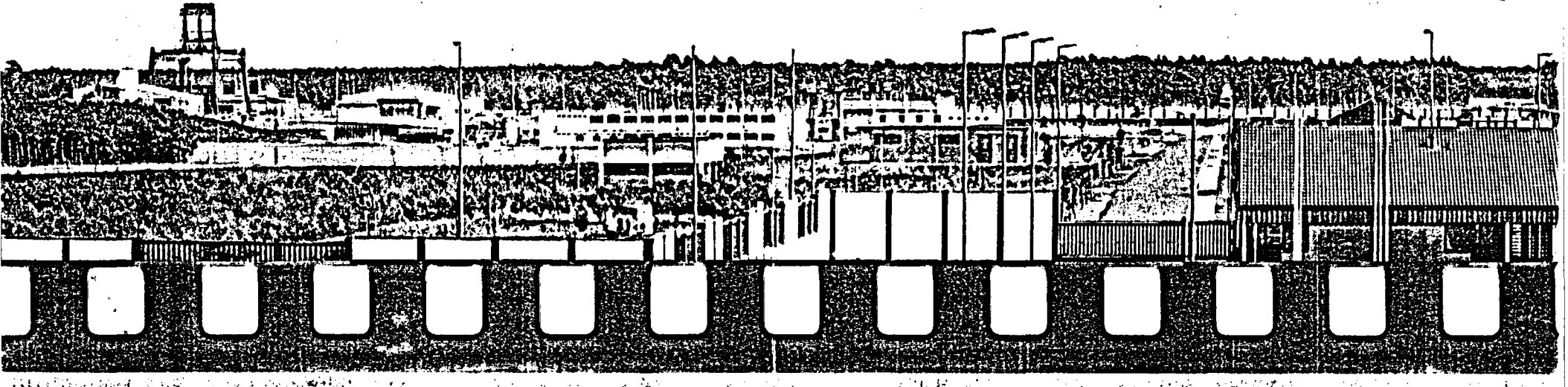
Vorschachtteufen 17.3. – 18.6.86

Und ab jetzt werden durchgeführt:

Das Abteufen des Schachtes Gorleben 1 wird mit Schräm-, Bohr- und Sprengarbeit durchgeführt, das gelöste Gebirge mit einem Greifer in den Kübel geladen und nach Tage gefördert und dort in die Bergebox entleert.



Beginn Schachtteufen 18. September 1986
Ende Schachtabteufen nach Zeitplan: Anfang 1989

Deutsche Gesellscha[illegible] Bau
und Betrieb von Endlagern für
Abfallstoffe mbH (DBE)
Woltorfer Str. 74
D-3150 Peine
Telefon: 0 51 71 / 43-1
Telex: 9 2 646 dbe d
Telefax: 0 51 71 / 43-218

SCHACHT GORLEBEN 1
1. KÜBEL AM
18. SEPTEMBER 1986