

WHC Nomination Documentation

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SITE NAME ("TITLE") Messel Pit Fossil site

DATE OF INSCRIPTION ("SUBJECT") 9/12/1995

STATE PARTY ("AUTHOR") GERMANY

CRITERIA ("KEY WORDS") N (i)

DECISION OF THE WORLD HERITAGE COMMITTEE:
19th Session

The Committee inscribed the nominated property on the basis of criterion (i), considering that the site is of outstanding universal value as the single best site which contributes to the understanding of the Eocene, when mammals became firmly established in all principal land ecosystems. Furthermore, the Committee commended the German Government for their support of the high standards of palaeontological research undertaken.

BRIEF DESCRIPTION:

Messel Pit is the richest site for understanding the living environment of the Eocene era, between 57 million and 36 million years BC. In particular, it provides unique information about the early stages of the evolution of mammals and includes exceptionally well preserved mammal fossils, ranging from fully articulated skeletons to stomach contents.

1.b. State, province or region: Land Hesse, Dramstadt Administrative District, County of
Dramstadt-Dieburg, Commune of Messel

1.d Exact location: Long.8°46' ; Lat.49°55'

**Nomination of Messel Pit for inclusion
in the UNESCO World Heritage List**

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Introduction

The Messel deposit is unique among the major palaeontological sites in that it is truly conservable in the long term. Both the quantity and quality of its fossils testify to crucial changes that occurred in the world's flora and fauna, particularly during the Eocene. It illustrates the explosive evolution of mammals during that time, from which man would subsequently emerge. The exceptional merit of the Messel deposit lies in its international importance as a record of the evolutionary history of the large vertebrate subphylum, especially mammals, and hence ultimately of man himself. The fossils deposited here embrace the entire spectrum of Eocene life-forms of 49 million years ago in a quality and variety of species so far unequalled by any other site.

1. Specific location

1a Country

Germany

1b State, province or region

Land Hesse,
Darmstadt Administrative District,
County of Darmstadt-Dieburg,
Commune of Messel

1c Name of property

Fossilagerstätte Grube Messel (Messel Pit fossil site)

1d Exact location on map and indication of geographical coordinates

Gauss-Krüger coordinates:

The centre of Messel Pit (sixth level, middle) has the coordinates

E 34 82 68

N 55 31 40

The area of the oil shale in the Messel Pit is bounded by the coordinates

E 34 82 40 E 34 82 85 E 34 83 05 E 34 82 60

N 55 31 08 N 55 31 04 N 55 31 70 N 55 31 70

Geographical coordinates:

Messel Pit is situated approximately at

longitude 8°46'

latitude 49°55'

1e Maps and/or plans

Enclosed [Annex 7] are topographical maps

- scale 1:200,000
- scale 1:100,000
- scale 1:50,000
- scale 1:25,000

on which the location of the Messel Pit fossil site is marked, as well as a site plan on a scale of 1:2,000.

2. Juridical data

2a Owner

Land Hesse

2b Legal status

Messel Pit is the property of Land Hesse and is therefore publicly owned. The oil shale in Messel Pit is a historical mineral resource, which makes it part of the cultural heritage as defined in the Heritage Protection Act (*Denkmalschutzgesetz*) of Land Hesse.

Hesse is one of the 16 federal states of the Federal Republic of Germany. Under Article 30 of the constitution of the Federal Republic of Germany, the Basic Law of 23 May 1949, the exercise of governmental powers and the discharge of governmental functions is incumbent on the federal states (*Länder*) in so far as the Basic Law does not otherwise prescribe or permit. Since there is no overriding constitutional provision in the cultural sphere, the power to legislate on cultural matters, including the protection of the national heritage, is vested in the *Länder* under their cultural sovereignty.

The Hessian Parliament enacted a Law for the Protection of the Cultural Heritage (Heritage Protection Act), which entered into force on 1 October 1974 and was revised by an Amendment Act of 5 September 1986 [Annex 1].

According to section 2, paragraph 2 (2) of the Heritage Protection Act, historical mineral resources are cultural monuments as defined in the Act. The definition of historical mineral resources (section 19 of the Act) also extends to traces of animal or vegetable life. By virtue of this legal definition, such traces attain the status of cultural monuments. Thus the fossil deposit at Messel Pit is a cultural monument within the meaning of the Hessian Heritage Protection Act.

On 2 May 1991, Messel Pit was entered in the Heritage Register (*Denkmaltbuch*) of Land Hesse [Annex 2].

Land Hesse has concluded two agreements to secure the long-term conservation of the Messel Pit fossil site as a public monument:

1. *Agreement of 26 June 1992 on the Conduct of Palaeontological Excavations in Messel Pit* with the Senckenberg Society for Nature Research [Annex 3].

The agreement transfers the concession to operate Messel Shale Pit, which still obtains under mining law, the coordination of palaeontological excavations and documentation of the excavation and research findings to the Senckenberg Society for Nature Research. A scientific advisory council appointed pursuant to the agreement guarantees a professional approach as well as totally responsible and sensitive treatment of the cultural monument.

2. *Agreement of 17 December 1992 on the Scientific and Cultural Use of the Messel Pit Fossil Site* with the Society for the Preservation of the Messel Pit Fossil Site [Annex 4].

The Society for the Preservation of the Messel Pit Fossil Site is a coalition of various associations, individuals and action groups committed to the preservation of the Messel Pit site as a historic monument and to the promotion of research in Messel Pit. The agreement lays down procedures for

all non-palaeontological activities at Messel Pit, thereby also ensuring responsible and sensitive treatment of the site.

Excavations in the oil shale of Messel Pit are strictly limited by means of the high scientific and technical standards demanded of the excavating institutes, and the scope of excavations and treatment of the site are constantly monitored. The authority to excavate is given by the ordinance issued on 21 October 1993 by the Hessian Ministry of Science and the Arts entitled *Procedure governing Applications for Palaeontological Investigations in Messel Pit* - State Gazette for Land Hesse 1993, p. 2767 [Annex 5].

Legal protection of the Messel Pit fossil deposit is thus provided by the Hessian Heritage Protection Act and a number of other legal provisions deriving from the Act. In addition, Land Hesse has undertaken to involve third parties in measures executed in and at the Messel Pit fossil site. This means in practice that the condition of the site is constantly observed and overseen by a number of governmental and non-governmental agencies. This ensures that the site is not subject to any detrimental modifications. The two operations that continue to be tolerated at the site are essential measures of mining safety and scientific excavations. The latter are subject to stringent controls in terms of scope and quality.

The legal framework has guaranteed that nothing has happened which could give rise to fears that the universal value of the site might be compromised now or at a future date.

2c Responsible national agency

Hessian Ministry of Science and the Arts
Rheinstrasse 23-25
65185 Wiesbaden
GERMANY

Messel Pit Management Company
(Grube Messel Verwaltungsgesellschaft mbH)
Rheinstrasse 23-25
65185 Wiesbaden
GERMANY

Messel Pit is the property of Land Hesse, which has assigned responsibility for it to the Hessian Ministry of Science and the Arts.

In 1993 the Messel Pit Management Company was founded to administer the site. The Company belongs entirely to Land Hesse. This arrangement enables the administration of Messel Pit to be conducted outside the Land budget, ensuring that administrative tasks are carried out flexibly, swiftly and in a non-bureaucratic manner.

The agreement of 26 June 1992 between Land Hesse and the Senckenberg Society for Nature Research assigns responsibility for the operation of Messel Pit, and in particular for all maintenance and supervisory work, to the Senckenberg Research Institute in Frankfurt am Main. The Institute, in turn, engages individual engineering or planning agencies to carry out the specific work required for the preservation and maintenance of the site.

2d Collaborating national agencies and organizations

Hessian Office for the Preservation of Monuments (specialized agency
(Landesamt für Denkmalpflege Hessen) for care of monuments)
Schloss Biebrich
65203 Wiesbaden
GERMANY

Senckenberg Research Institute (executive agency)
of the Senckenberg Society for Nature Research
Senckenberganlage 25
60325 Frankfurt am Main
GERMANY

Messel Pit Management Company (administrative agency)
Rheinstrasse 23-25
65185 Wiesbaden
GERMANY

Weilburg Mining Office Frankfurter Strasse 36 35781 Weilburg GERMANY	(supervisory authority under mining law)
Hessian State Museum, Darmstadt Friedensplatz 1 64283 Darmstadt GERMANY	(consultancy)
Society for the Preservation of the Messel Pit Fossil Site Rheinstrasse 65 64294 Darmstadt GERMANY	(consultancy)
Scientific Advisory Council for Messel Pit c/o Professor Willi Ziegler Senckenberg Museum of Natural History Senckenberganlage 25 60325 Frankfurt am Main GERMANY	(consultancy)
Cultural Advisory Council for Messel Pit c/o Herr Reinhard Dietrich Hessian Ministry of Science and the Arts Rheinstrasse 23-25 65185 Wiesbaden GERMANY	(consultancy)
Messel Museum of Fossils and Local History Langgasse 2 64409 Messel GERMANY	(consultancy)

3. Identification

3a History

Forty-nine million years ago

In the northern foothills of the Odenwald, south of Frankfurt am Main and near the city of Darmstadt, lie the fossilized deposits of a network of inland waters, consisting of freshwater lakes linked by watercourses, which, at the time of its emergence, was widespread. The deposits of sands, gravels, oil shales and lignite known nowadays as the Messel formation are preserved not only within Messel Pit but also in other small and scattered pockets in the surrounding area. The sediments of the Messel formation in the region of Messel Pit lie on deposits of 270 to 290 million-year-old red sandstone and on crystalline magmatic primary rocks that emerge here and there under the sediments. The Eocene basins of the Messel formation had already been hollowed out by faults in the earth's crust. The gradual subsidence of old sediments within the faults resulted in the formation of new sediments above them, so that in the course of time immense deposits accrued. The oil-shale bed at Messel originally extended to a depth of some 190 metres. The subsidence of the deposits preserved them from erosion over the millions of years that followed until the present day, whereas the watercourses that once linked the basins, as well as their sediments, were entirely eroded. The claystone (the oil shale) at Messel is of special scientific importance as a palaeontological monument.

1859

Attempts to mine morass ore and lignite from the top of the oil shale were carried out between 1859 and 1875 in the area of the present Messel Pit and led to the granting of an ironstone mining concession near Messel railway station.

1875

Various promising indications induced the *Michelstadt Ironworks Company* to excavate for lignite near Messel. It was these operations that unearthed the first fossil - the remains of a crocodile. Although the rock was designated as lignite, its slaty texture distinguishes it from the usual lignite types. It is a bituminous claystone that splits like slate. The successful quest for "lignite" was followed by the granting of permission for another two mines.

1883

A "brown-coal tar distillation plant" was constructed. Low-temperature carbonization (hermetically sealed distillation) of oil shale was carried out until 1962.

1884

The Messel Mining Company was set up to operate the mineral oil and paraffin factory in Messel, which distilled mineral oil and paraffin from the oleaginous rock, systematically depleting the bed of oil shale for that purpose.

1884-1909

Successful drilling led to the acquisition of further mining concessions in the vicinity of Messel.

1898

E. Wittich produced the first comprehensive survey of the Messel site.

1912

Dr Spiegel, representing the Messel Mining Company, stepped up his campaign to have fossil finds handed over to the Grand Ducal Regional Museum in Darmstadt. An agreement was concluded between the Regional Museum and the mine owner on the safekeeping of finds.

1923

The Messel Mining Company was incorporated into the Hugo Stinnes-Riebeck Mining and Oil Company (a joint-stock company) of Halle/Saale. The Messel Mining Company remained under this administration until 1945.

1951

A production plant for foam-mortar building blocks was built by the YTONG concern near the distillation works. The oil-shale waste from the works was treated and used in the manufacture of blocks.

1954

The Messel Paraffin and Mineral Oil Works (a limited-liability company) was founded.

1959

The Messel Paraffin and Mineral Oil Works amalgamated with the Swedish YTONG concern to form YTONG-Messel GmbH.

1961

Professor Kühne, Berlin, became one of the first to successfully embed Messel fossils in synthetic resin. This process, known as the "transfer method", made it possible to preserve the Messel vertebrate fossils permanently and was a crucial step forward in the exploration of the site and the conservation of finds, which would otherwise scarcely be preservable on account of the high water content of the freshly mined oil shale.

1962

YTONG switched the basis of its building block production from shale residues to sand. The YTONG-Messel company largely discontinued distillation of oil shale.

1966

The Hessian Regional Museum in Darmstadt carried out the first systematic fossil digs in Messel Pit.

1971

Private collectors began successful fossil hunts, which also generated a dramatic upsurge of scientific interest in Messel Pit. Spectacular finds were made, such as further skeletons of early horses, a tapir skeleton and the skeleton of one of the few fossilized anteaters discovered outside the American continent. Such finds helped to bring about a reappraisal of the importance of the fossil site.

Until 1971 there was still a limited amount of mining for oil shale, which was used for electricity generation. During the period of shale mining, about 20 million tonnes of rock were quarried, yielding almost a million tonnes of crude oil.

At this point, a decision had to be taken on whether the area should be landscaped or the open-cast mining restarted by other companies. The idea was mooted that the Messel Pit be used as a landfill site for refuse.

From 1973

Individuals, action groups, scientists, academic institutions and politicians raised objections to the planned refuse-disposal site.

1974

The great number of fossil discoveries and the high prices paid for unusual finds led to the fossil site at Messel Shale Pit being overrun by private diggers and fossil dealers.

1975

As a consequence of this invasion, the pit was closed to the public for safety reasons.

The Hessian Regional Museum in Darmstadt intensified its scientific excavations.

From 1975

Since 1975, the Senckenberg Research Institute, Frankfurt am Main, has also been digging and retrieving fossils along with the Hessian Regional Museum, Darmstadt. Thereafter, other institutions received excavation permits, namely the Dortmund Museum of Natural History (1975), the Geological and Palaeontological Institute of the University of Hamburg (1975), the Johannes Gutenberg University of Mainz (1976), the Karlsruhe Regional Natural History Collections (1979), the Institut Royal des Sciences Naturelles de Belgique, Brussels (1983) and the Geological and Palaeontological Institute of the University of Tübingen (1987).

The Messel Pit Refuse Disposal Association purchased the land containing Messel Pit from the YTONG company.

From 1976

An abundance of research work began on the fossils found in Messel. This brought home vividly to experts and the general public the importance of Messel Pit as a major memorial of the history of the earth and the evolution of its species.

1977/1978

The Senckenberg Museum of Natural History, with a group of amateur palaeontologists, organized a special exhibition about the Messel fossil site. Thereafter, a permanent exhibition was mounted at the museum; the exhibition was refurbished in

November 1992 to mark the 175th anniversary of the Senckenberg Society for Nature Research.

1979

The Hessian Regional Museum in Darmstadt opened a permanent exhibition featuring the Messel fossil site.

1981

The Regional Mining Office of Land Hesse approved the plan submitted by the *Messel Pit Refuse Disposal Association* for a central refuse dump at Messel Pit. Members of the Action Group for the Prevention of the Messel Pit Refuse Disposal Site filed private actions against this decision and against the order for its immediate implementation. These initially met with little success, and preparations for the construction of the refuse dump were initiated.

1984

A so-called "toleration agreement" between the parties forming the coalition government of Land Hesse contained an undertaking to preserve Messel Pit as a cultural monument.

1985

When the governing coalition fell apart, work on the installation of the refuse dump was intensified.

The Hessian Minister of Science and the Arts commissioned a report into issues that would arise if the pit were kept open for palaeontological research.

1987

The first International Messel Symposium took place at the Senckenberg Museum of Natural History in Frankfurt am Main, attended by over 100 participants from twelve countries. Key research findings reaffirmed the importance of the Messel fossil site.

The Higher Administrative Court of Land Hesse annulled the order for immediate implementation of the decision granting planning permission for the Messel Pit refuse dump because of shortcomings in the official approval procedure.

1988

The Higher Administrative Court of Land Hesse annulled the decision to grant planning permission.

1990

The Government of Land Hesse announced that Messel Pit would not now be used as a refuse dump. It decided to discontinue the procedure for the granting of planning permission to build a refuse dump, to preserve Messel Pit exclusively as a historic monument and to make it available on a permanent basis for palaeontological research.

1991

Pursuant to a coalition agreement between the parties forming the Government of Hesse, Land Hesse bought Messel Pit for a total sum of 32.6 million Deutschmarks, thereby creating a firm foundation for its permanent preservation as a monument and its accessibility for scientific study and research.

At the Second International Messel Symposium at the Hessian Regional Museum in Darmstadt, palaeontologists from 23 countries highlighted once again in their presentations and discussions the unique importance of the Messel Pit fossil site as a historic monument and research site.

1992

On 26 June 1992, Land Hesse and the Senckenberg Society for Nature Research concluded an agreement on the conduct of palaeontological excavations in Messel Pit [Annex 3]. To mark the 175th anniversary of the Senckenberg Society for Nature Research in November 1992, a permanent Messel exhibition in the Senckenberg Museum of Natural History was refurbished. On 17 December 1992, Land Hesse and the Society for the Preservation of the Messel Pit Fossil Site concluded an agreement on the scientific and cultural use of the Messel Pit fossil site [Annex 4].

1993

Land Hesse founded the Messel Pit Management Company to carry out the proprietary functions in respect of Messel Pit on its behalf.

3b Description and inventory

Messel Pit is approximately 1000 metres long and 700 metres wide. The former open-cast pit reaches a maximum depth of 60 metres. The oil shale and its accompanying sediments extend to a depth of some 120 to 130 metres below the pit floor.

During the mining era, the oil shale was mined at six levels (in 10-metre layers). Some parts of the bench faces are still discernible today, while others have been eroded by subsequent slope collapses. In the middle of the bottom level of the pit is a central drainage shaft. Drainage is effected by means of an underground rising pipeline, which leads to a sewage-treatment works. Part of the bottom level is covered by a layer, around 1.5 metres thick, of broken basalt that lies on the oil shale. This ballast, intended as a drainage bed for the once-planned refuse dump, now protects the oil shale immediately underneath from damage and desiccation. Here, in the deepest part of the pit, is oil shale from the Middle Eocene, the most recent strata preserved from the Eocene epoch in this region. On the slopes of the pit are outcrops of older seams from the Eocene succession. These are partly irregular, having been distorted by landslides. Only part of the structure has remained stratigraphically intact, that is to say with its various strata in proper chronological sequence.

The slopes and floor of the pit are served by narrow, unsurfaced vehicular tracks. The so-called "Dump Road", on the other hand, entering the pit at its south-western edge and leading to the north end of the pit floor, is surfaced and serves as an access road.

Parts of the pit slopes are afforested. In the eastern section of the pit there is a small lake.

Whenever maintenance, excavation and research work are carried out at the pit, the greatest possible care is taken to protect the habitats established by flora and fauna which have gradually reclaimed the barren land there since open-cast mining operations were halted. Some of these habitats support colonies of rare animals and vegetation that can only develop on waste land. The palaeontological excavations repeatedly create small barren spots on which secondary succession can occur. In the parts of the pit that are unsuited to palaeontological research, interference with nature is avoided. These succession areas provide flora and fauna with an undisturbed environment.

For a description of the fossil finds, please see below under 5b (i) to 5b (i) (3) - *Reasons for which the property is considered to meet one or more of the World Heritage criteria.*

3c Photographic and/or cinematographic documentation

A wealth of photographic documentation can be found in both the Senckenberg Museum of Natural History in Frankfurt am Main and the Hessian Regional Museum in Darmstadt.

A number of photographs are enclosed with the present application [Annex 12]. These depict the following:

- 1 - 6 Panoramic view from the south-western edge of the pit facing north and north-east. Photographed in February 1994.
- 7 View of the pit floor with the ballast surface and, in the background, the northern edge of the pit. Photographed in February 1994.
- 8 - 9 View southwards from the north-western edge of the pit. Photograph no. 9 shows the central pump shaft. Photographed in February 1994.
- 10 - 11 View from the fifth level towards the north-west, showing the afforested waste tips of the old mine. Photographed in February 1994.
- 12 View from the south-west of the roadway across the bottom level of the pit. In the background at the top edge of the pit is the YTONG plant. Photographed in February 1994.
- 13 - 14 View of the rubble tip in the north-west of the pit and the north-eastern edge of the pit taken from halfway up the pit slope. Photographed in February 1994.
- 15 View from the south-east, showing the central pump shaft in the south-west. Photographed from about the fifth level in February 1994.

- 16 View of the western slope of the pit, taken from about the fifth level. In the background is a waste tip, now planted over with trees, from the old mine. Photographed in February 1994.
- 17 Ballast surface of basalt stones, covering part of the pit floor, viewed from south to north. Photographed in February 1994.
- 18 Scientific excavations in the oil shale of Messel Shale Pit. Photographed in October 1993.
- 19 *Eomanis waldi*, pangolin, Messel. Reconstruction drawing by A. Helfricht.
- 20 *Leptictidium nasutum*, insectivore (swift bipedal hunter), Messel. Reconstruction drawing by A. Helfricht.
- 21 *Eurotamandua joresi*, anteater, Messel. Reconstruction drawing by A. Helfricht.
- 22 *Pholidocercus hassiacus*, a relative of the hedgehog, Messel. Reconstruction drawing by E. Junqueira.
- 23 *Macrocranion tenerum*, a relative of the hedgehog, Messel. Reconstruction drawing by E. Junqueira.
- 24 *Macrocranion tupaiodon*, a relative of the hedgehog, Messel. Reconstruction drawing by E. Junqueira.
- 25 *Propalaeotherium parvulum*, a small primitive horse (No. 1070-VII)
- 26 *Diplocynodon*, crocodile (No. 1390-III)
- 27 *Atractosteus strausi*, gar (No. 1258-I)
- 28 Roller-like bird (No. 362-V)
- 29 *Curculionidae*, weevils (No. 1359-IX)

- 30 Pinnate leaf of a walnut tree (*Juglandacea*) (No. 1385-X)
- 31 Aerial photograph taken from a flight over Messel Pit on 19 October 1993.

3d Public awareness

As the history of Messel Pit fossil site illustrates, the public at large and the international scientific community have considerable interest in this record of our natural history. This is reflected in frequent press, radio and television reports [Annex 6], as well as in the activities of regional societies and institutions. Three museums in the region maintain detailed presentations on the pit, the oil shale and the organic remains they contain, as well as on their importance in the field of natural history, namely

- the Hessian Regional Museum in Darmstadt,
- the Senckenberg Museum of Natural History in Frankfurt am Main, and
- the Messel Museum of Fossils and Local History.

For technical reasons, it is not possible to site a permanent museum-type exhibition of finds in the immediate vicinity of Messel Pit, as it is incapable of receiving tourist traffic on a large scale. However, a remedy is to be created in the form of a viewing platform at the edge of the pit. In close proximity to the viewing platform, information displays containing graphics and text will reveal and explain to visitors the significance of the site.

Numerous publications about Messel Pit have appeared:

3e Bibliography

The literature on the Messel Pit fossil site is listed in Annex 9.

4. State of preservation/conservation

Hesse is responsible for preserving the Messel Pit fossil site. Under the *Agreement of 26 June 1992 on the Conduct of Palaeontological Excavations in Messel Pit* with the

Senckenberg Society for Nature Research [Annex 3], the actual preservation and maintenance tasks are performed on behalf of Land Hesse by the Senckenberg Research Institute.

4a Diagnosis

The long-term preservation of the Messel Pit fossil site as a historic monument is ensured by dint of statutory protection, by the procedural methods jointly prescribed by the Government of Land Hesse and its contractual partners and by their jointly implemented measures.

The Hessian Heritage Protection Act also provides for protection of the area surrounding historic monuments (section 16 (2) of the Act). The nature and extent of this broader protection are determined by evaluating its utility in relation to other significant public and private interests.

Messel Pit lies in the highly urbanized Rhine-Main area, a region with extremely high concentrations of population, commerce and industry. The area in question centres on Frankfurt am Main and is bounded in the west by Wiesbaden and Mainz, in the south by Darmstadt, in the east by Hanau and in the north by Friedberg. Some 2.5 million people live in an area of 3,500 square kilometres, which represents a population density of 714 inhabitants per square kilometre. This intensive and illimitable use of the surrounding area has resulted in Messel Pit being bounded in the north by a railway line and to the south and west by industrial and commercial estates. In the east, forestry land adjoins the pit. Medium-term plans envisage the establishment of a residual refuse dump on this land, about 170 metres away from the pit. According to current information and plans, this will not produce any emissions that would damage the fossil site.

In view of these circumstances, there is only limited scope for insulating the fossil site at Messel from other activities on which the region depends.

The special features of the oil-shale deposit in the pit are its great depth and the clear demarcation between the deposit and the surrounding rock. Above a line drawn 106 metres above MSL, the pit floor, there are still some 110,000 cubic metres of oil shale. Below that line, the oil shale extends to a depth of around 120 to 130 metres.

The volume of shale there is estimated at about 22 million cubic metres. For technical reasons, these layers are largely unminable at the present time. The integrity of the site is therefore absolutely guaranteed for the foreseeable future.

The overall "depletion" of the oil shale that occurs for the purposes of research and safety measures is minute in relation to the size of the deposit. In this context it should be remembered that even major architectural properties on the World Heritage List often have parts of their original substance removed and replaced for the sake of safety, preservation and research.

The Messel Pit fossil site has been divided into "geoscientific priority areas", which are marked on the enclosed plan [Annex 11]. The purpose of these priority areas is to ensure that scientific excavations are kept within reasonable limits and that particular care is taken with the more unusual strata. The categories are determined by two related factors, namely the available quantity of a deposit and its accessibility. The zoning is based on the geological map of Messel Pit.

Category I (within the cartographically stratified oil shale):

Excavations are permissible only within much stricter limits than apply to Category II.

Category II (within the cartographically stratified oil shale):

Scientific excavations may safely be carried out on condition that disturbance of the property is minimized.

Category III (non-stratified Eocene succession):

Scientific excavations here are to be preceded by probes, on the basis of which the rock may be assigned to Category I or II.

Category IV (non-stratified Eocene succession):

Covered by other layers and therefore inaccessible to excavating scientists.

Category V (outside the Eocene succession):

Irrelevant to research; no purpose served by scientific excavation.

The surface area required for a scientific excavation is minimal in proportion to the overall mass of oil shale in Messel Pit. It may be assumed that each institute digs an

average area of 10 to 50 square metres and an average depth of one metre per digging season. In each of the last few years three institutes have dug for a period of two to six weeks during the summer.

4b History of preservation/conservation

Previous depletion of the substance of this property was mainly the result of mining operations, which ceased in 1971. These open-cast mining operations produced the crater, some 60 metres in depth and covering an area of almost one square kilometre, that is Messel Pit.

There then followed construction work for the planned refuse dump. To that end about one-third of the sixth level, the pit floor, was covered with broken basalt, a central shaft was constructed to drain the pit, and an asphalt road was built from the edge of the pit down to the sixth level. These measures have proved beneficial and necessary to the preservation of the pit as a historic monument. They facilitate the preservation, protection and surveillance of the fossil site.

Certain sections of the pit slopes have been subject to seasonal instability of the rock structure. That means that specific limited parts of the slopes have slipped. Since 1975, however, when palaeontologists started to visit the pit regularly, there have been no landslides of the sort that would seriously endanger life or limb. Since 1986 mining technology has been used for investigations and measurements, and the entire area of the pit has been constantly monitored by means of inclinometers, which measure the gradient of the slopes. These measurements necessarily involve the drilling of holes.

Since the end of the industrial mining of oil shale, small quantities of the shale have been removed for purely research-related purposes. The closure of the pit to the public in 1975 had a salutary effect in that it prevented unauthorized excavations.

Under the Hessian Heritage Protection Act, investigations, and particularly excavations, are subject to authorization by the Higher Authority for the Preservation of Monuments.

The first systematic excavations took place in 1966, the next in 1971 and thereafter on an occasional basis until the end of 1974. Since 1975 excavations have been conducted

exclusively by prestigious scientific institutions. These excavations resulted initially in the examination of about 500 cubic metres of oil shale per annum. Since 1989, a reduction in the number of excavating institutions and the development of new excavation methods have resulted in a sharp decrease in the disturbance of the oil shale. A new excavation strategy has been developed in theory and practice and has for some years been compulsory for all diggers. Its purpose is to limit as far as possible the depletion of the oil shale deposit, even in the context of scientific excavations. The overall coordination of the excavations conducted by the various scientific institutes is another means to this end.

4c Means of preservation/conservation

The size of Messel Pit means that groundwater and rainwater seep into the pit. At the pit floor there is a central shaft from which excess water is regularly pumped, thereby preserving Messel Pit in its present condition and appearance and stabilizing the slopes (since the more water penetrates into the slopes, the more likely they are to slip). If the water were not pumped out, a lake would fill the pit within a few years, preventing access to the fossil deposit.

Additional preservation measures are avoided so as not to jeopardize the authenticity of the monument or disturb the natural habitats in the pit. Nor are additional preservation measures necessary, since, apart from inevitable natural erosion, the site is not suffering any damage.

Research at the Messel Pit fossil site

The only interference with the Messel Pit fossil site that is tolerated are excavations by palaeontological research institutes and measures required to check the stability of the pit walls.

It should be emphasized that the Messel Pit fossil site derives its monumental status mainly from the research conducted in and on it. Without the fossil discoveries, their spectacular impact on the world of science and on the general public, the questions they raise and the answers revealed by investigation of the fossil deposits, Messel Pit would not be recognized as a unique historic monument of universal importance.

Excavations are kept within the framework prescribed for archaeological properties by Article 5 of the *Charter for the Protection and Management of the Archaeological Heritage (1989)*. In the absence of a special convention for palaeontological monuments, it may be deemed reasonable to apply to such a monument the criteria drawn up for archaeological properties.

Preservation of finds

Fragile vertebrate fossils found during excavations at the Messel Pit fossil site are preserved by embedding in synthetic resin. This process, known as the "transfer method", makes it possible to preserve permanently the Messel fossils, which would otherwise scarcely be preservable on account of the high water content of the freshly mined oil shale.

Oil shale contains a large percentage of water. As soon as oil shale is uncovered and exposed to the air it rapidly dries out, cracks and crumbles into small pieces. When this happens, the evidence and the fossils it contains are almost invariably destroyed. The preservation of finds was consequently fraught with problems in the initial stages, since they could not be left in their original slabs.

The transfer method referred to above is the process best suited to the preparation of fragile Messel vertebrates. Before the finds are transferred, the shale slabs containing the fossils are sealed in a moist receptacle and stored in a cool, dark place. The preparation involves detaching the fossil from the oil shale and transferring it onto a durable base (e.g. epoxy resin). The fossil is detached from the oil shale using pins, scrapers and fine sandblasters. Following this preparation, the fossil is hardened with a transparent varnish and can then be scientifically analyzed.

Plans

Planning for the environs of the Messel Pit fossil site is covered by the southern Hesse regional planning map [Annex 8].

On the instructions of the Hessian Ministry of Science and the Arts, a basic operational plan for Messel Pit is being drawn up with a view to establishing permanent statutory safeguards for palaeontological research in Messel Pit; the plan will set forth all

necessary future operational measures, including the ultimate recultivation objectives. The first draft is likely to appear at the end of 1994.

Palaeontological excavations, including safety specifications, are governed by a main plan of operations which the Senckenberg Research Institute is required to draw up annually.

4d Management plans

Responsibility for the care and preservation of the site was assigned to the Senckenberg Society for Nature Research on 1 July 1992. Under mining law, the Society is the operator of Messel Pit. To this end it has been allocated six established posts and budgetary funds that currently amount to 2.8 million Deutschmarks per annum. The Senckenberg Society for Nature Research, which is also responsible for the Senckenberg Museum of Natural History and the Senckenberg Research Institute, has used its own funds to purchase a building not far from Messel Pit to serve as a local base (field station) for the work of the Senckenberg Research Institute.

The following action has been initiated to protect the fossil site:

- a new fence has been erected around Messel Pit to prevent trespassing,
- the site and perimeter fence are kept under constant surveillance by foot patrols to prevent trespassing,
- a measuring system has been established for the pit and the surrounding area to monitor the stability of the pit slopes,
- groundwater and rainwater that gather on the pit floors are pumped away in order to stabilize the slopes of the pit, and
- all activities in Messel Pit are discussed by experts and other interested parties in the Cultural and Scientific Advisory Councils for Messel Pit.

1. The Cultural Advisory Council for Messel Pit:

The Cultural Advisory Council deals with activities in Messel Pit that are not directly related to palaeontological research. One such activity is the public portrayal of the site. Guided tours are provided and a viewing platform is to be erected at the edge of the pit; the Council also decides on all safety and

administration measures. Besides representatives of the relevant authorities, the Cultural Advisory Council also comprises representatives of the following bodies and institutions:

- the Action Group for the Prevention of the Messel Pit Refuse Disposal Site,
- the Messel Museum of Fossils and Local History,
- the Hessian Regional Museum, Darmstadt,
- the Society for the Preservation of the Messel Pit Fossil Site,
- the Messel Pit Management Company, and
- the Senckenberg Museum of Natural History, Frankfurt am Main.

2. The Scientific Advisory Council for Messel Pit:

The Scientific Advisory Council considers applications for palaeontological excavations in Messel Pit and lays down standards for excavations and for the scientific documentation with which findings are placed on record. Besides representatives of the relevant authorities, the Scientific Advisory Council currently consists of internationally renowned exponents of palaeontology and related sciences from Germany, Austria and France [Annex 10].

5. **Justification for inclusion in the World Heritage List**

Near the town of Messel by Darmstadt, rock strata from the early Tertiary period occur. These deposits of an Eocene lake subsided in the course of tectonic valley formation, which is how they came to be preserved originally in a bed of around 190 metres in depth. They consist of a bituminous claystone rich in organic substance (oil shale, with a kerogen content of about 10%) as well as layers of sand, clay and occasionally gravel. The oil shale contains bodily fossilized remains of plants and animals that identify it as sediment from a former freshwater lake of 49 million years ago.

Messel Pit fossil site constitutes a historical record, unique in the world, of the evolution of plant and animal life, attested by the fossils of the Eocene epoch found in the pit. During the Eocene, which belongs to the early Tertiary period, when the dinosaurs were already extinct, the mammals entered their phase of rapid development into a globally predominant class of animal. This process is exquisitely illustrated in

Messel Pit, which makes Messel a window of worldwide importance on a chapter in the history of our planet, a chapter with a crucial bearing on today's world and, through the development and evolutionary formation of mammals, on the ultimate emergence of man. As with numerous other classes of flora and fauna, this window provides a sharp insight into the early phylogeny of mammals. No other site on earth provides such comprehensive information in the form of fossilized mammals. At the moment around 40 species have been identified in Messel, and there is no end in sight to the series of new discoveries.

Particular significance attaches to the community of aquatic, terrestrial and aerial organisms entombed in its entirety in the Messel oil shale, for this - more than any individual fossil - provides an insight into biological systems and ecological links in a bygone era. Messel Pit thus constitutes a unique record of a complex ecosystem from the early Tertiary.

5a Cultural property

Not applicable

5b Natural property

Under Hessian/German law the Messel Pit fossil site is a cultural monument and thus is subject to the appropriate provisions of the Hessian Heritage Protection Act. According to the UNESCO criteria, it is a natural property. The Federal Republic of Germany's application in respect of Messel Pit is therefore submitted to UNESCO under the category of natural heritage.

5b(i) Reasons for which the property is considered to meet one or more of the World Heritage criteria with, as appropriate, a comparative evaluation of the property in relation to properties of similar type

Through the entire community of fossils contained within its rock, as attested by the finds made there, the Messel Pit fossil site demonstrates a vital explosive evolution of mammals that mainly occurred during the Eocene, once numerous reptile orders, including the dinosaurs, had become extinct at the end of the Cretaceous period, and eventually led to the emergence of man. Few high-quality sites are known at which this

process is recorded, and at none of these are the fossils so outstandingly preserved or their habitats so extensively reconstructable in a wide variety of biotopes.

The finds embrace a wide spectrum of the life-forms extant at that time in a biodiversity so far unequalled by virtually any other site. It thereby fulfils the criteria for the inclusion of natural properties in the World Heritage List as enumerated in the Operational Guidelines for the Implementation of the World Heritage Convention - WHC/2/Revised February 1994. Messel Pit constitutes a "*natural feature consisting of a physical formation which is of outstanding universal value from the scientific point of view*" (No. 43 of the Operational Guidelines for the Implementation of the World Heritage Convention - WHC/2/Revised February 1994).

Outstanding universal value within the meaning of the World Heritage Convention derives from the fact that the Messel Pit fossil site is an "*outstanding example representing the major stages of the earth's (evolutionary) history*" (No. 44 (a) (i) of the Operational Guidelines).

The Messel Pit fossil site is an irreplaceable monument of great value, not only for Germany but for the whole world. The source of this outstanding value is its universal importance in deciphering the history of the large subphylum of vertebrates, in particular the mammals, and hence ultimately of man himself.

The Messel Pit fossil site contains all the elements that furnish proof of this pivotal watershed in the evolutionary process. The fossils conserved there document the entire animal, vegetable and ecological environment that existed in the Messel area 49 million years ago, ranging from fossils of large vertebrates, through insects and plants down to conserved bacteria and organic molecular structures.

This universally unparalleled quality of insight into a long-lost ecosystem from a crucial stage in mammalian development fulfils the condition laid down in No. 44 (b) (i) of the Operational Guidelines for the Implementation of the World Heritage Convention - WHC/2/Revised February 1994.

The Messel Pit fossil site is also large enough to be deemed representative of the evolutionary process attested by the fossils found there. Since it illustrates a previous decisive stage in a development that is still continuing - particularly with regard to

mammals - it also meets the criterion set forth in No. 44 (b) (ii) of the Operational Guidelines.

The criteria enumerated in Operational Guideline No. 44 (b) (iii) to (v) are not applicable to Messel Pit, since they were formulated specifically for recent natural properties.

As has been described, Messel Pit fossil site enjoys adequate long-term statutory and institutional protection. It is a protected cultural monument under the Hessian Heritage Protection Act and is listed in the Heritage Register of Land Hesse. Conservation of the Messel Pit fossil site and preservation measures derive from the laws and regulations outlined above, which also establish the framework for the future conservation of the site. This also fulfils the criterion set forth in Operational Guideline No. 44 (b) (vi).

Preserved in the Messel Pit fossil site are the remains of organisms from Middle Eocene strata (Early Tertiary, Cenozoic) dating back some fifty million years; no other site in the world is known in which these fossils are matched in terms of

1. type and quality of preservation,
2. quantity, and
3. diversity.

The uniqueness of the Messel Pit fossil site stems from the concurrence of these factors. Each of them applies individually to other sites, but they occur together in only one place, which explains the global importance of the Messel Pit fossil site as a palaeontological monument.

1. Type and quality of preservation

The preserved fossils are of singular quality; they are often complete skeletons with the contours of soft parts and stomach contents in the case of vertebrates and conserved colouring and stomach contents in the case of insects.

For several hundred thousand years during the Eocene, the environs of the Tertiary Lake Messel and the lake itself were home to a rich array of flora and fauna, living in the tropical to subtropical climate (around 20 C) that prevailed in the area then. Animal

carcasses and vegetable matter were carried by wind and water into the lake and sank onto the fine silt of the lake bed. Conditions there were uncondusive to life, with low oxygen levels and minimal water movement. This largely prevented carcasses and vegetable matter from being eaten, from decomposing and from being washed ashore before they fossilized. These conditions were ultimately the reason for the excellent preservation of the Messel fossils. They helped to preserve complete animal skeletons, whereas at other Tertiary sites remains of organisms are usually preserved as fragments only. Messel is renowned for its "soft-part" preservation - imprints of the most delicate organic structures, such as hair and feathers. Moreover, the contents of stomach and intestines are often preserved. Thus the appearance of the extinct and frequently strange-looking animals can allow a precise picture to be drawn and provide the key to their diet and environment. The Messel discoveries lend themselves especially well to exemplary detailed and authentic reconstructions of biological adaptation processes. In addition, some fossils permit complex conclusions to be drawn in the realm of climatology.

Fossils embedded in the oil shale range from molecular particles to remains of several metres in length, such as those of crocodiles. Preserved vegetable matter includes leaves, blossoms (a great rarity at other sites), fruits, branches, pollen and pieces of wood. The extraordinary range of leaved flora (palms, figs, waterlilies, laurel, walnut, etc.) indicate tropical to subtropical vegetation. The diversity of the discovered plant remains is remarkable.

The fossilized fauna consists of aquatic creatures and waterside-dwellers (fish, frogs, salamanders, crocodiles), winged creatures (insects, birds, bats) and land-dwellers (invertebrates, reptiles), as well as - and this is particularly significant in the history of evolution - numerous species of mammals. The quality of preservation of the Messel fossils enables scientists to make detailed pronouncements on the anatomy, functional morphology, ontogeny and ecology of the organisms of that time, as well as on their environment, and answers phylogenetic and palaeobiological questions which could not otherwise be explored in such depth. The findings from studies into evolutionary biology in particular also deal with classes of animals that were, or still are, prevalent on other continents.

The Messel Pit fossil site opens up extraordinary avenues of scientific enquiry that cannot be fully exhausted even in the distant future. The outstanding quality of the

palaeontological evidence at the Messel Pit site means that the evaluation of all finds provides information on earlier intercontinental links among these organisms, which spread and migrated across slowly drifting continents and land bridges. The site's international prestige rests on these very opportunities for the advancement of knowledge towards the clarification of universal questions, such as the intercontinental migration and distribution of plant and animal populations in the Early Tertiary or climatic change during the earlier Tertiary.

Additional importance attaches to the Messel Pit fossil site as a result of complex chemical compounds found in the oil shale that have been preserved unaltered in the rock as "chemical fossils" for an astonishingly long time. These provide many clues for the resolution of questions regarding palaeontological and palaeoecological methods and enable palaeobiological processes to be reconstructed.

2. Quantity of fossils discovered

As far as the number of fossils goes, Messel is one of the world's most prolific sources for finds from a large part of the Cenozoic era. Invertebrates and plants have been found in considerably greater quantities than vertebrates, which reflects their relative strengths in the original habitat. Between 1.5 and 2% of the entire fauna are vertebrates. The alga *Tetraedron* was so profuse that it built up layers of the oil shale; in other words, it was a source of rock formation. The special characteristic of Messel, however, is the high number of fossilized vertebrates found there. Fish are the most common of these: tens of thousands of individual fish have been dug up so far. There have been a few hundred fragments and complete skeletons both of reptiles, such as crocodiles and turtles, and of birds.

There are wide variations among the numbers of mammalian discoveries. A single find from one mammal, *Eurotamandua*, contrasts with numerous mammalian classes for which largely complete skeletons have been excavated in one or several finds. As to the primitive horses, through which Messel first became famous, 32 finds were registered in the period from 1975 to 1986 alone. This makes Messel one of the world's most prolific Tertiary fossil sites.

3. Diversity of fossils discovered

Messel is also of special importance in terms of the diversity of deposited flora and fauna. The Messel insect fauna, for instance, is preserved in a significantly wider range of species than in the insect-bearing layers of the same epoch at the Geiseltal and other sites, which means that Messel is one of the most important deposits of fossilized insects anywhere in the world.

Among palaeobotanists, Messel is regarded as having one of the widest varieties of Early Tertiary species of leaved flora with preserved cuticle structures.

The vertebrate fauna of Messel, with some 100 identified species, 40 of which are mammals, and the new discoveries that continue to be made, is one of the most diverse within any site throughout the world. A comparison with the Geiseltal site demonstrates this quite clearly, for although the lower coal seam in the Geiseltal is contemporaneous with the Messel deposit, only six species of mammal have been identified there. Sites with a higher number of identified fossilized Eocene mammal species, such as Egerkingen in Switzerland and Bouxwiller in Alsace, are concentrated assemblages, where isolated skeletal parts, especially teeth, tend to be found. So their state of preservation cannot be compared with that of the Messel finds. Further knowledge, for instance about the palaeoecological environment, can scarcely be gleaned from such concentrations.

Value of the Messel Pit fossil site as a record of the past

Because of the high quality of preservation of a large number of diverse plants and animals, the Messel Pit site is immensely valuable as a record of the past. The evidence it provides of the historical development of our planet is the basis and source of many different questions and answers on the origins of modern life on earth. Some of these can be listed here as examples:

Palaeogeographical questions

Because of its position on the geological time scale (Middle Eocene), the world of fossilized organisms at the Messel Pit site permits important conclusions to be drawn about palaeogeographical relationships. Until the Lower Eocene, Europe and North

America were still linked by a land bridge across the North Atlantic, so that an exchange of fauna between the two continents was possible. As of the Middle Eocene, once the two continents separated, the fauna began to develop along different lines. The mechanisms determining the development of flora and fauna and their dispersal under the influence of plate tectonics and climatological development can thus be more precisely understood. Questions regarding the history of animal classes that are nowadays entirely restricted to South America, such as scaly anteaters and edentates (*Xenarthra*), had to be completely rethought after examples of these mammalian suborders were found at Messel.

Phylogenetic questions

Phylogenetic questions, such as the family links among the early even-toed ungulates (*Artiodactyla*) or the primitive ostriches (*Palaeotidae*), can be reopened with the aid of finds from Messel. As research advances, of course, similar questions in relation to the lower mammalian orders will assume increasing importance.

Palaeobiological and other questions

The preservation of entire skeletons provides the first clues to the lifestyles of many classes of organism. Specific environmental adaptations, for instance, for which no previous evidence could be found elsewhere, have been recognizable at the Messel site. That applies particularly to mammals; one example is the *Apatemyidae*, a class of insectivores, which were shown to be arboreal hunters of wood insects. They therefore fitted into the ecological niche now occupied in most parts of the world by woodpeckers. As excavations continue, further significant findings may be anticipated in the field of palaeobiology.

For a long time investigation of the fossilized flora and fauna of Messel was hampered by preparatory difficulties in particular. Not until the development of the transfer process onto synthetic resin could anyone preserve the many anatomical details and soft-tissue contours that distinguish the Messel fossils from those found at other sites. Progress in this direction is expected to continue, while the history of science also suggests the likelihood of further methodological improvements.

Consideration should also be given to the fact that only a small part of the range of species which might be expected to have lived in a balanced ecosystem at that time has so far been identified. This is strikingly corroborated by the fact that, although research has been conducted for many years now, the numerous finds that considerably improve our knowledge of previously encountered species are interspersed time and again by discoveries of new species, which are not infrequently representative of new higher categories (genera and families).

Physical distribution of the finds

The horizontal and vertical distribution of the fossils in the oil shale is of great palaeontological interest. During the entire period of industrial exploitation of the oil shale, the fossil finds in Messel were merely "waste products" of mining operations and were accordingly fragmentary. As a result, there are only occasional written records giving the exact place of discovery from the period prior to the pit closure. Scientifically analyzable data were only collected as a result of extensive digs by several museums and institutes from 1975, after the pit had been closed.

Current knowledge regarding the distribution of finds does not reveal any recognizable pattern. On the contrary, the fossils seem to be distributed throughout the whole shale bed, although local concentrations and certain stratigraphic preferences have been observed within individual classes of organism.

The primitive Messel horse (*Propalaeotherium*) may be chosen to illustrate the distribution of finds, on the one hand because it can be regarded as a particularly spectacular and characteristic representative of the fossilized Messel fauna and on the other because it is of great importance in accurately dating the site. Around 40 skeletons have been found, a manageable figure. These skeletons were distributed over almost the entire area of the pit. Segments in the west and south-east where no such fossils have been found are either subject to landsliding or are on the site of an old fire source in the south-east, two types of terrain where investigations have hitherto proved impossible. The same applies to areas in the north and north-east which are so densely overgrown that no detailed investigations have been possible there either. Only a few scattered examples of horse fossils have come from the centre of the pit; that area lay under water for a long time and has only been open to investigation since 1985. Furthermore, the southern part of the sixth level has been surfaced over with ballast and

is not at present accessible for excavations. Only in the north is there a space in which the primitive horse cannot be found. In general, the distribution pattern for such finds demonstrates that fossils are widely distributed across the pit and cannot at the present time be circumscribed within the bed of oil shale.

The individual classes of fossil

Mammals

Mammals, accounting for 1.5 to 2% of the total finds, are one of the rarities among the Messel fauna. Nevertheless, these mammalian finds in particular are of outstanding importance, since mammals were undergoing rapid, almost explosive development during the Palaeocene and Eocene, which is why their forms reveal a variety of adaptations and specializations. These are exemplified, for instance, by the extremely specialized anteaters and pangolins. The extraordinarily good state of preservation of the fossils found at Messel has even provided evidence of hard scales or of a horny plate on the forehead of the insectivore *Pholidocercus*. The bat remains from Messel are another example of early specialization in mammals, in this case the ability to fly. Although Messel is not the oldest known bat site, it is certainly the earliest extensive assemblage. The primates too were undergoing rapid development during the Eocene; the few known primate finds from Messel have made a vital contribution to our understanding of this process, since the preservation of entire or partial skeletons has allowed functional adaptations to be extrapolated. Because of the great variety of primate species that existed during the Eocene, they are another of the orders from which further important finds may be expected. Comparative functional investigations also provide clues to animal lifestyles. In the case of bats, for instance, the good state of preservation even furnished evidence of a fossilized sonar system. Moreover, the preserved fossilized stomach contents of many animals provide information on their diets. The remains of many animal species in various stages of life likewise permit important knowledge to be gleaned from the fossils of Messel Pit.

Birds

While progress in the analysis of mammals has been relatively satisfactory, the same is less true of bird remains, although - or maybe precisely because - such finds are considerably more frequent than mammalian finds. Future studies in this area are likely

to produce a wealth of knowledge regarding classification, comparative anatomy and ecology. The studies hitherto conducted on Messel birds indicate that a surprisingly large number of species lived there. They fall into an unexpectedly wide range of bird families, and these analyses undoubtedly hold the promise of new information on the composition of the Early Tertiary bird population. In the case of birds, the discovery of complete skeletons at Messel is of crucial importance, having in numerous instances been the first means of reliable classification of finds. It is also interesting to note that, with the exception of a flamingo-like bird that may be aquatic, the Messel birds are not waterfowl but in fact populated the land surrounding Lake Messel. It seems likely that the bird finds are about to provide new insight into the history of these birds' development and their early adaptation to particular habitats and ways of life.

Reptiles and amphibians

The diversity of the reptile and amphibian fauna, with their crocodiles, turtles, lizards, snakes, salamanders and frogs, besides providing new knowledge of generic structures, also permits conclusions to be drawn about food chains and general ecological conditions in the fossilized habitat. The state of progress in analyzing reptilian and amphibian finds is similar to that for birds, although more detailed information has been collected on specific classes (crocodiles and turtles). It must be said that particularly in the case of reptiles and amphibians many species are each represented by a single discovered specimen.

Fish

Among the vertebrate fossils, fish are by far the most frequent finds. In addition, they are Messel's only permanently aquatic class of vertebrates. This means that key information about general conditions of life in the former Lake Messel can be obtained with the aid of the fish. It is also possible to draw conclusions about the larger Eocene system of lakes and rivers in today's Upper Rhine area, of which Lake Messel was part, from the findings of a detailed scientific analysis of the Messel fish fauna. The Messel fish belong to two large groups - ganoid-scaled fishes and bony fishes.

The material so far recovered from excavations is sufficient to document definitively all of the common genera and species. However, in exceptional cases there are also likely to be some hitherto unknown forms; the probability of such finds becomes clear if we

consider that only one specimen of an eel, for instance, has so far been discovered. The more extensive analyses, which use fish as indicators of living conditions in the former lake and of the stratification of its waters, require statistically relevant numbers of finds and precisely identified places of extraction.

Invertebrates

The most common invertebrate fossils in the Messel oil shale are insects. Since a particularly wide variety of species inhabits tropical rainforests, it may be expected that several thousand different species will be found at Messel. Apart from insects, other invertebrate fossils in the oil shale are remains of snails and sponge spicules, which have been frequent localized finds. Crustaceans, isopods and spiders are rare.

Plant remains

Plant remains (leaves, wood, blossoms, pollen, fruits, etc.) have been found, some from aquatic plants but most from terrestrial vegetation. These plant remains play a prominent role in efforts to reconstruct the entire environment of the lake and its surroundings. They provide clues to earlier climatic conditions and special features of their habitats. Their state of preservation at Messel is quite varied. In this domain more than in any other, for instance in the extraction of blossoms, it has become evident that laboratory work and field work are highly interdependent. Many fossils are only found after becoming the target of a rock search. Plant and insect finds have much in common in terms of the information they can provide.

Chemically identifiable organic remains

Chemically identifiable organic remains must be regarded as an important group of fossils. The origin of organic substances and their degradation and conversion into kerogens can be examined on the basis of such remains. Knowledge and study of these organic remains depends to a great extent on the future development of investigative methodology.

By virtue of the comprehensive evidence yielded by the Messel Pit fossil site, the entire bed of oil shale is a cultural monument under Hessian/German law and constitutes a natural property under the criteria governing the World Heritage List.

In addition, the inclusion of this important property in the World Heritage List would help to redress the present conspicuous imbalance in the list between cultural and natural properties.

5b(ii) Evaluation of the property's present state of preservation as compared with similar properties elsewhere

Messel Pit is considered to be one of the four major fossil sites in the world alongside

- Burgess Shale, Canada,
 - Olduvai Gorge, Tanzania
- (both of which are on the World Cultural and Natural Heritage List), and
- Riversleigh, etc., Australia

(cf. *Nomination of Australian Fossil Sites (a serial nomination of sites at Murgon, Riversleigh and Naracoorte). The origin and evolution of Australia's mammals by the Government of Australia for inscription on the World Heritage List - Department of Environment, Sport and Territories - 1993, dated 25 September 1993, p. 51).*

The following sites contain fossils from the same epoch as the Messel Pit fossil site:

Geiseltal, Land Saxony-Anhalt, Federal Republic of Germany

In the Geiseltal there are Eocene deposits in four out of five lignite seams, where a total of 35 vertebrate deposits have been discovered and examined. These deposits resulted from fluvial and fluviolacustrine processes.

Type and quality of preservation:

The vast majority of specimens are preserved as complete skeletons or partial skeletons or, in rare instances, as disintegrated skeletons. The quality of the fossils ranges from good to very good. Soft-part structures and colouring are magnificently preserved, e.g. epidermis and other skin structures, muscle system, blood corpuscles, etc.

Quantity and diversity of fossils:

A total of around 100 vertebrate species has been found, including 43 species of mammals from various orders. Among the other vertebrates are birds, reptiles, amphibians and fish; many of these have been found in comparatively large numbers.

Numerous species of invertebrates have been discovered, especially vermiforms, insects, arthropods (crustaceans) and molluscs; these have likewise been found in comparatively large numbers. The fossilized plant remains in the Geiseltal are particularly abundant; numerous classes of organism have been identified, from higher plant forms to bacteria. The preservation of the plants is in many cases extraordinary; for example, conclusive evidence was obtained there of stages in the degradation of chlorophyll.

The fossil deposits discovered in the Geiseltal were scattered over an area of around 50 square kilometres. By contrast with Messel, the discovery of all finds was entirely the result of mining operations. During the periods 1926 to 1938 and 1949 to 1985, excavations took place ahead of scheduled seamworking. The coal seams of the Geiseltal are now exhausted, the last coal having been extracted some years ago, and with it the original deposit. Future studies of this important site can therefore only ever be based on the fossils already found.

Monte Bolca, near Verona, Italy

At Monte Bolca there are fossil-rich calcareous marine deposits, formed during the Eocene in what was then a bay.

Type and quality of preservation:

Specimens are preserved as complete and partial skeletons or, in rare cases, as disintegrated skeletons. The quality of the preserved fossils is good, but not so outstanding as at Messel. Preserved colouring in fossils is rare. Nor are there any preserved soft parts such as can be found at the Messel and Geiseltal sites.

Quantity and diversity of fossils:

Monte Bolca is one of the world's most important deposits of fossilized fish from the Early Tertiary. These constitute the largest group of finds at the site (around 200 marine species, many of which have also been extracted in large numbers). There has, however, been scarcely any evidence of the remains of other vertebrate classes (only rare discoveries of crocodiles, bird remains, insects and crustaceans). Vegetable matter is often encountered and is of high quality, complete palms and blossoms having been discovered. On the whole, then, the diversity of species is not so great as at Messel.

Green River Formation in the U.S. States of Wyoming, Colorado and Utah

The Green River Formation contains Eocene, and exceptionally Palaeocene, calcareous deposits from an area that once comprised several large lakes. The deposits are spread over some 65,000 square kilometres and have a depth of around 600 metres, although the fossil-bearing layer constitutes only a small part of the entire formation (no more than about half a metre).

Type and quality of preservation:

Specimens are preserved as complete and partial skeletons or, in rare cases, as disintegrated skeletons. The quality of the preserved fossils ranges from good to very good, but fossilized soft parts and preserved colouring are a rarity, so the state of preservation cannot be compared with that of the Geiseltal and Messel Pit sites.

Quantity and diversity of fossils:

Fossilized fish are particularly prominent, more than 22 species having been found. Evidence of numerous other vertebrate classes has been collected - amphibians, reptiles, birds and, above all, mammals, although their remains are less frequently found in intact skeletons than in disintegrated and isolated skeleton parts. Complete skeletons of the earliest bats, however, have been found, albeit in small numbers. A rich assemblage of flora has also been discovered in the Green River deposits.

The state of conservation of the fossils from the Green River Formation is not so outstanding as at Messel.

Summary

The Messel Pit fossil site is the only one of the major sites to provide evidence in such quality and abundance of the crucial explosive evolution of the mammals that occurred primarily during the Eocene and eventually went on to bring about the emergence of man. The pre-eminence of the Messel Pit fossil site thus derives from its universal importance as a record of the development of the large vertebrate subphylum, in particular the mammals, and hence ultimately man himself. The finds cover the entire spectrum of the organisms in a biodiversity and quality hitherto unmatched by any other

site. Furthermore, Messel is also the only fossil site of this status which remains truly preservable.

5b(iii) Indications as to the integrity of the property

Despite the decades of shale mining, by far the greater part of the formation at the Messel Pit fossil site is still intact. The strata extend to a depth of 120 to 130 metres below the present pit floor. Apart from the palaeontological excavations and the drilling of measuring holes to monitor the stability of the pit walls, there is no longer any interference with the substance of the site today. The aforementioned operations are so negligible in scale compared with the size of the property that they do not even pose any long-term threat to the existence and the evidentiary value of the cultural monument.

The Eocene strata in the region of Messel Pit have scarcely been affected by geological faults or displacements. In their entirety, they represent a unique authentic picture of the abundant flora and fauna and of their environment at a time when the rapid rise of the mammals to their present global pre-eminence began to gather momentum. The fossil site at Messel Pit therefore represents an outstanding monument to the start of the process that had such a formative influence on our present environment at a crucial stage in its development.

For the Government of Land Hesse

(signed)

Professor Evelies Mayer

Hessian Minister of State for Science and the Arts

Messel, 20 June 1994

L.S.

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(Auswahl)

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Für die Grube Messel relevante Auszüge aus dem

Gesetz zum Schutze der Kulturdenkmäler (Denkmalschutzgesetz) in der Fassung vom 5. September 1986 (Gesetz- und Verordnungsblatt für das Land hessen, Teil I, 1986, Seite 269ff.

§ 2 Begriffsbestimmung.

[...]

(1) Schutzwürdige Kulturdenkmäler im Sinne dieses Gesetzes sind [...]

(2) 2. Bodendenkmäler (§ 19).

§ 11 Erhaltungspflicht.

(1) Eigentümer, Besitzer und Unterhaltungspflichtige von Kulturdenkmälern sind verpflichtet, diese im Rahmen des Zumutbaren zu erhalten und pfleglich zu behandeln.

[...]

§ 15 Zugang zu Kulturdenkmälern.

Kulturdenkmäler oder Teile derselben sollen der Öffentlichkeit soweit wie möglich zugänglich gemacht werden, wenn der öffentliche Zutritt zugemutet werden kann.

[...]

§ 19 Bodendenkmäler.

Bodendenkmäler im Sinne der folgenden Bestimmungen sind bewegliche oder unbewegliche Sachen, bei denen es sich um Zeugnisse, Überreste oder Spuren menschlichen, tierischen oder pflanzlichen Lebens handelt, die aus Epochen und Kulturen stammen, für die Ausgrabungen und Funde eine der Hauptquellen wissenschaftlicher Erkenntnisse sind.

[...]

§ 21 Nachforschungen.

Nachforschungen, insbesondere Grabungen mit dem Ziel, Bodendenkmäler zu entdecken, bedürfen der Genehmigung der obersten Denkmalschutzbehörde. § 20 Abs. 4 gilt sinngemäß.

Gesetz zum Schutze der Kulturdenkmäler (Denkmalschutzgesetz) in der Fassung vom 5. September 1986

Erster Abschnitt Allgemeine Vorschriften

§ 1

Aufgabe des Denkmalschutzes und der Denkmalpflege

(1) Es ist die Aufgabe von Denkmalschutz und Denkmalpflege, die Kulturdenkmäler als Quellen und Zeugnisse menschlicher Geschichte und Entwicklung nach Maßgabe dieses Gesetzes zu schützen und zu erhalten sowie darauf hinzuwirken, daß sie in die städtebauliche Entwicklung, Raumordnung und Landschaftspflege einbezogen werden.

(2) Bei der Erfüllung dieser Aufgaben wirken im Rahmen ihrer Leistungsfähigkeit das Land, die Gemeinden und Gemeindeverbände sowie Eigentümer und Besitzer von Kulturdenkmälern zusammen.

§ 2

Begriffsbestimmung

(1) Schutzwürdige Kulturdenkmäler im Sinne dieses Gesetzes sind Sachen, Sachgesamtheiten oder Sachteile, an deren Erhaltung aus künstlerischen, wissenschaftlichen, technischen, geschichtlichen oder städtebaulichen Gründen ein öffentliches Interesse besteht.

(2) Kulturdenkmäler sind ferner

1. Straßen-, Platz- und Ortsbilder einschließlich der mit ihnen verbundenen Pflanzen, Frei- und Wasserflächen, an deren Erhaltung insgesamt aus künstlerischen oder geschichtlichen Gründen ein öffentliches Interesse besteht (Gesamtanlagen). Nicht erforderlich ist, daß jeder einzelne Teil der Gesamtanlage ein Kulturdenkmal darstellt.

2. Bodendenkmäler (§ 19).

§ 3

Denkmalschutzbehörden

(1) Oberste Denkmalschutzbehörde ist der Minister für Wissenschaft und Kunst.

(2) Untere Denkmalschutzbehörde ist in den kreisfreien Städten und in den kreisangehörigen Gemeinden, denen die Bauaufsicht übertragen ist, der Gemeindevorstand, in den Landkreisen der Kreisausschuß. Die Aufgaben des Denkmalschutzes obliegen den Landkreisen und Gemeinden zur Erfüllung nach Weisung.

(3) Bei der unteren Denkmalschutzbehörde soll nach Anhörung der Denkmalfachbehörde vom Kreisausschuß oder Magistrat ein sachverständiger, weisungsunabhängiger

Beirat berufen werden, der die Denkmalschutzbehörden bei der Durchführung ihrer Aufgaben unterstützt. Der Beirat kann bestimmte Aufgaben auf ehrenamtliche Vertrauensleute übertragen.

§ 4

Denkmalfachbehörde

(1) Denkmalfachbehörde ist das Landesamt für Denkmalpflege.

(2) Die Denkmalfachbehörde hat zur Erfüllung der in § 1 Abs. 1 genannten Ziele insbesondere folgende Aufgaben:

1. Durchführung des Denkmalschutzes nach Maßgabe dieses Gesetzes.
2. Beratung und Unterstützung der Eigentümer und Besitzer von Kulturdenkmälern bei Pflege, Unterhaltung und Wiederherstellung (Denkmalpflege).
3. Systematische Aufnahme der Kulturdenkmäler (Inventarisierung).
4. Führung des Denkmalbuches.
5. Wissenschaftliche Untersuchung der Kulturdenkmäler als Beitrag zur Erforschung der Landesgeschichte.

Die Denkmalfachbehörde soll in der Öffentlichkeit Verständnis für Denkmalschutz und Denkmalpflege wecken und fördern.

§ 5

Denkmalrat

(1) Der Hessische Minister für Wissenschaft und Kunst bildet zu seiner Beratung einen Denkmalrat.

(2) Dem Denkmalrat sollen je ein Vertreter der mit Denkmalpflege und Denkmalschutz befaßten Fachgebiete wie Kunstgeschichte, Vorgeschichte, Architektur, Städtebau, Geschichte, Volkskunde und bildende Künste, des Hessischen Museumsverbandes, des Hessischen Landesamtes für geschichtliche Landeskunde, der staatlichen Hochbauverwaltung, der evangelischen und katholischen Kirche, der kommunalen Spitzenverbände und des Haus- und Grundbesitzervereins angehören, die qualifizierte Kenntnisse der Denkmalpflege und des Denkmalschutzes besitzen.

(3) Die im Hessischen Landtag vertretenen politischen Parteien entsenden je einen Vertreter mit beratender Stimme.

(4) Vertreter der für Denkmalschutz, Umweltschutz, Landschaftspflege, Naturschutz und Raumordnung zuständigen oberen Landesbehörden sollen zu den Sitzungen des Denkmalrates eingeladen werden.

(5) Das Nähere bestimmt die Satzung des Denkmalrates, die der Minister für Wissenschaft und Kunst erläßt.

§ 6

Zuständigkeiten

(1) Für Maßnahmen auf Grund dieses Gesetzes sind die unteren Denkmalschutzbehörden zuständig, soweit dieses Gesetz nichts anderes bestimmt.

(2) Bei Maßnahmen an Kulturdenkmälern, die im Eigentum des Bundes oder des Landes Hessen stehen, entscheidet die oberste Denkmalschutzbehörde oder die von ihr bestimmte Behörde. § 11 Abs. 2, §§ 12, 25 und 26 finden auf Kulturdenkmäler im Eigentum des Landes Hessen keine Anwendung.

(3) Können bei Gefahr im Verzug die zuständigen Behörden nicht rechtzeitig tätig werden, soll die Polizei nach dem Hessischen Gesetz über die öffentliche Sicherheit und Ordnung die erforderlichen vorläufigen Maßnahmen treffen. Die zuständige Behörde ist unverzüglich zu unterrichten.

§ 7

Allgemeine Maßnahmen der Denkmalschutzbehörden

(1) Die Denkmalschutzbehörden haben diejenigen Maßnahmen zu treffen, die ihnen nach pflichtgemäßem Ermessen erforderlich erscheinen, um Kulturdenkmäler zu schützen, zu erhalten und zu bergen sowie Gefahren von ihnen abzuwenden. Sie haben bei allen Entscheidungen den berechtigten Interessen der Eigentümer oder Besitzer von Kulturdenkmälern Rechnung zu tragen. Bei Kulturdenkmälern, die der unmittelbaren Religionsausübung dienen, sind die von den Leitungen der Religionsgesellschaften festgestellten religiösen Belange vorrangig zu berücksichtigen.

(2) Soweit ein Vorhaben nach diesem Gesetz einer Genehmigung bedarf, kann diese unter Bedingungen oder Auflagen erteilt werden.

(3) Durch die Erteilung von Genehmigungen auf Grund dieses Gesetzes werden Genehmigungen, die auf Grund anderer Rechtsvorschriften erforderlich sind, nicht ersetzt. Baugenehmigungen und bauordnungsrechtliche Zustimmungen schließen die denkmalrechtlich Genehmigung ein; sie bedürfen insoweit der Zustimmung der Denkmalschutzbehörde.

§ 8

Beseitigung widerrechtlicher Maßnahmen

Wer eine Maßnahme, die nach diesem Gesetz der Genehmigung bedarf, ohne die erforderliche Genehmigung oder im Widerspruch zu den bei der Genehmigung erteilten Auflagen

gen durchführt, ist auf Anordnung der Denkmalschutzbehörde verpflichtet, den alten Zustand wieder herzustellen oder das Kulturdenkmal auf andere Weise entsprechend den Auflagen der Denkmalschutzbehörde instandzusetzen.

Zweiter Abschnitt Besondere Vorschriften

§ 9

Kulturdenkmäler

(1) Unbewegliche Kulturdenkmäler werden nachrichtlich in ein öffentliches Verzeichnis (Denkmalbuch) aufgenommen; Bodendenkmäler jedoch nur, wenn sie oberirdisch sichtbar oder von besonderer Bedeutung sind. Der Schutz unbeweglicher Kulturdenkmäler ist nicht davon abhängig, daß sie in das Denkmalbuch eingetragen sind.

(2) Bewegliche Kulturdenkmäler sind in das Denkmalbuch einzutragen, wenn es sich bei ihnen

1. um Zubehör eines Baudenkmals handelt, das mit der Hauptsache aus künstlerischen, geschichtlichen oder sonstigen Gründen eine Einheit bildet,

oder

2. um Gegenstände der bildenden Kunst handelt, deren Zugehörigkeit zu einem bestimmten Ort historisch begründet ist und deren Verbleib an Ort und Stelle im öffentlichen Interesse liegt.

(3) Von der Eintragung beweglicher Kulturdenkmäler sind Gegenstände ausgenommen, die von einer staatlichen Sammlung verwaltet werden. Die Denkmalfachbehörde soll von der Eintragung von Gegenständen in anderen Sammlungen, soweit diese fachlich betreut werden, Abstand nehmen.

§ 10

Denkmalbuch

(1) Das Denkmalbuch wird von der Denkmalfachbehörde geführt. Die Eintragung erfolgt von Amts wegen oder auf Antrag. Antragsberechtigt sind der Eigentümer des Kulturdenkmals, die Gemeinde, in der das Denkmal gelegen ist, sowie der Beirat nach § 3 Abs. 3.

(2) Die Eintragung ist von Amts wegen zu löschen, wenn die gesetzlichen Voraussetzungen nicht mehr vorliegen.

(3) Eintragungen erfolgen im Benehmen mit der Gemeinde.

(4) Eigentümer sollen von der Eintragung unterrichtet werden. Die Unterrichtung kann bei Gesamtanlagen (§ 2 Abs. 2 Nr. 1) durch Bekanntmachung im Staatsanzeiger für das Land Hessen erfolgen.

(5) Vor der Eintragung beweglicher Kulturdenkmäler sind die Eigentümer zu hören und von deren Vollzug unverzüglich zu unterrichten.

(6) Die unteren Denkmalschutzbehörden und die Gemeinden führen für ihr Gebiet Auszüge aus dem Denkmalbuch. Die Einsicht in das Denkmalbuch und seine Auszüge ist jedermann gestattet.

(7) Unbewegliche eingetragene Kulturdenkmäler sind im Liegenschaftskataster nachzuweisen. Leistungen der Kataster- und Landesvermessungsbehörden im Zusammenhang mit dem Nachweis im Liegenschaftskataster sind frei von Gebühren und Auslagen.

§ 11

Erhaltungspflicht

(1) Eigentümer, Besitzer und Unterhaltungspflichtige von Kulturdenkmälern sind verpflichtet, diese im Rahmen des Zumutbaren zu erhalten und pfleglich zu behandeln.

(2) Das Land sowie die Gemeinden und Gemeindeverbände tragen hierzu durch Zuschüsse nach Maßgabe der verfügbaren Haushaltsmittel bei.

§ 12

Durchsetzung der Erhaltung

(1) Kommen Eigentümer, Besitzer oder sonstige Unterhaltungspflichtige ihren Verpflichtungen nach § 11 nicht nach und tritt hierdurch eine Gefährdung des Kulturdenkmals ein, können sie von den Denkmalschutzbehörden verpflichtet werden, erforderliche Erhaltungsmaßnahmen durchzuführen.

(2) Erfordert der Zustand eines Kulturdenkmals zu seiner Instandhaltung, Instandsetzung oder zu seinem Schutz Maßnahmen, ohne deren unverzügliche Durchführung es gefährdet würde, können die Denkmalschutzbehörden diejenigen Maßnahmen selbst durchführen, die zur Abwendung einer unmittelbaren Gefahr für den Bestand des Kulturdenkmals geboten sind. Eigentümer und Besitzer sind verpflichtet, solche Maßnahmen zu dulden. Eigentümer, Besitzer und sonstige Unterhaltungspflichtige können im Rahmen des Zumutbaren zur Erstattung der entstandenen Kosten herangezogen werden.

§ 13

Nutzung von Kulturdenkmälern

Werden Kulturdenkmäler nicht mehr entsprechend ihrer ursprünglichen Zweckbestimmung genutzt, sollen die Eigentümer eine Nutzung anstreben, die eine möglichst weitgehende Erhaltung der Substanz auf die Dauer gewährleistet.

§ 14

Auskunfts- und Duldungspflichten

(1) Eigentümer und Besitzer von Kulturdenkmälern sind verpflichtet, die zur Erfüllung der Aufgaben des Denkmalschutzes erforderlichen Auskünfte zu erteilen.

(2) Denkmalschutzbehörden und Denkmalfachbehörde sind nach vorheriger Benachrichtigung der Eigentümer und Besitzer berechtigt, Grundstücke zu betreten und Kulturdenkmäler zu besichtigen, soweit es zur Erfüllung der Aufgaben des Denkmalschutzes erforderlich ist. Wohnungen dürfen gegen den Willen des Besitzers nur zur Abwendung drohender Gefahr für Kulturdenkmäler betreten werden. Die Unverletzlichkeit der Wohnung nach Art. 13 des Grundgesetzes wird insoweit eingeschränkt.

§ 15

Zugang zu Kulturdenkmälern

Kulturdenkmäler oder Teile derselben sollen der Öffentlichkeit soweit wie möglich zugänglich gemacht werden, wenn der öffentliche Zutritt zugemutet werden kann. Die Denkmalfachbehörde soll mit dem Eigentümer solcher Denkmäler Vereinbarungen über den freien Zutritt treffen; dies gilt insbesondere dann, wenn für die Erhaltung des Denkmals öffentliche Mittel aufgewendet werden oder aufgewendet worden sind.

§ 16

Genehmigungspflichtige Maßnahmen

(1) Der Genehmigung der Denkmalschutzbehörde bedarf, wer ein Kulturdenkmal oder Teile davon

1. zerstören oder beseitigen,
2. an einen anderen Ort verbringen,
3. umgestalten oder instandsetzen,
4. mit Werbeanlagen versehen will.

(2) Der Genehmigung der Denkmalschutzbehörde bedarf ferner, wer in der Umgebung eines unbeweglichen Kulturdenkmals Anlagen errichten, verändern oder beseitigen will, wenn sich dies auf den Bestand oder das Erscheinungsbild des Kulturdenkmals auswirken kann.

(3) Die Genehmigung soll nur erteilt werden, wenn überwiegende Gründe des Gemeinwohls dem nicht entgegenstehen. Eine Maßnahme an einer Gesamtanlage (§ 2 Abs. 2 Nr. 1) ist zu genehmigen, wenn sie deren historisches Erscheinungsbild nur unerheblich oder nur vorübergehend beeinträchtigt.

§ 17

Anzeigepflichtige Maßnahmen

(1) Eigentümer und Besitzer haben Schäden und Mängel, die an Kulturdenkmälern auftreten und ihren Denkmalwert und ihre Substanz beeinträchtigen, unverzüglich der Denkmalschutzbehörde anzuzeigen.

(2) Wird ein bewegliches eingetragenes Kulturdenkmal veräußert, so haben Veräußerer und Erwerber den Eigentumswechsel innerhalb eines Monats den zuständigen Denkmalschutzbehörden anzuzeigen.

§ 18

Genehmigungsverfahren

(1) Der Genehmigungsantrag ist der zuständigen Behörde (§ 6) schriftlich mit allen für die Beurteilung des Vorhabens und der Bearbeitung des Antrags erforderlichen Unterlagen einzureichen. Im Einzelfall kann verlangt werden, daß der Genehmigungsantrag durch vorbereitende Untersuchungen am Kulturdenkmal ergänzt wird.

(2) Soweit die besondere Eigenart eines Kulturdenkmals dies gebietet, kann die Leitung oder Ausführung von Arbeiten, die besondere Erfahrungen und Kenntnisse voraussetzen, durch denkmalfachlich geeignete Personen verlangt werden.

(3) Die Denkmalschutzbehörden beteiligen die Denkmalfachbehörde an ihren Entscheidungen. Kommt zwischen unterer Denkmalschutzbehörde und Denkmalfachbehörde kein Einvernehmen zustande, ist die Weisung der obersten Denkmalschutzbehörde einzuholen.

(4) Die Genehmigung erlischt, wenn nicht innerhalb von zwei Jahren nach ihrer Erteilung mit der Ausführung begonnen oder die Ausführung ein Jahr unterbrochen worden ist. Die Fristen nach Satz 1 können auf schriftlichen Antrag jeweils bis zu einem Jahr verlängert werden.

Dritter Abschnitt
Bodendenkmäler

§ 19

Bodendenkmäler

Bodendenkmäler im Sinne der folgenden Bestimmungen sind bewegliche oder unbewegliche Sachen, bei denen es sich um Zeugnisse, Überreste oder Spuren menschlichen, tierischen oder pflanzlichen Lebens handelt, die aus Epochen und Kulturen stammen, für die Ausgrabungen und Funde eine der Hauptquellen wissenschaftlicher Erkenntnisse sind. Die Vorschriften des Naturschutzrechts bleiben unberührt.

§ 20

Funde

(1) Wer Bodendenkmäler entdeckt oder findet, hat dies unverzüglich der Denkmalfachbehörde anzuzeigen. Die Anzeige kann auch gegenüber der Gemeinde oder der unteren Denkmalschutzbehörde erfolgen; diese leiten die Anzeige unverzüglich der Denkmalfachbehörde zu.

(2) Anzeigepflichtig sind der Entdecker, der Eigentümer des Grundstücks sowie der Leiter der Arbeiten, bei denen die Sache entdeckt worden ist.

(3) Der Fund und die Fundstelle sind bis zum Ablauf einer Woche nach der Anzeige im unveränderten Zustand zu erhalten und in geeigneter Weise vor Gefahren für die Erhaltung des Fundes zu schützen. Die Denkmalfachbehörde soll der Fortsetzung der Arbeiten zustimmen, wenn ihre Unterbrechung unverhältnismäßig hohe Kosten verursacht.

(4) Die Denkmalfachbehörde ist berechtigt, den Fund zu bergen, auszuwerten und zur wissenschaftlichen Bearbeitung vorübergehend in Besitz zu nehmen.

§ 21

Nachforschungen

Nachforschungen, insbesondere Grabungen mit dem Ziel, Bodendenkmäler zu entdecken, bedürfen der Genehmigung der obersten Denkmalschutzbehörde. § 20 Abs. 4 gilt sinngemäß.

§ 22

Grabungsschutzgebiete

(1) Die oberste Denkmalschutzbehörde kann durch Rechtsverordnung bestimmte abgegrenzte Gebiete befristet oder auf unbefristete Zeit zu Grabungsschutzgebieten erklären, wenn eine begründete Vermutung besteht, daß sie Bodendenkmäler von wissenschaftlicher oder geschichtlicher Bedeutung bergen.

(2) In Grabungsschutzgebieten bedürfen Arbeiten, die Bodendenkmäler aus vor- und frühgeschichtlicher Zeit gefährden können, der Genehmigung der obersten Denkmalschutzbehörde. Die bisherige land- und forstwirtschaftliche Nutzung bleibt im bisherigen Ausmaß unberührt.

§ 23

Nutzungsbeschränkungen

(1) Die oberste Denkmalschutzbehörde kann die wirtschaftliche Nutzung eines Grundstücks oder eines Grundstücksteils beschränken, in dem sich Bodendenkmäler von wissenschaftlicher oder geschichtlicher Bedeutung befinden. Berechtigter ist das Land, vertreten durch die Denkmalfachbehörde.

(2) Die Beschränkung nach Abs. 1 ist auf Ersuchen der obersten Denkmalschutzbehörde im Grundbuch einzutragen.

§ 24

Ablieferung

(1) Das Land, der Landkreis, die kreisfreie Stadt und die Gemeinde, in deren Gebiet Funde (bewegliche Bodendenkmäler) gemacht worden sind, haben in dieser Reihenfolge das Recht, die Ablieferung gegen eine angemessene Entschädigung zu verlangen.

(2) Die Ablieferung kann verlangt werden, wenn Tatsachen vorliegen, nach denen zu befürchten ist, daß der Erhaltungszustand des Fundes verschlechtert wird oder dieser der Öffentlichkeit oder wissenschaftlichen Forschungen verlorengeht.

(3) Die Ablieferung kann nicht mehr verlangt werden, wenn

1. seit der Mitteilung drei Monate verstrichen sind; dies gilt nicht, wenn der Erwerbsberechtigte (Abs. 1) innerhalb dieser Frist sich gegenüber dem Eigentümer das Recht, die Ablieferung zu verlangen, vorbehalten hat;

2. der Eigentümer dem Erwerbsberechtigten die Ablieferung des Fundes, bevor über die Ablieferungspflicht entschieden ist, angeboten und der Erwerbsberechtigte das Angebot nicht binnen drei Monaten angenommen hat.

(4) Die oberste Denkmalschutzbehörde entscheidet auf Antrag eines Beteiligten, ob die Voraussetzungen der Ablieferung vorliegen.

Vierter Abschnitt
Schlußbestimmungen

§ 25

Enteignung

(1) Die Enteignung ist zugunsten des Landes, eines Landkreises, einer Gemeinde oder einer rechtsfähigen Stiftung zulässig, soweit sie erforderlich ist, damit

1. ein Kulturdenkmal in seinem Bestand oder Erscheinungsbild erhalten bleibt,

2. ein Bodendenkmal (§ 19) wissenschaftlich ausgewertet oder der Allgemeinheit zugänglich gemacht werden kann,

3. in einem Grabungsschutzgebiet (§ 22) planmäßige Nachforschungen betrieben werden können.

(2) Im übrigen gelten die allgemeinen Vorschriften über die Enteignung. Antragsberechtigt ist die Denkmalfachbehörde.

§ 26

Sonstige
entschädigungspflichtige Maßnahmen

(1) Stellen Maßnahmen auf Grund dieses Gesetzes eine Enteignung dar, ist eine angemessene Entschädigung in Geld zu leisten. Führt eine entschädigungspflichtige eigentumsbeschränkende Maßnahme dazu, daß der Eigentümer das Eigentum nicht mehr wirtschaftlich zumutbar nutzen kann, so kann er statt dessen die Übernahme des Eigentums gegen angemessene Entschädigung verlangen.

(2) Die Grundsätze der Entschädigung bei der förmlichen Enteignung sind entsprechend anzuwenden. Enteignungsbegünstigt ist das Land, vertreten durch die Denkmalfachbehörde. Die Gemeinden und Gemeindeverbände sollen sich an der Entschädigung im Rahmen ihrer Leistungsfähigkeit beteiligen.

§ 27

Bußgeldbestimmungen

(1) Ordnungswidrig handelt, wer vorsätzlich oder fahrlässig

1. genehmigungspflichtige Maßnahmen entgegen § 16, § 21 Satz 1 oder § 22 Abs. 2 Satz 1 ohne Genehmigung beginnt oder durchführt oder einer von der zuständigen Behörde mit der Genehmigung erteilten Auflage zuwiderhandelt;
 2. entgegen § 12 Abs. 2 Satz 2 Maßnahmen der Denkmalschutzbehörde zur Abwendung einer unmittelbaren Gefahr für den Bestand eines Kulturdenkmals nicht duldet;
 3. der Auskunftspflicht nach § 14 Abs. 1 nicht nachkommt oder entgegen § 14 Abs. 2 Satz 1 den Beauftragten der zuständigen Behörde das Betreten von Grundstücken oder Besichtigen von Kulturdenkmälern nicht gestattet;
 4. entgegen § 17 Abs. 2 den Eigentumswechsel eines beweglichen eingetragenen Kulturdenkmals nicht oder nicht rechtzeitig anzeigt;
 5. entgegen § 20 Abs. 1 Satz 1 einen Fund nicht unverzüglich anzeigt;
 6. entgegen § 20 Abs. 3 den Fund oder die Fundstelle nicht bis zum Ablauf einer Woche nach der Anzeige in unverändertem Zustand läßt;
 7. den von der Denkmalfachbehörde erlassenen, vollziehbaren Anordnungen zur Bergung, Auswertung und zur wissenschaftlichen Bearbeitung nach § 20 Abs. 4 zuwiderhandelt
- oder
8. einer Nutzungsbeschränkung nach § 23 Abs. 1 zuwiderhandelt.

(2) Ordnungswidrigkeiten nach Abs. 1 Nr. 2 bis 8 und Nr. 1, mit Ausnahme der Zuwiderhandlungen gegen § 16 Abs. 1 Nr. 1, können mit einer Geldbuße bis zu fünfzigtausend Deutsche Mark geahndet werden. Ordnungswidrigkeiten nach Abs. 1 Nr. 1 können im Falle der Zuwiderhandlung gegen § 16 Abs. 1 Nr. 1 mit einer Geldbuße bis zu einer Million Deutsche Mark geahndet werden.

(3) Verwaltungsbehörde im Sinne des § 36 Abs. 1 Nr. 1 des Gesetzes über Ordnungswidrigkeiten ist die untere Denkmalschutzbehörde.

(4) Ist eine Ordnungswidrigkeit nach Abs. 1 Nr. 1 begangen worden, so können die zur Vorbereitung oder Begehung gebrauchten oder bestimmten Gegenstände eingezogen werden. § 19 des Gesetzes über Ordnungswidrigkeiten ist anzuwenden.

§ 28

Staatskirchenverträge

(1) Art. 20 Satz 2 des Vertrages des Landes Hessen mit den Evangelischen Landeskirchen in Hessen vom 18. Februar 1960 (GVBl. S. 54) und Art. V Satz 2 des Vertrages des Landes Hessen mit den Katholischen Bistümern in Hessen vom 9. März 1963 (GVBl. I S. 102) bleiben unberührt. Die Vorschriften des § 16 Abs. 1 Nr. 3 und des § 17 Abs. 2 finden insoweit keine Anwendung.

(2) Bei kircheneigenen Kulturdenkmälern ist die Kirchenleitung in den Verfahren nach § 10 Abs. 4 und 5 zu beteiligen.

§ 29

Aufhebung von Vorschriften

Die diesem Gesetz entgegenstehenden Vorschriften werden aufgehoben. Namentlich werden folgende Vorschriften aufgehoben, soweit sie nicht bereits außer Kraft sind:

1. das Gesetz, den Denkmalschutz betreffend, vom 16. Juli 1902 (Hess. Reg. Bl. S. 275), zuletzt geändert durch Gesetz vom 5. Oktober 1970 (GVBl. I S. 598),
2. das Ausgrabungsgesetz vom 26. März 1914 (Preuß. Gesetzsamml. S. 41), zuletzt geändert durch Gesetz vom 5. Oktober 1970 (GVBl. I S. 598),
3. die Bekanntmachung über die Anzeigepflicht und die behördlichen Anordnungen bei Ausgrabungen und Funden vom 25. Oktober 1920 (Hess. Reg. Bl. S. 328), geändert durch Gesetz vom 6. Februar 1962 (GVBl. S. 21),
4. Erster Teil Titel 8 § 33 des Allgemeinen Landesrechts für die Preußischen Staaten vom 5. Februar 1794, zuletzt geändert durch Gesetz vom 9. Oktober 1962 (GVBl. I S. 437).

§ 30

Ausführungsvorschriften

Der Minister für Wissenschaft und Kunst wird ermächtigt, durch Rechtsverordnung Vorschriften zu erlassen über

1. Form, Inhalt und Führung des Denkmalsbuches und seiner Auszüge einschließlich der Unterrichtung der Öffentlichkeit und der Eigentümer,
2. die nähere Ausgestaltung des Genehmigungsverfahrens einschließlich der nach § 18 Abs. 2 erforderlichen Qualifikationen sowie vereinfachter Regelungen bei Maßnahmen, die auf Grund ihres Umfangs oder ihrer Eigenart Kulturdenkmäler nicht oder nur unerheblich beeinträchtigen können,

3. die Übertragung einzelner Zuständigkeiten der obersten Denkmalschutzbehörde auf andere Behörden; § 6 Abs. 2 Satz 1 bleibt unberührt.

Diese Ausführungsvorschriften soll der Minister für Wissenschaft und Kunst mit dem Denkmalrat beraten.

§ 31

Inkrafttreten

Dieses Gesetz tritt am Tage nach der Verkündung in Kraft.

Fundstelle:

Gesetz- und Verordnungsblatt für das Land Hessen, Teil 1, 1986, S. 269 ff.







Délégation Permanente
de la République fédérale d'Allemagne
auprès de l'UNESCO

Dir W.L. Lahr
res d 26.01.10 Eu
(7839)

13/15, av. Franklin D. Roosevelt – 75008 Paris

Mr
Francesco BANDARIN
Director
World Heritage Center
UNESCO
Paris

ADDRESS

13/15, avenue Franklin D. Roosevelt
75008 Paris

TEL + 01.53.83.46.63

FAX + 01.53.83.46.67

Email: wolfgang.lahr@diplo.de

Extension no.: -664

-
Subject: World Heritage List, Management Plan
Messel Pit Fossil Site (Germany)

File no.: 611.90 Pr 5.12/17

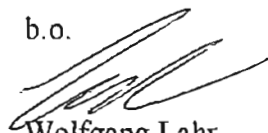
Paris, 25th January 2010

Dear Mr Director,

Please find enclosed a letter of the Hessen authorities dated 9th December 2009 attached with two copies of the first and new established management plan of the world heritage site "Messel Pit Fossil Site".

Please accept, Mr Director, the assurances of my highest consideration.

b.o.


Wolfgang Lahr
(Third Secretary)

Hessisches Ministerium für Wissenschaft und Kunst
Postfach 3260 · 65022 Wiesbaden
UNESCO World Heritage Centre
7, place de Fontenoy

75352 Paris 07 SP
FRANKREICH

Aktenzeichen IV 5 701/13.002-0015
PC: 0854
Bearbeiter/in Dr. Reinhard Dietrich
Durchwahl 0611 / 32-3463
Fax 0611 / 32-3498
E-Mail Reinhard.Dietrich@hmkw.hessen.de
Ihr Zeichen
Ihre Nachricht
Datum 9. Dezember 2009

über

Auswärtiges Amt
Werderscher Markt 1

11013 Berlin

Management-plan for World Heritage *Messel Pit Fossil Site*

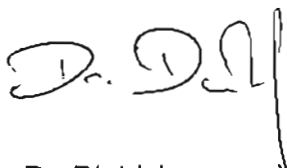
Ladies and Gentlemen,

Please find attached two copies of the first and newly written management-plan for World Heritage *Messel Pit Fossil Site*.

Messel Pit Fossil Site was inscribed at a time when neither a management-plan nor a statement for a buffer-zone was needed for the inscription of a world heritage site.

So this paper provides two things for the *Messel Pit Fossil Site* for the first time: A management-plan and a definition and a description as well of the world heritage itself – the rock containing the fossils – as well as for the buffer zone, the area protected by the perimeter fence enclosing the whole of the former pit.

Sincerely Yours



Dr. Dietrich

MINOR BOUNDARY MODIFICATIONS

IV 5 - 701/13.002-0015 PC: 1020	Hessisches Ministerium für Wissenschaft und Kunst Rheinstraße 23-25 D – 65185 Wiesbaden GERMANY
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31st of March 2010

Establishment of a buffer zone for Messel Pit Fossil Site

Requested Documentation

1. **Area of the property (in hectares):** please indicate a) the area of the property as inscribed and b) the area of the proposed buffer zone.

- a) Area of the property as inscribed: 42 hectares
- b) Area of the proposed buffer zone: 22.5 hectares

2. **Description of the modification:** please provide a written description of the proposed buffer zone.

When the Messel Pit Fossil Site applied for World Heritage nomination in 1994, the Operational Guidelines did not yet foresee the delineation of a buffer zone. With newer amendments to the Operational Guidelines a buffer zone is now required for world heritage sites.

The World Heritage of Messel Pit Fossil Site is a geological formation of oil

shale at the bottom of Messel Pit containing fossil remains which are examples of a major stage of earth's history and an outstanding geological feature, the remains of organisms from the middle Eocene strata dating back 50 million years.

Around the area which contains this geological feature a perimeter fence was put up. It surrounds the whole former mining site, an area wider than the extension of the mentioned geological feature.

The fence prevents illegal trespassing, illegal excavations and other damage from the protected area. The 2006 periodic report "*State of Conservation of World Heritage Properties in Europe*" came to the conclusion that the fence has proven to be a highly effective measure of protection for the world heritage site. The buffer zone of the Messel Pit Fossil Site is therefore clearly defined on its outer side by the perimeter fence. The inner side is the outer border of the protected geological feature. It fits in with the Operational Guidelines 2008, section 104: "*For the purposes of effective protection of the nominated property, a buffer zone is an area surrounding the nominated property which has complementary legal and/or customary restrictions placed on its use and development to give an added layer of protection to the property.*"

3. ***Justification for the modification:*** please provide a brief summary of the reasons why a buffer zone needs to be established, with particular emphasis on how such modification will improve the conservation and/or protection of the property.

A buffer zone needs to be established due to the Operational Guidelines 2008, section 104. This will help maintain the high standard of protection as described in the 2006 periodic reporting "*State of Conservation of World Heritage Properties in Europe*" as highly effective.

4. Contribution to the maintenance of the Outstanding Universal

Value: *please indicate how the proposed buffer zone will contribute to the maintenance of the Outstanding Universal Value of the property.*

The World Heritage Committee on its 19th session in Berlin in 1995 followed its advisory body, the International Union for the Conservation of Nature (IUCN), which opted for inclusion of the Messel Pit Fossil Site in the World Heritage List under criteria (viii) - the former natural criteria (i) - *“considering that the site is of outstanding universal value as the single best site which contributes to the understanding of the Eocene, when mammals became firmly established in all principal land ecosystems.”* The geological formation of the oil shale, containing the Eocene fossils, is that part of the site which is of outstanding universal value and therefore constitutes the world heritage.

The proposed buffer zone will contribute to the maintenance of the Outstanding Universal Value by preventing illegal trespassing, illegal excavations and other damage from the protected geological formation containing the Eocene fossil remains.

5. Implications for legal protection: *please provide information on the legal protection in place for the proposed buffer zone and a copy of relevant laws and regulations.*

The site itself as well as the proposed buffer zone is under legal protection by the state-law protecting historical and palaeontological monuments and sites: *[Hessisches] Gesetz zum Schutze der Kulturdenkmäler (Denkmalschutzgesetz) in der Fassung vom 5. September 1986 = Act on the Protection of Cultural Monuments (Monument Protection Act) of the Land of Hesse of 5th of September 1986.*

The relevant passage reads:

§ 16 Genehmigungspflichtige Maßnahmen

[...]

(2) Der Genehmigung der Denkmalschutzbehörde bedarf ferner, wer in der Umgebung eines unbeweglichen Kulturdenkmals Anlagen errichten, verändern oder beseitigen will, wenn sich dies auf den Bestand oder das Erscheinungsbild des Kulturdenkmals auswirken kann.

par 16. Measures Requiring Approval

[...]

sec. 2. The approval of the monument protection authority is further required for the construction, change or removal of facilities in the vicinity of an immovable cultural monument, which may have an effect on the existence or the appearance of the cultural monument.

6. *Implications for management arrangements:* *please provide information on the management arrangements in place for the proposed buffer zone.*

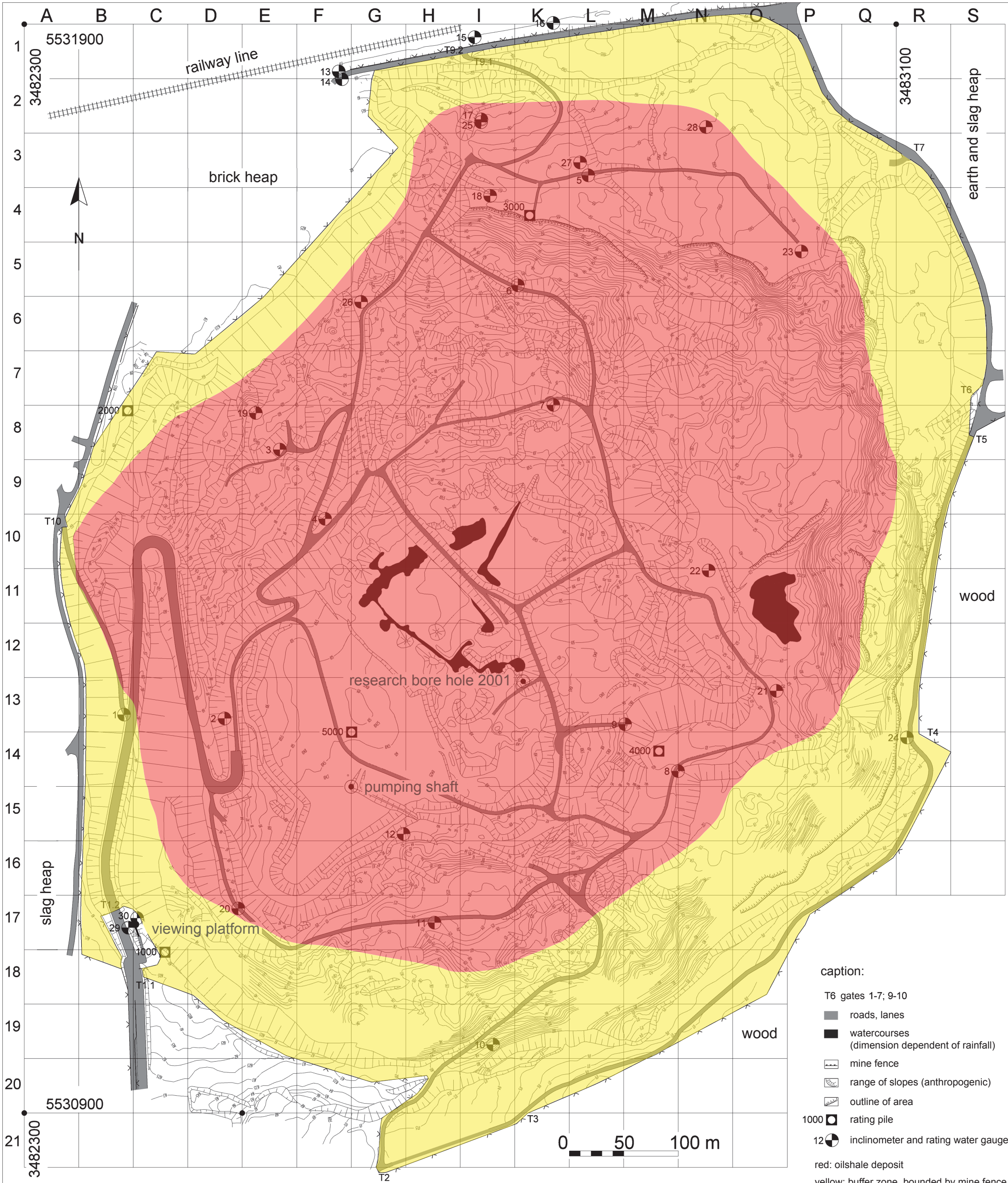
A perimeter fence was put up which surrounds the whole former mining site and does include the site itself as well as the buffer zone. The fence and the buffer zone are under surveillance by foot patrols. These measures have intercepted illegal trespassing and illegal excavations and other damage. This fencing-off has proven to be an effective measure of protection for the world heritage site.

7. **Maps:** *please submit a map showing both the inscribed property and the proposed buffer zone. Please make sure that the map has the title and the legend/key in English or French (if this is not possible, please attach a translation) and clearly refers (in the title and in the legend) to the boundary of the World Heritage property and to the buffer zone of the World Heritage property.*

see: Annex

Dr. Dietrich

World Heritage Messel Pit Fossil Site



Messel Pit Fossil Site Key Plan Oilshale Deposit and Buffer Zone

Mapping based upon aerial photo from 24.03.1998 on behalf of Senckenberg Gesellschaft für Naturforschung

© Senckenberg Research Institute
Department Messel Research
Dr. Stephan Schaal

date: 07.11.2003 - Dipl.-Ing. Ronny Gipser, CA-Consulting

Messel Pit Fossil Site Management Plan

1st of November 2009

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Messel Pit Fossil Site

Management Plan (01 November 2009)

Glossary of Terms and Abbreviations

In order to avoid any misunderstandings, the following chart details the German terms and abbreviations and their English equivalents as used within the Messel Pit Fossil Site Management Plan.

BbergG	Bundesbergbaugesetz	Federal Mining Law
BIZ	Besucherinformationszentrum 'ZEIT UND MESSEL WELTEN'	Visitor Information Centre 'TIME AND MESSEL WORLDS'
HDSchG	Hessisches Denkmalschutzgesetz	Hessian Heritage Protection Act
HLMD	Hessisches Landesmuseum Darmstadt	Hessian State Museum
HMWK	Hessisches Ministerium für Wissenschaft und Kunst	Hessian Ministry of Science and Arts
ICOMOS	Internationaler Rat für Denkmalpflege	International Council on Monuments and Sites
IGD	Institut für Graphische Datenverarbeitung	Institute for Graphical Data Processing
IUCN		International Union for the Conservation of Nature
LfdH	Landesamt für Denkmalpflege Hessen	Hessian State Office for Heritage Protection
NABU	Naturschutzbund Deutschland e.V.	German Society of Nature Conservation
NGO	Nicht-Regierungsorganisation	Non-Governmental-Organization
OP		Operational Guidelines for the Implementation of the World Heritage Convention
SGN	Senckenberg Gesellschaft für Naturforschung	Senckenberg Society for Nature Research
UNESCO		United Nations Educational, Scientific and Cultural Organisation
WGM gGmbH	Welterbe Grube Messel gGmbH	Messel Pit World Heritage Non-Profit Limited
ZAS	Zweckverband Abfallwirtschaft Südhessen	South Hessian Joint Waste Management Authority
	Bergaufsicht	Head Mining Office
	Bodendenkmal	Historical Landmark
	Erbbaurechtsvertrag	Leasehold Agreement (2007)

Museumsverein Messel e.V.	Messel Museum Association
Fossilienmuseum Messel	Messel Museum of Fossils and Local History
Geo-Naturpark Bergstraße-Odenwald	Global Geopark Bergstrasse-Odenwald
Grube Messel Verwaltungsgesellschaft mbH	Society for the Preservation of the Messel Pit Fossil Site
Grundgesetz der Bundesrepublik Deutschland	Fundamental Law of the Federal Republic of Germany
Hauptbetriebsplan 2004-2013	Main Operating Plan 2004-2013
Hauptbetriebsplan Grube Messel 2004-2013	Messel Oil Shale Pit Main Operating Plan
Hessisches Forstamt Dieburg	Hessian Forestry Office Dieburg
Hessisches Gesetz über Naturschutz und Landschaftspflege	Hessian Nature Conservation Act 1980
Oberste Denkmalschutzbehörde	Supreme Authority for Heritage Protection
Untere Denkmalschutzbehörde	Lower Authority for Heritage Protection
Vereinbarung über die Präsentation der Weltnaturerbestätte Grube Messel	Agreement on the Presentation of Messel Pit World Heritage (2005)
Vertrag über die Durchführung paläontologischer Grabungen in der Grube Messel	Agreement on the Conduct of Palaeontological Excavations at the Messel Pit (1992)

Chapter One: Introduction

1.1 Vision

The Messel Pit became known for its rich abundance of fossils in an extraordinary state of conservation as early as the 19th century and remains one of the most important mammal fossil sites until today. The exhaustive fossil record of Messel Pit not only allows the reconstruction of the evolution of early mammals but also gives a unique insight into the biotopes in which they lived. In 1995, in recognition of these outstanding qualities, UNESCO (United Nations Educational, Scientific and Cultural Organisation) inscribed the site onto the World Heritage List. The Messel Pit Fossil Site thereby became Germany's sole exclusively natural World Heritage Site until 2009, when the trans-national natural heritage site "The Wadden Sea" was inscribed into the list.

In order to safeguard the values for which the site was inscribed and to preserve them for future generations, the Messel Pit Site has to be carefully managed. Therefore the vision of the key partners – namely the Hessian Ministry of Science and Arts (HMWK), the Senckenberg Society for Nature Research (SGN) and Messel

Pit World Heritage Non-Profit Limited (WGM gGmbH) – who cooperated for the development of the management plan, is to:

- Protect Messel's outstanding universal value
- Advance scientific research and sustainable tourism
- Provide a key document for the cooperation of stakeholders
- Build local, national and international networks to propagate said vision
- Raise awareness of the problems of the site and to facilitate identification of it for visitors and the local population alike
- Improve the accessibility of the site to make it enjoyable for everybody
- Educate visitors in order to improve understanding of the site's values

1.2 Key Partners

The key partners in the context of the management plan are organisations, who have a direct influence on the management of Messel Pit either by their respective rights or responsibilities.

Hessian Ministry of Science and Arts (HMWK)

The Hessian Ministry of Science and Arts is accountable for professional and legal support and supervision of three of the World Heritage Sites in Hesse. The Ministry represents the interests of the Federal State of Hesse as the sole land owner of the Messel Pit Fossil Site.

Senckenberg Society for Nature Research (SGN)

The Senckenberg Society for Nature Research was founded in 1817 as a private organisation. In 1821, its first museum opened its doors to the public interested in geology, palaeontology, botany and zoology. The SGN has in the meantime acquired a respected reputation worldwide in these scientific fields and the Senckenberg Museum has become one of the largest museums for natural history in Germany. Today, more than 4,000 members contribute generously to the scientific institution and the museum by private donations and individual memberships.

In 1992, the SGN not only took responsibility for the proper scientific utilization of Messel Pit but also the general operation of the site. The Department of Messel Research was set up in 1993 by SGN as part of the Senckenberg Research Institute

with the primary objective of the investigation and reconstruction of the Eocene Lake Messel. SGN operates a field office next to Messel Pit as a base station for the planning and implementation of scientific excavations and the preparation of the findings.

Messel Pit World Heritage Non-Profit Limited (WGM gGmbH)

Messel Pit World Heritage Non-Profit Limited was founded in 2003 as a non-profit organisation under German legislation. Its primary purpose is the presentation of the Site to visitors, including related aspects and activities – such as visitor management and the operation of related facilities – such as the visitor centre. Its shareholders are the State of Hesse, the Senckenberg Society for Nature Research (SGN) and the municipality of Messel. As appointed in the 2005 contract, Messel Pit World Heritage Non-Profit Limited acts as a trustee for the State of Hesse (Please see 3.2 'National Legal Framework', 'Agreements')

1.2 Other partners:

The following organisations are numbered among 'other partners'. Though they are not directly entrusted with the management of the site, most of them have made a contribution to its protection and the scientific exploration in the past. Therefore they are seen as major stakeholders and are consulted and involved in a participatory approach. The most active ones are as follows:

Hessisches Landesmuseum Darmstadt

Louis I, Grand Duke of Hesse, donated his collection of arts and other objects to the public in 1820 and thereby laid the foundation for the later museum. Today, the museum contains two divisions: the division of art history and cultural history and the division of natural history, including geology and palaeontology, mineralogy and zoology. Since the 1970s, Hessisches Landesmuseum Darmstadt has been conducting excavations at the Messel Pit and retrieving a large collection of fossils.

Hessian State Office for Heritage Protection (LfDH)

The Hessian State Office for Heritage Protection is a technical authority and therefore not part of the hierarchy of the administrative authorities. Its responsibilities are the enforcement of heritage protection, the supervision and the consultation of owners of cultural heritage properties in conservation, maintenance and

reconstruction, the compilation of a methodical inventory of cultural heritage properties and the scientific examination of these assets. Additionally, it acts as the advisory body to the Hessian Ministry of Science and Arts and also maintains a palaeontological division.

Messel Museum Association (Museumsverein Messel e.V.)

Messel Museum Association has been operating a museum of fossils found at the site as well as local history since 1978 with the support of the municipality of Messel. Regular meetings between the statutory bodies and Messel Museum Association are held to inform and discuss members about future developments at the site.

Geopark Bergstrasse-Odenwald Association (Geo-Naturpark Bergstraße-Odenwald e.V.)

In 2004, UNESCO assisted in the creation of the Global Geoparks Network, the intention of which is to preserve the geological heritage of a region, to increase the understanding of this heritage among locals and visitors, and to promote tourism and sustainable regional development. The Geopark Bergstrasse-Odenwald Association joined the European Geoparks Network and the UNESCO Global Network in 2002.

1.3 The UNESCO World Heritage List

The General Conference of UNESCO adopted the Convention concerning the Protection of the World Cultural and Natural Heritage in 1972, which declares that the preservation and protection of cultural and natural properties of outstanding universal value is not limited to a national or regional level. According to the Operational Guidelines⁴, “the cultural and natural heritage is among the priceless and irreplaceable assets, not only of each nation, but of humanity as a whole. The loss, through deterioration or disappearance, of any of these most prized assets constitutes an impoverishment of the heritage of all the peoples of the world. Parts of that heritage, because of their exceptional qualities, can be considered to be of 'outstanding universal value' and as such worthy of special protection against the dangers which increasingly threaten them.”

Therefore the Convention of 1972 also stipulated the composition of the World Heritage List, which is managed by the inter-governmental World Heritage Committee and contains sites which are selected in a nomination process. In this process, applying sites have to prove that their respective outstanding universal value as well as meeting the criteria of “authenticity” (for cultural sites) and integrity

(for cultural and natural sites) are met and appropriate means for its protection and management are in place.

According to the 2008 Operational Guidelines for the Implementation of the World Heritage List, the nominated properties have to fulfil at least one of the following criteria.

- *(i) represent a masterpiece of human creative genius;*
- *(ii) exhibit an important interchange of human values, over a span of time or within a cultural area of the world, on developments in architecture or technology, monumental arts, town-planning or landscape design;*
- *(iii) bear a unique or at least exceptional testimony to a cultural tradition or to a civilization which is living or which has disappeared;*
- *(iv) be an outstanding example of a type of building, architectural or technological ensemble or landscape which illustrates (a) significant stage(s) in human history;*
- *(v) be an outstanding example of a traditional human settlement, land-use, or sea-use which is representative of a culture (or cultures), or human interaction with the environment especially when it has become vulnerable under the impact of irreversible change;*
- *(vi) be directly or tangibly associated with events or living traditions, with ideas, or with beliefs, with artistic and literary works of outstanding universal significance.²*
- *(vii) contain superlative natural phenomena or areas of exceptional natural beauty and aesthetic importance;*
- *(viii) be outstanding examples representing major stages of earth's history, including the record of life, significant on-going geological processes in the development of landforms, or significant geomorphic or physiographic features;*
- *(ix) be outstanding examples representing significant on-going ecological and biological processes in the evolution and development of terrestrial, fresh water, coastal and marine ecosystems and communities of plants and animals;*
- *(x) contain the most important and significant natural habitats for in-situ conservation of biological diversity, including those containing threatened species of outstanding universal value from the point of view of science or conservation*

The World Heritage currently (August 2009) includes 890 properties, including 689 cultural, 176 natural and 25 mixed properties from 145 state parties. As of November 2007, 186 state parties have ratified the World Heritage Convention.

According to the Operational Guidelines, the criteria of “authenticity” applies for all sites listed under criteria (i) to (vi) from above and is met when their cultural values “are truthfully and credibly expressed through a variety of attributes including form and design, material and substance, use and function, traditions, techniques and management systems, location and setting, language and other forms of intangible heritage, spirit and feelings and other internal and external factors” (Operational Guidelines 2008, section 82).

The criterion of “integrity” is met, when a property

- a. *“includes all elements necessary to express its outstanding universal value;”*
- b. *“is of adequate size to ensure the complete representation of the features and processes which convey the property’s significance;”*
- c. *“suffers from adverse effects of development and/or neglect”*

(Operational Guidelines 2008, section 88).

For properties listed under criteria (vii) to (x), as in the case for Messel, integrity means that “bio-physical processes and landform features should be relatively intact. However, it is recognized that no area is totally pristine and that all natural areas are in a dynamic state, and to some extent involve contact with people. Human activities, including those of traditional societies and local communities, often occur in natural areas. These activities may be consistent with the outstanding universal value of the area where they are ecologically sustainable” (Operational Guidelines 2008, section 90).

The inscription of the Messel Pit Fossil Site

The World Heritage Convention was ratified by the Federal Republic of Germany in 1976 and acceded by the German Democratic Republic in 1988. In 1990, with the unification of both German states, it was agreed in the Unification Treaty that the treaties and agreements to which the Federal Republic of Germany was a contracting party remained in force and that their respective rights and obligations were to be applied to the whole territory of Germany.

The World Heritage Committee on its 19th session in Berlin in 1995 followed its advisory body, the International Union for the Conservation of Nature (IUCN), which opted for Messel’s inclusion in the World Heritage List under criteria (viii) - the former natural criteria (i) - *“considering that the site is of outstanding universal value as the single best site which contributes to the understanding of the Eocene, when mammals became firmly established in all principal land ecosystems. Furthermore, the Committee commended the German Government for their support of the high standards of palaeontological research undertaken.”*

It therefore confirms the justification provided in the nomination document:

"[Messel Pit] contains examples of the major stages of earth's history and outstanding geological features. Messel Pit fossils are the remains of organisms from the middle Eocene strata dating back 50 million years. The Messel Pit Fossil Site demonstrates a vital and explosive evolution of mammals that mainly occurred during the Eocene. Few high quality sites are known to provide the opportunity to study this process, and at none of these sites are the fossils so outstandingly preserved or their habitats so extensively reconstructible in a wide variety of biotopes. The specimens provide information to decipher the history of the large subphylum of vertebrates. The finds embrace a wide spectrum of diverse Eocene life-forms unequalled by virtually any other site."⁴

Fossil Sites on the World Heritage List

Messel Pit Fossil Site constituted the third fossil site inscribed in the World Heritage List after

- Dinosaur Provincial Park, Canada, inscribed in 1979
- Australian Fossil Mammal Site, inscribed in 1994.

Four other fossils sites have been inscribed after Messel Pit Fossil Site:

- Fossil Hominid Sites of Sterkfontein, Swartkrans, Kromdraai, and Environs, South Africa in 1999
- Miguasha National Park, Canada in 1999
- Monte St. Giorgio, Italy in 2003
- Wadi Al-Hitan (Whale Valley), Egypt, in 2005
- Joggins Fossil Cliffs, Canada in 2008.

A number of other prominent sites containing fossil sites have also been nominated:

- Grand Canyon National Park, United States of America, in 1978,
- Canadian Rocky Mountain Parks, Canada, in 1984
- Dorset and East Devon Coast, United Kingdom, in 2001.

Chapter Two: Description and historical background of the site

2.1 Geological overview and history of formation

2.1.1 Geological formation of Messel Pit

The Messel Pit owes its existence to complex processes in plate tectonics, which originated in the formation of a rift system in the Dogger period of the Middle Jurassic, some 170 million years ago. This rift system, which later formed the Atlantic Ocean, caused the break-away of the African continent from the supercontinent Pangaea. In the Lower Eocene period, around 53 million years ago, the northward movement of the African Continent led to the collision of the Adriatic Plate with the Eurasian Plate, which initiated the formation of the mountain chain of the Alps. The very same continental drift also caused the depression of the Upper Rhine Graben - a rift system which extends from the Swiss Jura near Basel to the southern edge of the Taunus, north of Frankfurt/Main. In an isostatic response, uplift occurred at the flanks of the rift system and the thinning of the crust allowed magmatic and volcanic activities to occur, resulting in dykes which parallel the Upper Rhine Graben.

The Messel Pit itself is located on an uplifted block of magmatic and metamorphic rocks from the Paleozoic, which are covered by continental sediments and volcanic rocks of the Lower Permian age. Today, the uplifted area is called 'Sprendlinger Horst' and seen as the northernmost extension of the Odenwald. To the west, north and east it is surrounded by areas of depression: the Upper Rhine Graben, the Neulsenburger depression and the Hanau-Seligenstädter depression. The same geological strata, which surface at Messel Pit are buried under thick layers of sedimentary and volcanic rocks in the depression areas. In the Upper Rhine Graben, they can only be found at a depth around 1500 metres or more.

The volcanic activities at the flank of the Upper Rhine Graben led to the formation of today's Messel Pit during the Tertiary. Molten rock ascended along a vertical fault line and came in contact with ground water some 100 metres below the surface. The extreme difference in temperature led to the instant evaporation of the ground water, fuelling a so-called "phreatomagmatic explosion" – thereby shattering and ejecting the rocks above the point of contact. As a result, a funnel-shaped crater formed and was partly filled with the ejected bedrock. Rock debris and volcanic ash, also ejected during the explosion, piled up and subsequently formed a low crater wall. Until today, the remains of that crater wall consisting of loose and lightweight materials have completely eroded away. The process of the formation of the Messel Pit was heavily disputed in the past and was only proven as recently as 2001 by geoscientific investigations and drilling.

In the aftermath of the phreatomagmatic explosion, which occurred around 48 million years ago, groundwater filled the 700 metre-wide and 1000 metre-long crater and formed the Messel Pit crater lake. Organic sediments, the remains of algae and bacteria, formed the first strata of the so-called 'Messel Formation', organic sediments which later became known as the "oil shale". At the centre of the Messel Pit, this formation has piled up to a thickness of more than 200 metres and incorporates 1-1.5 million years of sedimentation, the life-span of the Messel Pit crater lake.

During the time the Messel lake was in existence, it was located on the Central European continent, though not far away from the coastline: the shallow bays of the former North Sea stretched as far south as the present-day Central-German Midlands and to the west the sea extended over today's English channel and into the Paris Basin. To the south was the Thetys sea, the ancestor of the modern Mediterranean. If one also takes plate tectonics into account, the position of Messel Pit has since the early Tertiary shifted around 1300 kilometres northward and some distance - which cannot be determined by scientific methods - eastward. So, at its time of existence, the Messel lake was located at a latitude of around 38 degrees of latitude - comparable to the latitude of southern Spain or Sicily today.

2.1.2 The fossils of Messel Pit

Very special conditions had to be fulfilled for fossilization processes to occur at the Messel crater lake, which had a small diameter (around 1.5 kilometres) and comparably great depth of around 300 metres - common characteristics of Maar lakes. These physical characteristics constrained the mixing process of the water which usually occurs in shallower lakes. The disgorged material which formed the crater wall acted as an additional barrier for the inflow of water and air currents.

As a result, nutrients and oxygen were dispersed in life-sustaining amounts only in layers relatively close to the water surface (down to a depth of approximately 20 metres). However, even in the top levels of the water column of the lake, nutrients and oxygen were subject to strong seasonal changes. Sediments from the eroding crater wall were washed into the lake during rainy seasons, while algae bloomed in the dry seasons.

Below the surface, conditions became too hostile for most life-forms to deal with. At the bottom of the lake, only anaerobic bacteria were able to completely decompose the remnants of dead matter and bodies of the life forms from below the water surface. The remains of the anaerobic bacteria, conserved by geological and chemical processes, left a minute imprint of the bodies they decayed - and today form the famous fossils of Messel Pit.

The specific feature which distinguishes Messel Pit World Heritage Site from the great majority of similar fossil sites is due to the extraordinary conditions of conservation of its fossils, which allow a detailed reconstruction of the biotope and the habitats they lived in. Since Messel was located a great distance southward in the early Tertiary in comparison to its present-day location, the climate was similar to subtropical and tropical climates today. As a result, the fauna and flora bear resemblance to those found in similar climate zones at present.

Plant fossils are well represented in Messel Pit - the Senckenberg Research Institute lists over 20,000 catalogued specimens - usually in the form of seeds, pollen grains,

leaves, fruits and algae, whereas wooden remains are rarely conserved. Many of the preserved ferns or tree species are either extinct or related to species found in the tropics of Central America and Asia.⁵

Insects - with their abundance and functions vital for almost every terrestrial ecosystem - are a good indicator of the ecosystems they live in. In total, close to 15,000 specimens of insects have been found in Messel, with beetles, constituting the largest group, totally about 60 per cent of all insects. While land-based insects seemed to dominate the insect fossils of Messel pit, recent studies of fish excrement have shown that water-living insects were equally abundant. The majority of the fossilized insect species is related to today's species. Spectacular fossils, like giant ants with a wingspan of up to 16 centimetres are rarely found.⁶

The adaptations of fish species - the ability to directly breathe air and to re-absorb materials from their scale margins - indicate a sometimes hostile environment. The most common fish species was *Atractosteus trausi*, a member of an archaic group of fishes remarkable for their strong skull bones and *Cyclurus kehreri*, a relative of the bowfins of eastern North America. All fish species found in Messel were predators.⁷

Only five species of amphibians have been found in Messel, in particular salamander and frog species. Surprisingly, maybe due to the inferior water quality, aquatic frogs are very rare, whereas terrestrial toad/frog species (anurans) are more common.

Three of the modern four orders of reptiles have been found at Messel: snakes and lizards, turtles and crocodiles, among them the first crocodile remains were discovered in 1877. Noteworthy again is the extraordinary condition of preservation of most of the reptiles - with complete skeletons of fragile bones as in the case of snakes like *Palaeopython fischeri* and three-dimensionally preserved remains of reproductive organs of turtles. These cold-blooded animals also act as climate indicators which show that the average temperature must have been higher than today.

The birds, as well as the most iconic fossils of Messel Pit, the mammals, are represented by a wide variety of species. Most of these either belong to archaic, now extinct groups or are early predecessors of today's species, therefore bearing testimony to the rapid evolution of these classes until today. Again, the extraordinary quality of the fossils (including such fine structures as feathers, hair and soft body tissues such as wing membranes, stomach and intestinal contents) allow researchers to make conclusions that go far beyond the mere morphology of these animals. Some of these include the reconstruction of movements, reproduction, feeding patterns and other important discoveries.

2.2 History of raw material production:

The identification of small amounts of bog iron ore in the middle of the 19th century in the area of today's Messel Pit led to the discovery of Messel brown coal and in turn oil shale. The mining company "Messel Union" (Gewerkschaft Messel) was originally founded by the banker Cäsar Straus in order to exploit the oil shale.

The brown coal (oil shale) found, however, was unsuitable for use as fuel. That being said, its components were extracted in a process of low-temperature carbonization and then sold. An appropriate technology for the extraction process had to be invented, in which a representative of the company, the 28-year-old chemist Dr. Adolf Spiegel, played a leading role. The oil shale was extracted from an open-cast mine, broken down and then carbonized by distilling it at a temperature of about 500 C. At first, the furnaces caused problems with the process which led to a difficult economic situation for the young company in the 1890s. After the problems were resolved, new products could be launched and the output of crude oil increased. At first, the main products were tar and paraffin, which were used in the production of candles. At the beginning of the 20th century gasoline, diesel and fuel oil became the company's main products and ammonium sulphate (fertilizer), coke, and from the 1920s onwards electrode coke, formed the most important by-products.

When the Messel furnaces were introduced in 1900, production increased dramatically. During World War I, the production of engine fuel became an important asset for the company. In light of the economic regression after the war, Messel Pit joined the company "Riebeck'sche Montanwerke" in Halle, Saxony, which also operated brown coal carbonization plants. In 1918, the entrepreneur Hugo Stinnes took over the company and its name was altered to "Hugo Stinnes-Riebeck Montan- und Ölwerke AG". After his death in 1924, the company became part of the IG-Farben Chemical Company. In the following decades until 1945, the modernization of the Messel Pit factory continued: a new boiler house was built, more excavators were purchased and the refinery was re-equipped. Ultimately, 32 furnaces were in operation.

During the Second World War, the company became important for the supply of raw materials but nevertheless, in spite of great efforts, production fell. At the end of the war, on March 24th and 25th, 1945, the factory was bombed twice from the air. Although the mine itself, the factory buildings and the plant were not actually damaged, the supply lines were hit by gunfire and the electricity supply was cut off. This meant that the carbonizing furnaces could not be discharged and, as a result became deformed.

After the end of the war, the Messel factory was handed over to the Americans who became responsible for the administration of the business, which was run under the name "Messel Paraffin and Petroleum, U.S. Administration". The most important parts of the plant were quickly repaired and production was started up again, which was made possible with the help of the Marshall Plan. Conveyor belts replaced the

old carts, both for transporting shale and removing waste. In spite of all this, the days of producing crude oil from oil shale were numbered. New sources of oil were discovered in 1952, which meant that production at Messel became increasingly uneconomic and less important.

On January 1st, 1954, the ownership of the works was returned to German hands. The economic situation, however, became more critical: on top of competition from crude petroleum, the company was confronted with social charges, environmental impositions and technical problems in open-cast mining. On top of that, the work force started to move into “cleaner” professions. In 1959, the Ytong Company, which began by making bricks from the slag-heaps, took over the mineral oil works. In March 1962, the carbonizing furnaces, the heart of the company, were shut down. Ytong continued to mine oil shale for the production of energy until 1972, when the pit was finally closed altogether. ⁸

2.3 History of scientific research

The first fossils were found in Messel Pit as early as 1870 while workers were searching for brown coal. These first finds belonged to the order of crocodiles and were described by Ludwig in 1877. At the end of the 19th century, additional finds were published, containing several species of freshwater-fish, remains of turtles, a bird skeleton and imprints of leaves. In the following decades, the director of the mining company, Dr. Spiegel, himself a natural scientist with a broad range of interests – collected and salvaged fossil remains which were discovered in the progress of the mining operations. He thereby laid the foundations for later scientific research by collecting an increasing number of finds, including remains of plants, insects, turtles, bats and equines. In 1911, Oskar Haupt, the custodian of the Geological-Palaeontological division of Hessisches Landesmuseum Darmstadt identified the geological age of this fossil site while researching the equines of Messel. His dating of the site to the Middle Eocene is still valid in principle today.

When the mining of the oil shale by hand was replaced by mechanization in the 1920s, the number and quality of new findings decreased. Despite of this, the plant management was able to obtain numerous new fossils. In 1966 and 1967, Hessisches Landesmuseum Darmstadt found some rare objects, including a skeleton of a frog and the skull of another amphibian in the course of planned excavations.

When the mining stopped, a 'hole' was left that extended approximately 1000 metres from north to south and 700 metres from east to west. Up to that point in time, the public had paid little attention to the Messel Pit. However, it soon became better known, since the increased opportunity to search for fossils, combined with improved preparation techniques available, now meant that spectacular finds could easily be made accessible to the public. Plans to turn the former quarry into a rubbish-dump also gained it public recognition. A 20-year long struggle began, involving highly

motivated citizens and scientists, to save this unique fossil site. From 1975 onwards, regular scientific digs were organized and conducted by Hessisches Landesmuseum Darmstadt, the Senckenberg Research Institute and other scientific institutes, which reported many sensational finds.

The movement organized by the citizens and the community of Messel became stronger and more active and the people were finally successful in their bid to save Messel Fossil Pit. The plans to construct a waste disposal site, initiated by the Head Mining Office in Wiesbaden, were declared to be illegal by the Court of Administration in Kassel on November 23rd, 1988. The legal dispute was ended after an appeal, the costs of which were taken over by the Federal State of Hesse, who also purchased the site from the South Hessian Joint Waste Management Authority for approximately 16.7 million Euros.

2.4 History of tourist utilization

In the beginning of the 1970s, as new methods for conserving the rapidly deteriorating oil shale were developed and the interest of a broader public in fossil remains increased, Messel became well-known to private collectors of fossils. When one such collector had excavated the fossil of the predecessor of the modern tapir and supposedly earned a huge amount of money by selling it, this created a kind of gold-rush for fossils. By the end of 1974, Messel Pit had to be closed to the public by the Mining Head Office for security reasons.

However, when the plans of the South Hessian Joint Waste Management Authority to turn Messel Pit into a waste disposal site became known, this led to a public outcry by scientists and concerned private citizens. During the struggle for the safeguarding of Messel's fossils, the site not only gained publicity in scientific circles, but also to the general public. In 1981 and 2000, for example, articles about Messel were published in "Geo"-magazine, a nationwide magazine for popular science. The very threat of Messel's destruction as a fossil site not only increased its profile on a national level, but internationally as well.

A number of exhibitions in Senckenberg Museum, Hessisches Landesmuseum Darmstadt and Messel Museum of Fossils and Local History additionally promoted Messel Pit, so that not only the exhibits, but also the site in which they were found, gained recognition.

Despite the difficulties of turning a former mining site into a safe location for visitors, a viewing platform was installed at the border of Messel Pit in 1997, which provides a view of Messel Pit to visitors, especially to those, who cannot take part in guided tours due to physical problems. With continuing growth of public interest and an increase of visitation, Messel's prominence as a tourist destination will grow further.

It is the belief of the key partners that this increase in tourist numbers is not in opposition, but rather in accordance with the World Heritage Convention, under the provision that a sustainable visitor management is developed, as detailed in this management plan. In addition, the current visitor numbers, of around 25,000 a year, are quite low in comparison to other World Heritage Sites and the planned increase of visitor will be largely limited to the area of the new visitor centre. The number of those actually descending into Messel Pit will also increase moderately due to improved facilities for visitors.

The construction of the visitor centre and the planned increase in visitor numbers has a considerable effect on a number of management issues, such as visitor safety (please see also Chapter 8). Since the only way to descend into Messel Pit is by guided tours, which are limited to a number of a maximum of about 50 participants each, visitors can be closely supervised so that the increase in their numbers is currently not seen to have detrimental effects on the integrity of the site. Currently, eight guided tours can take place simultaneously, so that the maximum number of visitors at a time is limited to around 400 people.

In order to safeguard the integrity of Messel Pit in future, all effects of increased visitation will be closely monitored in the course of periodic reporting (please see 10.1).

Detailed plans for the visitor information centre are given under 6.2.4. and 8.1.3.

Chapter Three: Statutory Framework

3.1 International conventions and charters

The World Heritage Convention

The Convention concerning the Protection of the World Cultural and Natural Heritage was adopted in 1972 by the member states of UNESCO. In this convention, the signatory state parties recognized their duty of ensuring the identification, protection, conservation, presentation and transmission to future generations of their respective cultural and natural heritage.

In 1976, the World Heritage Committee was founded which was made up of – an international committee elected by the general assembly of UNESCO by its member states. Additionally, the World Heritage Fund was established and the Operational Guidelines were adopted by the World Heritage Committee in June 1977. Within the last few decades, these guidelines were updated on a regular basis to reflect the changes in heritage protection and management. The most recent version of the Operational Guidelines was published in January 2008. The guidelines require that each nominated property should have an appropriate management plan or management system and which specifies the elements which should be considered

in such a plan – thereby setting a framework which is binding for the Messel Pit Fossil Site Management Plan.

However, the World Heritage Convention has not been separately implemented in German law. It was seen that the Convention is not necessary to enforce since there is already appropriate German legislation which protects natural and cultural heritage.

With a growing number of fossil sites applying for World Heritage nomination, an evaluation adapted for fossil sites had to be developed to better judge the qualities of outstanding universal value of these sites. The International Union for the Conservation of Nature (IUCN) developed during the nomination process of Miguasha Provincial Park in 1994 its IUCN Fossil Sites Evaluation Checklist, consisting of ten questions every newly nominated site has to fulfil (please see 5.1). The checklist was published in IUCN Evaluation of Nominations of Natural and Mixed Properties to the World Heritage List.

Fossil sites all over the world usually are seen to be part of natural heritage. Unlike other nature reserves, as for example national parks, their purpose of existence is not to protect parts of an ecosystem or a specific species but to gain an understanding of the evolutionary development of life forms from the past. This places fossil sites in scientific methods in the realm of archaeological sites, which are considered cultural heritage. Possibly due to this in-between-status, no international convention or charter concerning the protection and management of fossil sites as separate entities exists. The development of such a convention or charter, which might be an adaptation of the ICOMOS Charter for the Protection and Management of Archaeological Heritage, remains subject to future development.

3.2 National legal framework

Under Article 30 of the Fundamental Law of the Federal Republic of Germany (German Constitution of 1949), the exercise of governmental powers and the discharge of governmental functions are incumbent on the Federal States in so far as the constitution does not otherwise prescribe or permit. There is no overriding or constitutional provision in cultural matters. The power to legislate on cultural matters, including the protection of the national heritage is vested in the Federal States under their “cultural sovereignty”.

In the Federal State of Hesse, heritage protection and conservation are distributed to various authorities with differing fields of responsibility. In respect to heritage protection, the Hessian Ministry of Science and Arts holds supreme authority for

heritage protection (Oberste Denkmalschutzbehörde). The lower authorities for heritage protection (Untere Denkmalschutzbehörden) are located in counties and communities whose main responsibility is to provide administrative decisions concerning heritage protection. Both types of authorities are counselled by heritage advisory committees. The Hessian State Office for Heritage Protection (LfDH) is provides scientific advice in questions adhering to heritage protection.

Legislation

The following legislation affects the management of Messel Pit Fossil Site:

- Hessian Heritage Protection Act (HDSchG) of 1 October 1974 with amendment of 5 September 1986

Due to a special feature under the HDSchG (section 19), the oil shale in Messel Pit is considered to be a historical monument (Bodendenkmal), which is defined as containing or representing “movable or non-movable objects, being evidence, remnants or traces of human, **animal or plant life**, which stem from eras and cultures, for which excavations and findings are the main sources of knowledge.” According to that definition, there is no clear separation between cultural and natural heritage; historical landmarks can be part of both categories.

- Mining Act of the German Federal Government of 13 August 1980

Most recently amended on 9 December 2006, this act defines the terms of conditions, under which mining activities in Germany must be conducted and under which former mining sites have to be operated (as is the case for Messel Pit). The Mining Act mainly details the safety of the site by prescribing the composition of operating plans for (former) mining sites in intervals of a decade as a prerequisite. Currently the Messel Oil Shale Pit Main Operating Plan for 2004 -2013, which includes detailed and specific regulations for the operation of Messel Pit, is in force.

- Hessian Nature Conservation Act of 1980, most recently amended 2006

This act sets the legal framework for nature conservation in the Federal State of Hesse. It also incorporates the 'Nature 2000' guidelines of the European Union, which were adopted in 1992 and designed to protect the most seriously endangered species and habitats across Europe. The act defines which levels of interference – by agriculture, forestry-use or fishery – are acceptable for specific areas and strictly limits exemptions of this law.

Agreements

The preferred method to set legal obligations, which are mainly concerned with questions of ownership and responsibilities, comprises agreements, subject to public law and usually contain one or more public bodies as contractors. Four agreements adhere to the management of the site:

- Agreement of 26 June 1992 on the Conduct of Paleontological Excavations in Messel Pit between the Hessian Ministry of Science and Arts (HMWK) and the Senckenberg Society for Nature Research (SGN). This agreement details the following main aspects: the mode of operation and scientific standards for excavations and the constitution, composition and fields of responsibility of a scientific advisory board (please see 6.1.2). Most importantly, the operation of Messel Pit Fossil Site is assigned to the Senckenberg Society for Nature Research in compliance with existing laws and regulations.
- Agreement of 17 December 1992 on the Scientific and Cultural Use of the Messel Pit Fossil Site. This contract includes the foundation of the Society for the Preservation of the Messel Pit Fossil Site (Grube Messel Verwaltungsgesellschaft mbH)
- Agreement of 28 February 2003 on the re-structuring of the “Society for the Preservation of the Messel Pit Fossil Site” into “Messel Pit World Heritage Non-Profit Limited” (WGM gGmbH) between Hessian Ministry of Science and Arts (HMWK), Senckenberg Society for Nature Research (SGN) and the municipality of Messel. WGM gGmbH is constituted by three shareholders: the State of Hesse (65%), SGN (25%) and the municipality of Messel (10%). WGM gGmbH’s main responsibility consists of the presentation of the site to the public, including the operation and maintenance of a visitor centre and a viewing platform, the regulation of public access, and the participation in approval procedures concerning the scientific use and the prevention of hazards.²
- Agreement on the Public Presentation of Messel Pit Fossil Site of 2005, between the State of Hesse and Messel Pit World Heritage Non-Profit Limited (WGM gGmbH): The State of Hesse transfers all rights which are a result of its ownership of Messel Pit, particularly the rights for public access and the public presentation of Messel Pit, to WGM gGmbH. Furthermore, the State of Hesse assigns its authority, as detailed in the agreement on the “Scientific and Cultural Use of the Messel Pit Fossil Site” of 1992 to WGM gGmbH as trustee.
- Leasehold Agreement of 16 November 2007, accredited in December 2008, between the Hessian Ministry of Science and Arts (HMWK) and the South Hessian Joint Waste Management Authority (ZAS) concerning the construction of a visitor centre. The land, on which the visitor centre will be erected, is property of the publicly owned local joint waste management authority. The Federal State of Hesse is in the process of paying the agreed

amount to the owner; the lease period extends over 99 years. (please see Chapter Four and Appendix 1)

3.3 Non-Statutory Framework

Guidelines as published by the World Heritage Centre in the series “World Heritage Papers” have been consulted in the preparation of the management of Messel Pit World Heritage Site, specifically the World Heritage Paper No. 23 “Enhancing our Heritage Toolkit - assessing management effectiveness for natural World Heritage Sites”.

Chapter Four: Protected Area

4.1 Extension of the site

Messel Pit is located in a forested region in between of the towns of Darmstadt, Dieburg and Langen, about 20 kilometres south-east of Frankfurt/Main, which is approximately eight kilometres north-east of Darmstadt and about two kilometres south of the village of Messel. After almost a century of mining activities, in which a considerable amount of oil-shale was extracted, the former open-cast mine covers an area of 1.5 square kilometres, extending approximately 1000 metres to the north and south and 700 metres in an east-west direction, as well as reaching down to a maximum depth of approximately 70 metres. The area is fenced in by a perimeter enclosure to prevent trespassing. Currently there are two entrance ways to Messel Pit: the winding road which was built in connection with Messel's formerly planned function as a waste disposal site in the 1980s, and an additional entrance east of the pit which is intended to facilitate access to Messel Pit in the future.

4.2 The World Heritage Property of Messel Pit

The geological formation of oil shale at the bottom of Messel Pit contains fossil remains which are examples of a major stage of earth's history and an outstanding geological feature. This geological formation contains the remains of organisms from the middle Eocene strata dating back 50 million years which has been recognized as the asset which classifies the Messel Fossil Pit as a World heritage site as described in the nomination document and accepted as such by the World Heritage Committee. Only parts of this geological formation are accessible on the surface while most of it lies deep underground.

4.3 The buffer zone

When Messel Pit Fossil Site applied for World Heritage nomination in 1994, the Operational Guidelines did not yet foresee the delineation of a buffer zone, in which the conservation and protection of a World Heritage property is particularly enforced. With newer amendments to the Operational Guidelines, such an appropriate buffer zone is now required for inscription on the World Heritage List. According to current standards, a protected area in the form of a buffer zone should feature the following criteria:

"For the purposes of effective protection of the nominated property, a buffer zone is an area surrounding the nominated property which has complementary legal and/or customary restrictions placed on its use and development to give an added layer of protection to the property. This should include the immediate setting of the nominated property, important views and other areas or attributes that are functionally important as a support to the property and its protection. The area constituting the buffer zone should be determined in each case through appropriate mechanisms."

(Operational Guidelines 2008, section 104).

A perimeter fence was put up which surrounds the whole former mining site and which is under surveillance by foot patrols. These measures have intercepted illegal trespassing and illegal excavations. This fencing-off has proven to be very effective in the protection of those parts of the world heritage site which are accessible on the surface. The buffer zone of Messel Fossil Pit World heritage site is therefore clearly defined by the perimeter fence.

In the 2006 periodic reporting "State of Conservation of World Heritage Properties in Europe" - the protection arrangements of Messel Pit were considered to be highly effective.

4.4 Protection of scenic views and industrial remains

It is also the intention of the key partners to ensure that the scenic views of Messel Pit are not too severely affected by the extensive industrial sites surrounding the World Heritage Site and indeed Messel itself.

An important view of Messel is provided by the viewing platform. At times, visitors on the platform, looking in a northerly direction may distinguish another waste rock pile behind the waste-heap of aerated cement blocks, which are remains of the former industrial use of Messel Pit and in the meantime have become a valuable biotope for snakes and lizards. The former pile consists of demolition waste, which is owned by a company processing it in the vicinity of Messel. The key partners seek to encourage the lowering of this dump beyond the line of visibility to avoid potential visual impairment of Messel Pit by communicating with the Community of Messel.

Chapter Five: Important Values in Site Management

5.1 Statement of significance

In management plans for World Heritage Sites, the term of “outstanding universal value” is of utmost importance for the protection and management of such as site. According to the Operational Guidelines, “outstanding universal value means cultural and/or natural significance which is so exceptional as to transcend national boundaries and to be of common importance for present and future generations of all humanity”. Therefore this chapter focuses on the outstanding qualities set out below.

Messel Pit Fossil Site was inscribed into the World Heritage List at the 19th session of the World Heritage Committee in Berlin in 1995. Previously, in May 1995, an IUCN expert mission had visited the site to evaluate the outstanding qualities of Messel Pit with the help of a detailed Fossil Site evaluation checklist IUCN had developed the previous year (please see 3.1). The checklist provides ten questions developed by IUCN in order to give some indicative measures of significance. The complete checklist can be viewed under

http://whc.unesco.org/archive/advisory_body_evaluation/698.pdf

The evaluation followed the opinion of the nomination document:

“The oil shale Messel Pit provides the single best site which contributes to the Eocene understanding of the middle part of Eocene period. Messel is also exceptional in the quality of preservation, quantity and diversity of fossils. While most fossil vertebrate remains yield only fragments of bone material, Messel offers fully articulated skeletons and the outline of the entire body as well as feathers, hairs and stomach contents. Significant scientific discoveries have and are being made at Messel including studies of the evolution of echolocation in exceptionally well-preserved fossil bats and vital new data on the evolution of the horse. The fossils found here are providing a unique insight into an early stage of mammal evolution when many of the basic steps in diversification were being achieved. But mammals were not the only component of the fauna - birds, reptiles, fish, insects and plant remains all contribute to an extraordinary fossil assemblage. Clearly criterion (I) – the later criterion (viii) – as given in the justification section of the nomination summary is met.”

5.2 Statement of Integrity

Considering the industrial use of Messel Pit, the category of 'integrity' is not easily applicable for Messel Pit. A somewhat paradoxical situation arises, since fossils of Messel Pit owe their very discovery to these early mining activities.

According to the Operational Guidelines, “*properties proposed under criteria (viii) should contain all or most of the key interrelated and interdependent elements in their natural relationships.*” Under these aspects, the extraordinary state of conservation of Messel's fossils, which not only allows for the reconstruction of the morphology of the preserved fauna and flora, but also for that of their environment, the condition of integrity is met to an exemplary degree.

In comparison to other fossil sites the IUCN report concludes:

“In terms of fossil localities which provide a window into the Eocene Age, Messel is the best and most productive example discovered to date. The most obvious comparison would be the brown coal fossil assemblages notably that of Geiseltal, also in Germany, but this site has not received the scientific attention that Messel has. There are some very important localities in Egypt, notably Fayum, which have yielded significant Eocene vertebrates including early primates and whales but Messel is still judged as pre-eminent in terms of richness. The nomination document also notes the Monte Bolca site in Italy which is not as diverse as well as the Green River formation in the western USA which does not offer the quality of specimen preservation that Messel does.”

In contrast to other fossil sites that are marine in origin – for example the deferred Devonian fish site at Miguasha – and thus widespread, Messel can be considered as the single best 'classic' locality 'snapshot' of life as it was in the Eocene. It has been identified as one of the four most significant fossil sites in the world by several senior palaeontologists and by the biologist David Attenborough. At this point in time it can reasonably be claimed that it is the 'best property of its type'.”

5.3 Conclusion

Messel Pit is adequately safeguarded today and it is clear that the Hessian Government has a serious commitment to its long-term maintenance as a site of scientific importance. Controls on excavation are in place and its disturbances to the oil shale are very limited. Although a vast amount of material has been taken from the site during former mining activities – approximately 20 million tons of rock in a century of mining activities – the volume of fossil-bearing oil shale sediments is still massive and far from being depleted.

The actions detailed in the following chapters will show the incorporation of the management objectives as predetermined by said sources.

Chapter Six: Catalogue of measures

In order to achieve comprehensive results regarding the effectiveness of this paper it is indispensable to give a detailed account of the measures which are taken and those which are projected. Every action shall be undertaken with careful accuracy, present no endangerment for the outstanding universal value (please see 1.2 and 5.1) of the Messel Fossil Pit Site and be implemented according to the legal frameworks (please see 3.2). Within the Messel Fossil Pit, three main categories of ongoing and projected measures can be distinguished:

- Maintenance (represented by the Federal State of Hesse and SGN)
- Scientific Research (represented by SGN)
- Public Relations (represented by WGM gGmbH)

These categories are divided into ongoing and projected measures:

6.1 Ongoing Measures:

6.1.1 Maintenance Measures

Although mining activities in the Messel Pit stopped in 1972, the Federal Mining Law is still to be applied since it also covers regulations for unused former mining sites. Therefore scientific excavations and safety measures are liable to the Federal Mining Law which also imposes the obligation of a main operating plan (section 55). The current main operation plan usually has a validity of a decade and has to be renewed subsequently.

In 1992 an agreement about the liability of the Federal Mining Law in the Messel Pit (as open pit) was concluded between the HMWK and the SGN (please see 3.2).

According to this agreement SGN is responsible for the open pit, e.g. the preparation of the main operating plan, it also is in charge of the water drainage, the slope reinforcement, the protection against trespassers and the former North-East Dump.

Section 21 of the Hessian Heritage Protection Act provides that the research in Messel oil shale has been liable to investigation authorisations since 1986. The research permits are given by the Office of Heritage Protection and are valid for a one year excavation period.

The SGN conducts extensive investigations and measurements on a regular basis according to the mining regulations of the Federal Mining Law. The ongoing palaeontological research and excavations within the area of the oil shale are being undertaken in accordance with the report of the 19th session of the World Heritage Committee.

Further measures undertaken include:

- In 1980, 2001 and 2004 core hole drilling took place in order to examine the geology of the soil layers of the Messel Pit (please see Section 2.3).
- Thirty inclinometers (please see Appendix 1) monitor the stability of slopes. In case of landslides, necessary steps are undertaken under the supervision of SGN. Another inclinometer drilling has been conducted in 2009.
- The drainage of the area of Messel Fossil Pit Site is done by means of installations constructed by ZAS, the landowner of public access area. The groundwater and rainwater that gathers on the pit floor is pumped away in order to stabilize the slopes of the pit.
- The water levels in the Messel Pit were defined in agreement with the nature conservation organisations and with the Hessian Office for Heritage Protection and appointed to the height of the 6th bed. To avoid the collection of water and the fluctuation of the water-level two additional water pumps have been set up to pump out accumulating rainwater (please see Appendix 1).
- In case of emergency or special activities, a backup generator is available.
- When the site was declared a World Heritage Site in 1995, a perimeter fence was erected. The fence is comprised of seven drive gates and six entry gates, which are accessible only by authorised personnel. Furthermore, there are three internal gates within the site. Visitors can only access the site with a guided tour via the entrance gate, near the information point. The SGN is in charge of the maintenance of the fence.

- The site and perimeter are kept under surveillance by foot patrols to prevent trespassing.
- The fence construction is also subject to conditions of the German Society of Nature Conservation (NABU) which ensures that wildlife in the Messel Pit is not hindered by the fence and initiated some opening for the trespassing of boars and rabbits.
- In order to control wildlife in the Messel Pit HMWK licensed hunter for the Messel Pit (and the former North-East Dump).
- Regular uprooting of plants is inevitable to ensure the accessibility for and safety of visitors and personnel.

In order to ensure the maintenance of the geological site and the sustainability of ongoing scientific research it is important to prevent regularly renaturation and uncontrolled growth.

The SGN plans to list the animal and plant species which can be found in the area of Messel Fossil Pit site.

6.1.2 Scientific Research

Regarding **excavations** at the World Heritage Site, different layers of protection apply. The buffer zone has been categorized into five so-called “geoscientific priority areas”, which ensure that scientific excavations are kept within reasonable limits and particular care is taken to protect the more valuable strata of the oil shale. The categories are as follows:

- Category I: Scientific excavations have to be strictly limited in scope.
- Category II: Scientific excavations are harmless, provided they are carried out in a sensitive way
- Category III: Preliminary surveys prior to scientific excavations have to clarify a listing under Categories I and II
- Category IV: Scientific excavations not possible (covered by deposits)
- Category V: Unsuitable for scientific exploration (not worthwhile for excavations)

Strict minimum requirements as detailed in the “Agreement on the Conduct of Paleontological Excavations in Messel Pit” have to be fulfilled by any institution engaged in scientific field-research within the WH site. The agreement details the following principal aspects: licensing, scientific purpose, documentation, inventory and storage of the findings. With the protection of Messel as a cultural and natural site, the focus in scientific excavations has shifted from extensive rescue excavations which focused on iconic species to small-scale and more accurate excavations attempting to reconstruct the whole biotope of the former Messel Lake.

- Scientific excavations by SGN, HLMD and other institutions, take place every year from spring to autumn. The excavations are undertaken by permanent excavation teams as well as excavation trainees who are mostly students.
- Ongoing scientific excavations are strictly controlled according to their quality
- In co-operation with the mining authority, the SGN surveys the stability of the slopes which is essential for the safety of visitors, personnel and the excavation teams. The excavations are implemented according to the “System of rules for paleontological excavations in the Messel Pit Fossil Site”.
- The fossils are conserved in large part according to the so-called transfer method
- After the elaborated preparation the fossils found are included in the public collections of the excavating institutions, so they can be scientifically researched, published and presented.

In connection to the meeting of the scientific advisory board of Messel Pit and in order to ensure communication amongst scientists, SGN invites colleagues who are interested or involved in Messel Pit research to the “Working meeting Messel Pit”¹⁶ which takes place annually for about 25 to 30 participants, to be detailed in Section 10.4.

In the 2006 periodic report, “State of Conservation of World Heritage Properties in Europe”, the protection arrangements of Messel Pit were considered to be highly effective.

6.1.3 Public Access and Promotion (compare 8.2)

Public Relations are one of the key issues for the management of World Heritage sites. The number of visitors to the site, the amount of tourism revenues, the behaviour, interest and understanding of visitors are all directly connected to the quality of public relations work. At the Fossil Pit, it is mainly Messel Pit World Heritage Non-Profit Limited (WGM gGmbH) which is in charge of the following important tasks:

- Responsible for the active marketing of the site. This non-profit organisation is the main contact for communicating with the public and in charge of the development of presentation concepts and the transfer of scientific findings. Moreover, it develops and provides information material such as print media (flyers and programmes) to the public (as seen in Section 1.1).
- Administrates an internet presence: the official homepage of the Messel Fossil Pit is www.grube-messel.de
- Coordinates and controls the quality and implementation of the various guided tours into the Messel Pit Site (for more details, see Section 8.1.4).
- Engages in fund-raising and in finding sponsors.

Since 2005, an info-station – the seat of WGM gGmbH – has been located next to the site entrance. Here, WGM gGmbH runs a visitor shop, offers guided tours, provides informational material and presents an animated film on the emergence of the Messel Fossil Pit.

Since 1997, a visitor observation platform with text panels about the history and the development of the Messel Pit has been on site and open to the public 24 hours a day. Since 2004, the observation platform has had 212,000 visitors.

The tasks of WGM gGmbH will be completed in close co-operation with other scientific institutions; for instance the Hessisches Landesmuseum Darmstadt, the Messel Museum Association and further co-operation partners at the municipal, regional, national and international level.

6.2 Projected Measures

6.2.1 Landscape Management

In the future, landscape management measures will be undertaken to prevent the Messel pit from becoming overgrown with vegetation.

6.2.2 Scientific Research Measures

For 2009, a password protected “Research Portal”¹⁸ is envisaged where scientists can introduce their projects on Messel Pit. This Portal is restricted to scientists who have registered with the SGN and received a personal password. This project aims to facilitate information exchange about research projects on Messel Pit. The Portal will be accessible at www.senckenberg.de

6.2.3 Public Access and Promotion

Due to difficulties experienced by visitors in finding their way to the information station, and therefore the entrance to the site, it is necessary to improve the current situation of signage to the Messel Pit. Due to complicated legal responsibilities, national, regional and municipal consultants need to co-operate in terms of developing the existing infrastructure in order to make approaching to the site easier. Such particulars would include a wider regional integration of the Messel Fossil Pit site and an improvement on the site’s relationship to other institutions such as the Messel Museum and the museums in Darmstadt and Frankfurt/Main (Please see Section 1.2). The main objective of World Heritage Messel Pit is to establish the visitor communication and information centre “ZEIT UND MESSEL WELTEN” (see below) in the vicinity of the Messel Fossil Pit. In conjunction with the development of the visitor centre, new parking areas and visitor facilities will be constructed, including the extension of the access road.

6.2.4 The Visitor Information Centre (BIZ)

When this management plan comes into force, the Visitor Information Centre “Time and Messel Worlds” (ZEIT UND MESSEL WELTEN) will still be under construction, as its inauguration is projected for 2010..²⁰ On 17 December 2008, the foundation stone was laid in the vicinity of Messel Fossil Pit. Once complete, it will offer an interactive and attractive exhibition about the topics about the site. The centre will also offer possibilities to explain the authenticity of the site to the public. To meet the scope of visitor requirements to the centre, WGM gGmbH will follow through with the following measures²¹:

²¹:

- Provide an information station at the site
- Operate a visitor shop with World Heritage relevant articles and merchandise, which respond to the needs of consumers and clients

- Develop and implement tourist products for a wide range of visitors and facilitate access to the Messel Pit and to the Visitor Information Centre by means of:
 - Development of relevant forms of media and their practical realisation (public relations, exhibitions, lectures, further education methods, internship possibilities, brochures, internet access, etc.)
 - Creation of a European communication and co-operation network with the perspective of international expansion
 - Medium-term and long-term acquisition of sponsors
- Establishment and protection of the brand “Messel Pit” for the “Time and Messel Worlds” exhibit in a European context
- Establishment and extension of best practices in "Customer proximity and natural scientific transfer qualities for the general public" amongst the European World Heritage Sites.
- Sustainable maintenance of the Messel Fossil Pit and creation of sustainable values.
- Protection of resources
- Development of a didactic approach for the mediation of the Messel Pit World Heritage Site and integration of sustainable socio-economic aspects for touristic marketing.
- Development of an appropriate World Heritage approach to communication, as well as high quality sustainable value creation to enable visitors to take part in the didactic programme.
- Conception and realisation of projects in co-operation with local and international partners.

Description of design²²:

The projected building for the Visitor Information Centre will be composed of several rooms which will span from north to south between monolithic shear walls which consist of pale faced concrete. This design imitates the basic idea of the stratifications of the oil shale and provides the visitor with the impression of wandering through different layers of earth. Construction units from west to east are light-weight walls or consist of metal and glass and divide particular spatial units which form the outer façade and thereby supporting the structure of the shear walls. The ceilings consist of reinforced concrete with a filigree design, which highlights the building's rough appearance. Only the two western layers of the one-story building consist of an upper floor, and only part of the building will include a basement.

The external dimensions of the building are 71 meters in length by 34.40 metres in width, and the building's layer structure is influenced strongly by jutties and offsets

which result in a base area of 1223 square metres. The total area of the Visitor Information Centre will extend over 32.000 square metres.

An inner courtyard of a base area of 80 square metres is integrated and bordered by exhibition rooms on three sides, and by a cinema and event hall on one side.

Integration into the World Heritage Site:

The parking places for the Visitor Information Centre are located behind a wall on the left of the main access road to the southwest of the site. Bus parking is hidden behind a tree row. Because of this, the impression of visitors to the site who come by foot, bicycle or tour bus is not disturbed by parked vehicles. The south facade of the Visitor Information Centre continues along the existing retaining wall and is flush with its height, thereby symbolically alluding to the previous development of the site's industrial history.

The different layers of the building point north with the extension of one layer breaking through a grove and serving as an observation deck of the Messel Pit. The roof scape, like the exhibition rooms, is also structured into stripes by shear walls. The roof construction is flat and is extensively covered with plants and grass. Merely one stripe serves as an accessible surface and is connected with the retaining wall by means of a platform.

The exterior area consists of three units: the "Garden of Times" which will be free of charge; the theme garden, which is directly attached to the exhibition and the "Garden of Worlds".

Interior and exhibition space:

Outside the building, visitors are directed to the entryway to the "Trail of Questions". This path is the starting point for every visitor to the site, and is useful in introducing the main topics of the exhibition.

The light and broad foyer offers an initial orientation to disburse the streams of visitors and structures the building into the public space and the exhibition space.

The exhibition starts with the cinema and a wide waiting room. The following exhibit is about volcanism and located in a darkroom to intensify the impression of this topic.

In the next room drilling cores and further objects are exhibited along the right wall. A model of an elongated drilling core is integrated into the floor.

Diffused light announces the transition to the theme gardens. From there the visitor comes back to the building into a very high light-flooded room where the topic of rain forest and its different horizontal layers are exhibited.

Diffused light announces the transition to the theme gardens. From there the visitor comes back to the building into a very high light-flooded room where the topic of rain forest and its different horizontal layers are exhibited.

Adjacent to this area, the visitor accesses the next layer which exhibits evolution and geo-diversity. Big openings enable the outside view on the original edge of the pit and its succession forest. Passing by a room where the dissection of fossils is demonstrated, the visitors enters the treasure chamber. This room is inlaid in between the concrete walls in order to highlight the characteristics of the exhibits. By means of a flexible wall, the treasure chamber can be connected to the cinema.

The circuit ends with an exhibition in the foyer about the history of industrial development at the site.

Chapter Seven: Challenges and Opportunities

7.1 Challenges

7.1.1 Tourism pressure

With a growing number of visitors, tourism pressure will also increase in the future and could possibly lead to a degradation of the site in the case of unrestricted access.

However, since the increase will be largely due to the new visitor centre, which is located in the vicinity of the site. The number of visitors descending into Messel Pit is supposed to increase only moderately and could be strictly enforced, since visitors are only granted access while participating in guided tours, which have to be booked in advance. Adverse effects could therefore only occur due to inappropriate management decisions.

7.1.2 Climate change

Climate change could possibly affect Messel Pit Fossil Site, provided that heavy rain falls in a short time period, as detailed below, become more frequent. Currently forecasts estimating the effects of climate change indicate a possible increase of such events in future.

7.1.3 Natural disasters

Heavy rainfall in short periods can cause sliding of the slopes. A measurement system has been installed which is constantly monitoring the stability of slopes, especially at Messel's single entrance for visitors, the road leading to the bottom of Messel Pit. Additionally, research has been undertaken for the evaluation of a

possible increase in slides in the future and to propose ad-hoc measures when such an event occurs.

7.2 Opportunities

All of the issues identified as opportunities possess an inherent threat, either through a withdrawal or absence of sensitive management strategies, or through an unbalanced attitude or preference of the different interests of the stakeholders. However, all policies for the mitigation of risks can be seen as an opportunity to enhance or add to the quality of the site.

New developments at the site, like the planned visitor centre, enhance the presentation of the outstanding universal value of Messel Pit to the public. By exhibiting famous examples of Messel fossils within the new building, the key partners seek to overcome the actual main weakness of the site. So far, examples and replicas of famous fossils were not visible at the site itself but could only be seen in museums, like the Senckenberg Museum in Frankfurt am Main and the Hessisches Landesmuseum in Darmstadt.

Chapter Eight: Access and Heritage Presentation

The interpretation and presentation²³ of a world heritage site is one of the main responsibilities for a site's management team. Tourism signifies the biggest challenge and possibility for a site. It covers various aspects like heritage awareness, education, promotion, public relations among others.

Therefore the challenge is to show and offer the uniqueness of the site within a clear frame and structure to the public.

8.1 Visitor Information

8.1.1 Visitor observation platform:

In 1997, a visitor observation platform (Please see Appendix 1) was opened close to the main entrance to the site. There, panels provide printed information about the history, development and significance of the Messel Fossil Pit. The platform is accessible 24 hours a day.

8.1.2 Info-Point:

On 28 September 2005 the Information Station – the seat of WGM gGmbH - opened to the public. A visitor shop and a small exhibition currently provide the necessary space for visitor management until the projected Visitor Information Centre will more appropriately meet the needs of the Messel Pit.

8.1.3 Visitor Information Centre (BIZ) (compare 6.2.4):

The initial operation of the Visitor Communication and Information Centre “Time and Messel Worlds” is projected for September 2010. It will provide a bigger visitor capacity of an envisioned 100.000 visitors annually, temporary exhibitions of fossils on loan from other museums, as well as exhibits dedicated to volcanism, climate, evolution, Geo-diversity, and landscape.

Vision

Messel Pit's complexity derives from its historical development, its value as a tourist destination, as well as its character as an archive of time dating to 47 million years ago. On this basis, it can be defined as a treasure chest of “Time and Messel Worlds”. It is the sustainable aim of WGM gGmbH to further develop and to establish the brand Messel Pit beyond local, national and European levels, and to position it internationally.

The Messel Pit enables the visitor to learn about new facets of life on earth, and to exchange this knowledge with people from all over the world.

The World Heritage Site Messel Fossil Pit is predestined to serve the public as a transfer, information, and communication centre with the following highlights:

- A diversity of topics
- A relevant scientific singularity with fascinating aesthetics in shape and colours
- A high social image
- A consistent rate of annual visitors
- The potential to explore topics aimed at connecting people
- The dedication of the Hessian State to the conservation of the Messel Pit World Heritage Site
- Integrating service based preconditions with a consideration in planning and realization of a building complex with gardens

Approach

With the presentation of Case studies and working methods as well as the highlighting of objects, the allure of the Messel Pit serves to communicate natural sciences to the visitor. By means of these topics, bridges are built to other continents and cultures and new worlds are opening up. Respect and fascination of the GEO-Nature of the world are aspects which open new perspectives to the visitors.

This is considered an appropriate World Heritage approach which demonstrates a part of UNESCO's pedagogy.

For this educational approach WGM gGmbH developed a strategy with the following basics for a young target group:

- Learning to observe
- Exploring and researching
- Gathering experiences
- Combining and constructing
- Being creative
- Realising and exchanging experiences
- Communicating experiences
- Producing enjoyment in the spot light

8.1.4 Visitor Services

World Heritage Messel Pit also coordinates and offers a considerable number of guided tours into the Messel Fossil Pit. WGM gGmbH operates according to German mining laws, hence, safety regulations need to be followed. The site provides safety instructions to all visitors, such as obligatory use of safe footwear for all visitors to the site which can be borrowed from the information centre. Furthermore, the personnel advise individuals on which type of guided tour would be appropriate according to their physical conditions. Accordingly, WGM gGmbH suggests to book and consult the staff by telephone or email prior to a visit.

The tour programme is done annually and according to the physical conditions of the visitors, their level of interest and their time capacity, the Messel Pit provides a variety of guided tours from 1 April to 1 November.

The guided tours range between one and three hours and are designed to meet different needs, such as walking or hiking tours, excavation impressions, nature tours, children expeditions, family tours, and children birthdays.

Additionally, further training of teachers is offered and tours for schools, kindergartens or groups can be booked as required.

QR-Code-Technology (Mobile-Tagging)

With the on-site installation of a new technology, the so-called “QR-code” or “Mobile Tagging” in 2007, visitors are provided with another way to obtain information about the industrial history of the site. This technology uses two-dimensional bar codes which are meant to be read and inputted by the camera of a mobile phone. These barcodes then serve as a hyperlink to additional online information. The QR-Code-Technology is aiming to awaken interest in the target group of young visitors.

8.2 Information

8.2.1 Internet Presence

The official internet presence www.grube-messel.de²⁵ of the World Heritage Messel Pit is supervised by WGM gGmbH. Online information about the Messel Pit is also provided at:

www.worldheritagesite.org/sites/messelpit.html, www.unesco.org/en/list/720 (World Heritage list).

The SGN is envisaging an Online Research Portal (Please see Section 6.2.2).

8.2.2 Publications

In order to satisfy the various interests of visitors to the site and the information station WGM gGmbH strives to offer a variety of reading material, including: publications, flyers, site maps, programmes, guided tours offers and posters are available in the information station, via internet and with co-operating partners.

8.3 Networks and International Co-operations

To achieve a high level of awareness, WGM gGmbH seeks to establish an international network of communication and co-operation.

Immediate co-operation partners include:

- World Heritage Sites in Hesse: Abbey and Altenmünster of Lorsch, Frontiers of the Roman Empire and Upper Middle Rhine Valley
- Municipality of Messel, Museum for fossils and local history Messel
- Hessisches Landesmuseum Darmstadt
- Senckenberg Society for Nature Research (SGN) and Senckenberg Museum
- Deutsche UNESCO Welterbestätten e.V.
- Regional service providers – gastronomy, hotels, regional touristic services

- European Geopark Bergstrasse-Odenwald – member of the UNESCO Global Geoparks Network
- International Cooperation for Palaeontological Research

The Messel Fossil Pit Site is the northern entrance gate to the Global Geopark Bergstrasse-Odenwald which unites a scenic and historic landscape of about 500 million years of geology. In addition to the Messel Fossil Pit, this Global Geopark cooperates with several partners such as the World Heritage site Abbey and Altenmünster of Lorsch. It is also a member of Global Geoparks Network which is considered as the highest commendation for a unique landscape and its use for tourism and which is supported by UNESCO.

Chapter Nine: Resources

9.1 Ownership and Administration

The State of Hesse is the legal owner of the Messel Fossil Pit and therefore owned by the public. The administration is jointly managed by the Senckenberg Society for Nature Research (SGN) and Messel Pit World Heritage Non-Profit Limited (WGM gGmbH). WGM gGmbH is also jointly owned by the Federal State of Hesse. The Messel Fossil Pit is administrated separately from the federal state's budget.

Finances*

Hessian State benefits for the Messel Pit: 162,500 Euros annually

German Federal State and Hessian State benefits for Senckenberg:

Each 7,553,250 Euros annually

9.2 Scientific Work and operation (SGN)

The SGN conducts maintenance and conservation work on behalf of the Federal State of Hesse according to the Agreement of 26 June 1992 on the Conduct of Palaeontological Excavations in Messel Pit between the Hessian State and Senckenberg Society for Nature Research (SNG). To support operation of Messel Pit and research activities the SNG keeps a satellite research station in Messel.

Finances:

Operation of the Pit and waste water treatment plant: 380,000 Euros

Security measures and slope reinforcement: 80,000 Euros

Maintenance of ways and roads: 10,000 Euros

Excavation: 12,000 Euros

Fossil treatment and Messel Pit Laboratory: 10,000 Euros

Operation of the research station in Messel: 14,000 Euros

Personnel costs for the research station in Messel: Not available at this time

Personnel:

Currently the SGN provides five scientific researchers, one preparer and six technical assistants for the Messel Pit.

9.3 Access and Promotion (WGM gGmbH)***Finances:***

Since 2005, the shareholders have provided a maximum of 250,000 Euros annually for business operations (depending on the yearly decision by the State of Hesse). According to the “non-profit organisation form” revenues need to be generated.

In the 2009 financial year, an allocation of an additional 100,000 Euros for the operation of the projected Visitor Information Centre has been provided. Its operation is estimated at about 900,000 Euros per year, which will need to be generated mostly by the revenue of entrance fees and guided tours.

Personnel:

Starting in 2009, the staff of WGM gGmbH consists of six full-time positions, two seasonal positions for a period of seven months, plus one short-term position is foreseen.

For the operation of the centre, at least eight full-time positions for the service counter area including guided tours are estimated.

Chapter Ten: Implementation

The key partners are aware that the management of a World Heritage site is an ongoing process which has to be sustainable. Thus, it is important to monitor and to evaluate the implementation of the Management Plan. This is to ensure that the Messel Pit Fossil Site and its values are being effectively preserved, and that the applied strategies are responding to changing conditions. Regular monitoring and evaluation are therefore critical points in assessing the effectiveness of conservation treatments and in determining the needs for maintenance or repair. These management tools provide the necessary information for the revision of the plan, and for the continuous update of strategies and methods.

10.1 Periodic reporting

According to Article 29 of the World Heritage Convention in connection with Chapter V of the Operational Guidelines, the submission of periodic reports by the State Parties is required every six years. Periodic Reporting serves four main purposes:

- a. *“To provide an assessment of the application of the World Heritage Convention by the State Party;*
- b. *To provide an assessment as to whether the outstanding universal value of the properties inscribed on the World Heritage List is being maintained over time;*
- c. *To provide up-dated information about the World Heritage properties to record the changing circumstances and state of conservation of the properties;*
- d. *To provide a mechanism for regional co-operation and exchange of information and experiences between States Parties concerning the implementation of the Convention and World Heritage conservation”.*³¹

Periodic reporting for the World Heritage Site Messel Fossil Pit was last undertaken in 2006 by the World Heritage Committee.³² The periodic reporting document “State of Conservation of World Heritage Properties in Europe”³³ provides general information about the actual state of the Messel Fossil Pit, draws conclusions, highlights the strengths of and the threats to the site, and also sheds light on projected and recommended future actions. The main examples of the outcome were:

- The staffing situation of visitor management and visitor facilities at the Messel Fossil Pit needs improvement, e.g. the operation of a Visitor Information Centre
- Need for awareness raising
- Reactive monitoring reports were not available
- The current management system is highly effective³⁴

10.2 Reactive monitoring

In General

According to section 172 of the OP 2008, “the World Heritage Centre is to be informed of extraordinary circumstances and work which may affect the state of conservation of the World Heritage site within the framework of a reactive monitoring programme. All procedures prompted by reporting through official channels or by third party information related to action in and on World Heritage sites fall under reactive monitoring³⁵

Reactive Monitoring is the reporting by the Secretariat, other sectors of UNESCO and the Advisory Bodies to the Committee on the state of conservation of specific World Heritage properties that are under threat³⁷.

Messel Fossil Pit

Until today there has not been a reason given to conduct reactive monitoring for the Messel Fossil Pit. The scientific council is open for comments and the local population is included in decision making.

10.3 Quality assurance³⁸

For every World Heritage site "technically competent planning and procedures are critical for quality assurance and measures" [_fn9#_fn9³⁹](#). This implies that all procedures need to be "documented and monitored in detail." This is done by the key partners.

10.4 Advisory boards and commissions

The UNESCO - “Recommendation concerning the Protection, at National Level, of the Cultural and National Heritage” recommends co-operation with advisory boards for advice on and preparation with measures that may affect the heritage of a site. This is done by the scientific advisory board (Please see Section 6.1.2). This advisory board includes experts and representatives of organizations devoted to conservation of the property, as well as representatives of participating administrative bodies (For further information, see Appendix 3).

The Mining Authority is to be regularly informed about the investigation authorisations according to monument rights, and receives maps from the Hessian Federal State Office for Heritage Protection about the fixed excavation spots.

The following figure identifies the relations and co-operations between the particular advisory boards, commissions and stakeholders. A continuous and detailed report of the scientific excavations of the previous year is a precondition for the continuation of the distribution of licences for excavations.

Conclusion

List of figures

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Appendices

Appendix 1: *Übersichtskarte zur Betriebs- und Grabungsplanung der Fossilienfundstätte Grube Messel*

Appendix 2: Scientific research Cooperation Partners of SGN

Appendix 3: Supervisory committee 'Scientific Advisory Board'

ANNEX 2 (please see also 8.3):

To ensure a high level of scientific research, scientists from SGN who do research on Messel cooperate with scientists of a wide range of national and international institutions, e. g. :

Fossil flora from Messel:

Royal Holloway University of London, University of Florida, Universität Göttingen, Universität Tübingen, Universität Prag

Fossil vertebrates from Messel:

University of Michigan, Ann Arbor, USA; TU Clausthal; Uni Göttingen; University of Oslo, Norwegen; Universität Bonn, Hessisches Landesmuseum Darmstadt, Landesamt für Denkmalpflege Hessen, Generaldirektion Kulturelles Erbe Rheinland-Pfalz

Geology, geophysics, geochemistry etc:

Uni Jena, Uni Bonn; HLUG, Wiesbaden; GGA, Hannover; Uni Frankfurt; Uni Göttingen; Uni Halle-Wittenberg; Uni Freiburg; Hessisches Landesmuseum Darmstadt, Uni Würzburg

Extant fauna from messel:

Arbeitsgemeinschaft Hessischer Lepidopterologen; Arbeitsgemeinschaft Hessischer Coleopterologen; Arbeitsgemeinschaft Hessischer Hymenopterologen

Fossil invertebrates from Messel:

Hessisches Landesmuseum Darmstadt; Moscow State University, Russia; National Museum Praha, Czech Republic; Institute of Biology and Soil Sciences, Vladivostok, Russia; Uni Kansas, USA; Uni Bonn; Australian National Insect Collection; Uni Göttingen

ANNEX 3 (please see also 10.4)

Supervisory Committee 'Scientific Advisory Board'

Composition:

Unabhängiger Fachwissenschaftler (Ausland)

Unabhängiger Fachwissenschaftler (In- oder Ausland)

Vertreter der Senckenbergischen Naturforschenden Gesellschaft (SGN)

Vertreter der für Denkmalschutz zuständigen obersten Landesbehörde

Vertreter der IG Messel

Vertreter der für Denkmalpflege zuständigen Landesbehörde

Vertreter eines in Messel grabenden Instituts

Vertreter der Paläontologischen Gesellschaft

Vertreter des Landesmuseums Darmstadt

Vertreter der Deutschen Forschungsgemeinschaft

Vertreter eines in Messel grabenden Instituts

Ständige Gäste

1Operational Guidelines 2008, accessible on: <http://whc.unesco.org/en/guidelines/>

2 The Committee considers that this criterion should preferably be used in conjunction with other criteria

3 March 2009

4IUCN summary Messel Pit Fossil Site, accessible on : <http://www.unep-wcmc.org/sites/wh/messel.html>

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8Dieser Abschnitt ist übernommen aus: Höllwarth, M., History of the Messel Pit, in: Window to primeval times, Wiesbaden, 2000.

9The Agreement of 28 February 2003 has replaced the Agreement of 17 December 1992 on the Scientific and Cultural Use of the Messel Pit Fossil Site. The contract included the foundation of the Society for the Preservation of the Messel Pit Fossil Site (Grube Messel Verwaltungsgesellschaft mbH).

10<http://whc.unesco.org/archive/periodicreporting/EUR/cycle01/section2/720-summary.pdf>

11cf. UNESCO 1996, WHC 95/CONF 203/16

12http://whc.unesco.org/archive/advisory_body_evaluation/720.pdf

13IUCN 1995, p. 11

14Keller, T, Frey, E, Heil, R, Rietschel, S, Schaal, S & Schmitz, M 1991: 'Ein Regelwerk für paläontologische Grabungen in der Grube Messel', *Paläontologische Zeitschrift* 65, pp 221-224.

15Compare HMWK 2000 (ed.): 'Fenster zur Urzeit'

[16](#)'Arbeitstreffen Grube Messel'

[18](#)'Forscherportal'

[19](#)(Kunden-/Kommunikations- und Informations-Zentrum "ZEIT & MESSEL WELTEN")

[20](#) Welterbe Grube Messel gGmbH 2009, p. 3

[21](#) cf. Welterbe Grube Messel gGmbH 2008

[22](#)DABau Hessen 2007, ES-/EW-Bau 02.03.2007

[23](#)cf. Ringbeck, 44

[24](#)cf. Feldkamp, Vogel

[25](#)In German language

[26](#) Some print media for the planned Visitor Information Centre is under preparation.

[27](#)cf. Welterbe Grube Messel gGmbH 2009, p. 29

[28](#)Date: 2008

[29](#)Date: 2008

[30](#) cf. Feldkamp, Vogel

[31](#)Operational Guidelines 2008, § 201

[32](#) cf. <http://whc.unesco.org/archive/periodicreporting/EUR/cycle01/section2/720-summary.pdf>

[33](#) (Cycle 1) Section II Summary

[34](#) (Cycle 1) Section II Summary

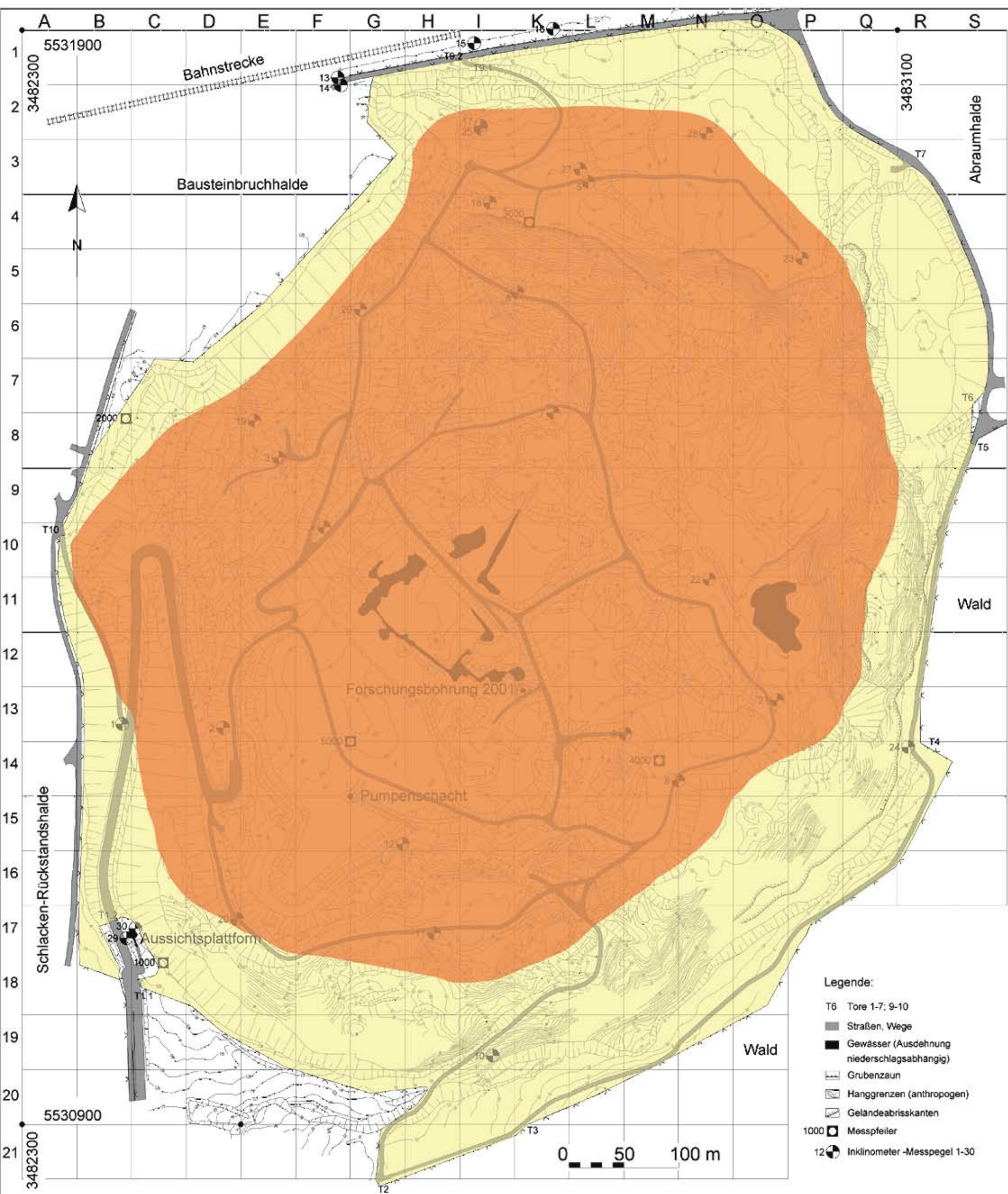
[35](#) Ringbeck, p. 38 et seq.

[36](#)Operational Guidelines 2008, par. 170

[37](#)Operational Guidelines 2008, par. 169

[38](#)Erarbeitung mit Frau Dr. Frey

[39](#) Ringbeck, p. 40



Fossilienfundstätte Grube Messel

Übersichtskarte zur Betriebs- und Grabungsplanung

Photogrammetrische Kartierung nach Luftaufnahme vom 24.03.1998 im Auftrag der Senckenbergischen Naturforschenden Gesellschaft

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Abteilung Messelforschung
Dr. Stephan Schaal

Datum: 07.11.2003 - Dipl.-Ing. Ronny Gipser, CA-Consulting



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H.E. Ms Martina Nibbeling-Wrießnig
Ambassador, Permanent Delegate
Permanent Delegation of Germany
to UNESCO
UNESCO House

WHC/74/3229/DE/PA/MR

11 October 2010

**Subject: Minor modification proposal of the *Messel Pit Fossil Site*
(N 720bis) (Germany) World Heritage property.**

Madam,

I have the pleasure to inform you that the World Heritage Committee, at 34th session (Brasilia, Brazil, 25 July – 03 August 2010), examined the buffer zone minor modification proposal of the ***Messel Pit Fossil Site*** and decided to **approve** the modification of this property already inscribed on the World Heritage List. Please find below the Decision **34 COM 8B.45** adopted by the Committee.

The *Operational Guidelines for the Implementation of the World Heritage Convention* (paragraph 168), request the Secretariat to send to each State Party with a newly inscribed property a map of the area(s) inscribed. Please examine the attached map and inform us of any discrepancies in the information by and not later than **15 December 2010**.

The full list of the Decisions adopted by the World Heritage Committee at its 34th session is available on line at <http://whc.unesco.org/en/sessions/34COM/>.

May I take this opportunity to thank you for your co-operation and for your support in the implementation of the *World Heritage Convention*.

Please accept, Sir, the assurances of my highest consideration.

Yours sincerely,

Francesco Bandarin
Director a.i.
World Heritage Centre

cc: German National Commission for UNESCO
Dr Birgitta Ringbeck, World Heritage focal point for Germany
IUCN

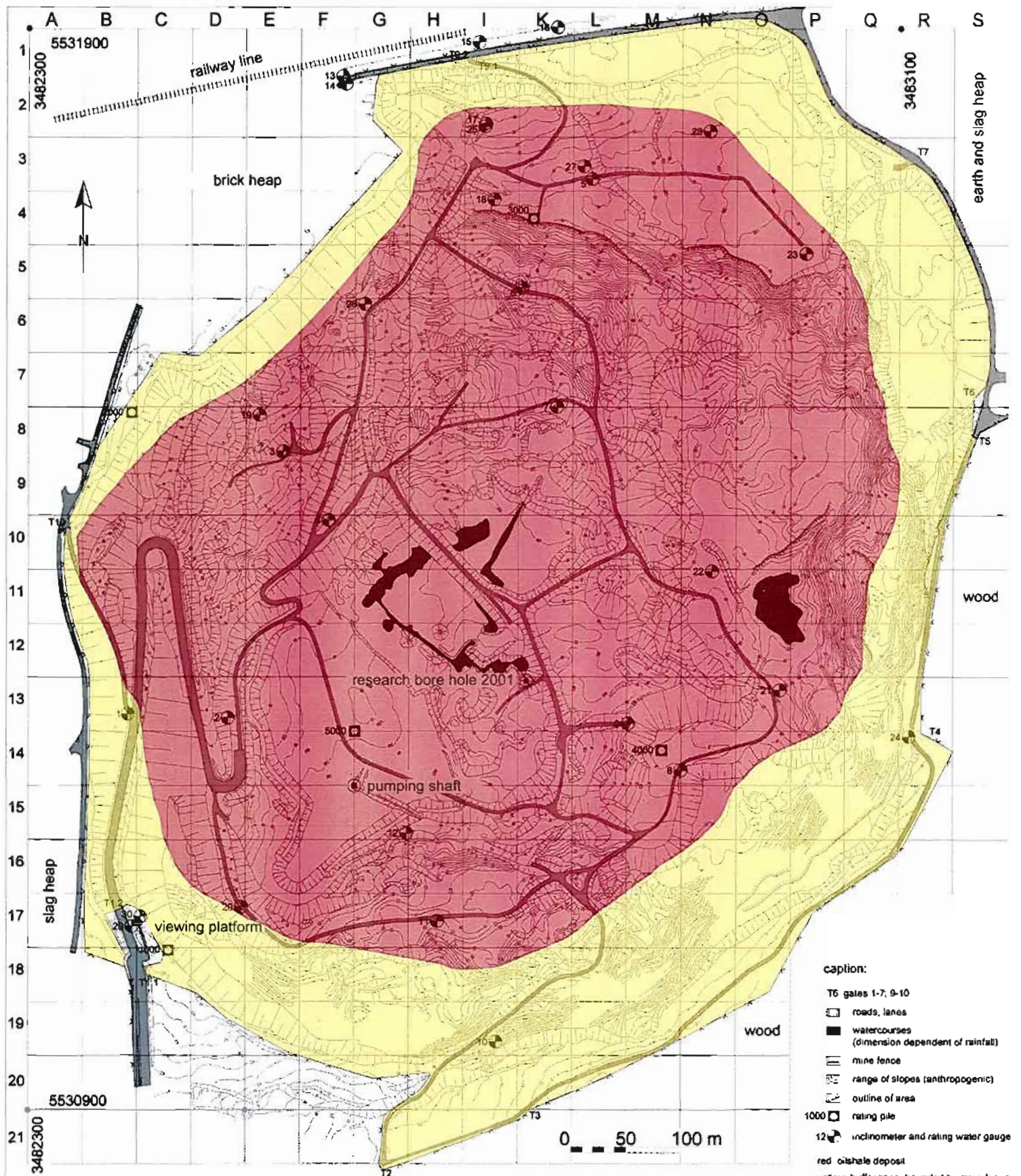
**Extract of the Decisions adopted by the World Heritage Committee at its 34th session
(Brasilia, 2010)**

Decision: 34 COM 8B.45

The World Heritage Committee,

1. Having examined Documents WHC-10/34.COM/8B and WHC-10/34.COM/INF.8B2,
2. Approves the proposed creation of a 22.5 ha buffer zone for the 42 ha **Messel Pit Fossil Site, Germany** in order to strengthen the integrity of the inscribed property and support its effective protection and management;
3. Notes with appreciation the submission of a fully revised management plan for the property, including its buffer zone, and encourages the State Party to fully implement the plan on an ongoing basis.

World Heritage Messel Pit Fossil Site



caption:
 T6 gates 1-7, 9-10
 roads, lanes
 watercourses (dimension dependent of rainfall)
 mine fence
 range of slopes (anthropogenic)
 outline of area
 1000 rating pile
 12 inclinometer and rating water gauge
 red oilshale deposit
 yellow buffer zone, bounded by mine fence

Messel Pit Fossil Site Key Plan Oilshale Deposit and Buffer Zone

Mapping based upon aerial photo from 24.02.1998 on behalf of Senckenberg Gesellschaft für Naturforschung

Senckenberg Research Institute
 Department Messel Research
 Dr. Stephan Schaaf

date 07.11.2003 - Dipl.-Ing. Ronny Gipper, CA-Consulting