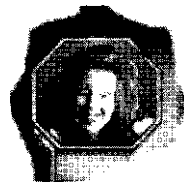


# BURNTIME



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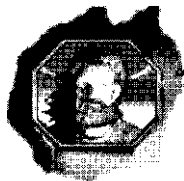


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Computer players have the reputation of becoming obsessed with playing and at the same time of losing their communicative skills. Companies today, producing technological leisure games on a large scale, will have to face up to this reality. We believe that anyone who enjoys a good game is also interested in world current affairs both now and in the future. For this reason we have put together some information about the three real threats affecting our environment today. Unfortunately, due to lack of space, we have had to omit the highly sensitive subject of the ozone. In this handbook the subjects discussed are those most relevant to the world created in BURNTIME. Obviously only the most essential information on the subjects could be touched upon. A more detailed account was not possible, as this handbook would have got out of all proportions. We hope, however, that you will take an interest in the problems facing our environment, if you weren't already aware of them.

Burntime is set in a contaminated and hostile world sometime in the future. The world we live in, does not look like this yet, but if you read the information in "On the Way to Burntime", you will find out just exactly how this could happen. Even if you find it hard to imagine

such a world, remember that up until now, no society has been able to survive forever. The ruins and the script are all that remain of a once powerful Roman civilisation. A society can hardly survive for more than a thousand years.

A civilised society has 3 stages in its cycle - its ascent, heyday and downfall. The downfall often happens very quickly and unexpectedly due to outside influences such as a war or a natural disaster. Even today there are the initial signs that the heyday of our domineering western industrial society could come to an end. Moreover, the industrial countries are doing everything to speed up this course of events, and for the first time in the history of the planet Earth, a civilisation is on the way to causing its own final devastating natural disaster.

So while you are hopefully having lots of fun playing Burntime, think about the fact that in the short time it takes you to get to like this game, it could become reality. Enjoy the game and make sure you do everything in your power to ensure it remains just a fantasy in our future.

**Max Design wishes you lots of funs!**

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## Burntime



It makes no difference what type of weapon will be used in the Third World War,  
because in the Fourth World War it will certainly be clubs!

## On the Way to Burntime

# NUCLEAR

**T**he very thought of a nuclear war, and all its inconceivable after-effects on the human race and the environment, is for most people a nightmare. Only a few people still believe in the occurrence of a "limited" attack with nuclear weapons. The worldwide consequences of a nuclear attack are being realised more and more. Life on Earth, if at all possible, would change dramatically and even in peacetime, a war cannot be ruled out. As long as we have access to some type of weapon, you can count on its use at some point in time.

The invention of gun powder was the start of the modern day arms race. The height of this race today has been the discovery of nuclear weaponry. The threat posed by nuclear weapons will only stop with total disarmament or when it becomes out-dated and replaced with another type of weapon. Since the Chernobyl disaster, people have become aware of the fact that the real danger lies within nuclear power plants. Radiation's fatal property is that of knowing no limits. An accident of any proportion in a nuclear reactor will always have worldwide after-effects.

## Nuclear

The invention of nuclear power stations has created a time bomb virtually under our noses. A disaster is imminent in any nuclear reactor at any given time. Several breakdowns - even in the "safe" power stations of the West - have demonstrated that a "safe" nuclear power station does not exist. The use of nuclear power to save energy has not only proved itself uneconomical but also a threat to the entire population.

Energy saving by using nuclear power is the tip of the iceberg of technological developments. It all began with the invention of the steam engine. The principle has remained the same to date. Several countries have already stopped using nuclear power, and others are trying to find a replacement in their energy programme as quickly as possible. However countries such as the USA, Great Britain, France, several states in the former Soviet Union and the Federal Republic of Germany are so involved with nuclear power economically, that a withdrawal is hardly realistic.

The only hope is that a new discovery will soon replace nuclear power, and the Earth will survive the Nuclear Age without irreparable damages.

There are further threats posed by nuclear power. The disposal of nuclear waste is still a problem that remains unsolved and no-one seems capable of solving it. Also the risk to each individual created by radiation on a daily basis cannot be ignored. A routine X-ray at the dentist and even some digital wrist watches give off a certain amount of radiation. There are also time bombs such as sunken nuclear submarines and entire nuclear reactors lying at the bottom of the world's oceans. Due to lack of space these problems are not covered in this handbook.

## **Radiation and its side effects**

The greatest danger from radiation is in that it is invisible. The human being's sense organs cannot detect it. Radiation only becomes indirectly apparent to man when the damages become obvious. In spite of this, man still treats radiation rather carelessly. It is only in recent years that most people have become aware of its dangers through the enormous information campaigns run by various environmental protecti-

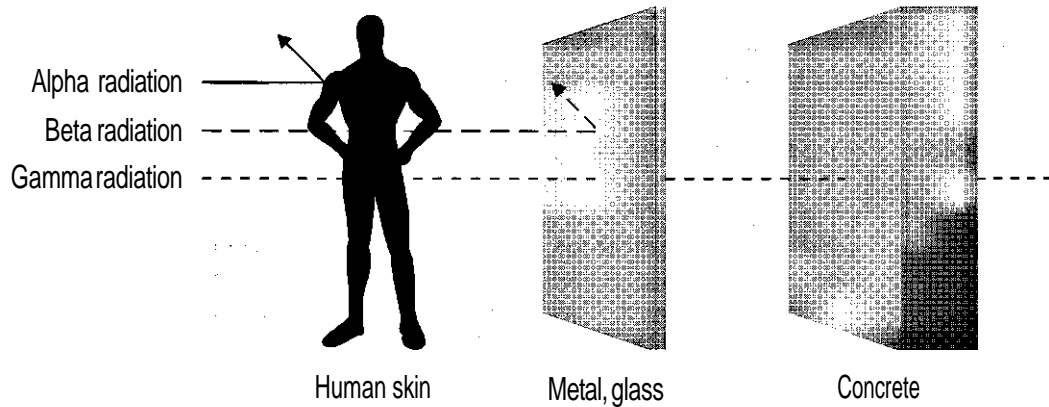


on groups. They are fighting for worldwide nuclear disarmament and against nuclear power stations.

There are different types of radiation which vary in degree of danger to man and the environment. However there is no such thing as harmless radiation.

**Alpha radiation** is proportionally large and heavy. It can be stopped by passing through other charged particles or by bumping into other particles. Its range has up until now been limited. It cannot penetrate the human skin. The alpha radiating substances are very

## Penetrating power of radiation



## Nuclear

dangerous if they are swallowed. The tissue around the substance will become badly damaged.

**Beta radiation** is smaller, faster and has a larger penetration ability than alpha radiation. It can penetrate the human skin and external radiation is just as dangerous as internal. Thin sheets of aluminium or even plexi glass are enough to stop the penetration of beta rays.

**Gamma, neutron and X-ray radiation** are not electro-nically charged. They are extremely dangerous because of their extensive range and enormously high penetration ability. Above all external radiation can damage humans severely. This type of radiation can only be stopped by a thick concrete or lead wall.

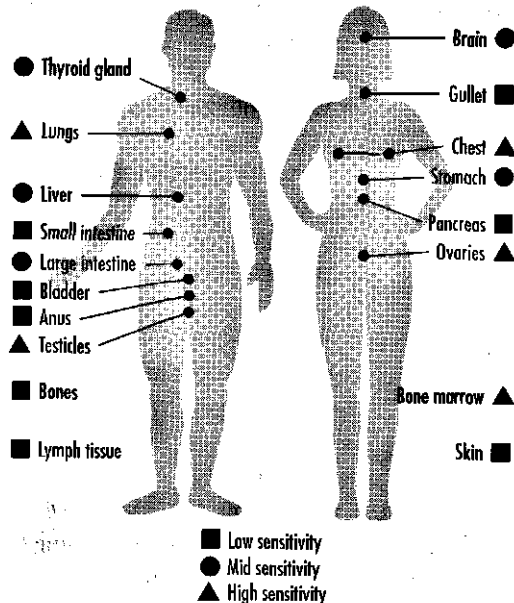
Ionizing radiation always attacks the most elementary and important parts of an organism - the cells. The damages caused by radiation effect either the individual directly or its offspring indirectly. A cell can be damaged in three ways by radiation: the cell dies, the division of the cells is damaged and causes cancer, or the reproductive cells are damaged and cause malformations of the offspring.

The damage can only be detected when the normal cells die off or are irreparable. All organs have many more cells than are necessary to function properly. This is a natural safety device. However the reproductive mechanism will pass on any damaged cells to subsidiary cells. When the diseased cells reproduce faster than the healthy cells, then cancer is present. Cancer is therefore caused by the accumulation and spreading of the infected cells from the reproductive mechanism. Death is caused by growths that spread throughout the entire body.

The reproductive cells are extremely sensitive. Ionizing radiation can damage the hereditary information of a reproductive cell in the DNS. If a child is produced from these cells, the defective information in the cells is inherited by the child. A single defective reproductive cell can cause malformations in generations of offsprings.

The effects and damages of radiation do not relate to the level of the dose or to the condition of the affected organism. The cells of embryos and small children, the reproductive cells and the cells in the lining of the intestines and in the bone marrow are all extremely sensitive.

## Sensitivity of human organs towards radiation



A large amount of radiation can lead to acute radiation syndrome. A dose of over 100 sieverts of radiation damages the central nervous system and will cause death within a few days. A dose of at least 10 sieverts will irreparably damage the stomach and intestine tract. It causes vomiting, internal bleeding and diarrhea. When the cells in the lining of the intestine stop dividing, death normally occurs after one or two weeks. A dose of 3 sieverts or more causes damage to the bone marrow. Within one to two months about half of the infected people will die. Another large proportion will die in the next few years.

Various organs are various sensitive about radiation. The reproductive cells are the most sensitive parts about radiation of the human body.

## Nuclear

The effects of a high level of radiation have already been examined and the results are confirmed. Not so much is known about the effects of lower strains of radiation. Here we are dealing with the long term effects and this makes an accurate examination difficult. Therefore a general statement cannot be made. As long as there is no clear evidence available, the dangers should be assessed on a higher scale rather than a lower one. A low dose of radiation today maybe considered as extremely high and dangerous in twenty years time.

## **Computer causes nuclear war**

Since the introduction of nuclear weapons, the hierarchy of the military have been living in a nightmare. All the essential government and military systems, as well as the nuclear launching bases, could be destroyed on a first attack by the enemy who would then win the nuclear war. Therefore early warning systems were introduced to hinder a successful first attack. Also the operations system and com-

mand-giving system have been fundamentally changed. This has however increased the danger of an unintentional attack or a badly planned attack with nuclear weapons. The nightmare continues.

In a maximum of 15 minutes any super power can reach the area of another super power with its weapons. Torpedoes launched from submarines can, depending on where they are positioned, reach the opposition's strategic important points in even less time. To be able to retaliate quickly, nuclear weapons are on a 24 hour alert. Computers guarantee the quickest possible advance warning. The other side is capable of leading a counter attack, when an attack is first reported. The entire advance warning system must operate efficiently and without error, to ensure a correctly timed counter attack and to avoid the possibility of an unintentional attack with nuclear weapons.

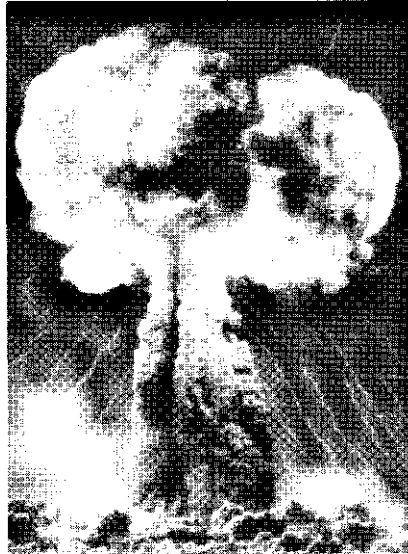
This system should have been finalised by the Americans in the Strategic Defense Initiative (SDI) under President Reagan. The advance warning time to activate a counter attack is less than one minute. This makes human intervention no longer possible. Computers would have to decide on the appropriate

## Computer causes nuclear war

form of retaliation. Drastic cut-backs were made to the SDI programme and at the moment there is no chance of it ever being put into practice.

In the existing systems a computer is not capable of launching a nuclear weapon. Humans still make the decisions, however they are still dependant on computers to produce and work out the figures.

One of the most famous breakdowns happened to the computer of the American Radar Advance Warning System BMEWS in 1960. It was an error of the worst possible type - a mistakenly reported nuclear attack. The computer announced the presence of a very large object 4,000 kms away. It reported that a huge missile attack by the Soviet Union was imminent. Luckily, however, just in time it turned out that the computer had withheld two zeros from the range



**A picture of the British test "Mosaic" in Australia on 19.06.1956. The fallout covered the northern coast of the continent.**

indicator. The object was simply the moon - 400,000 kms away from the earth.

At the beginning of the sixties the North American Aerospace Defense Command (NORAD) was established in the Cheyenne Mountains in Colorado. It is connected to a worldwide network of advance warning satellites and radar systems. 87 computers are manned by dozens of technical experts who produced the essential figures. A Soviet missile attack on North America can already be spotted very early on, with the help of this advance warning system.

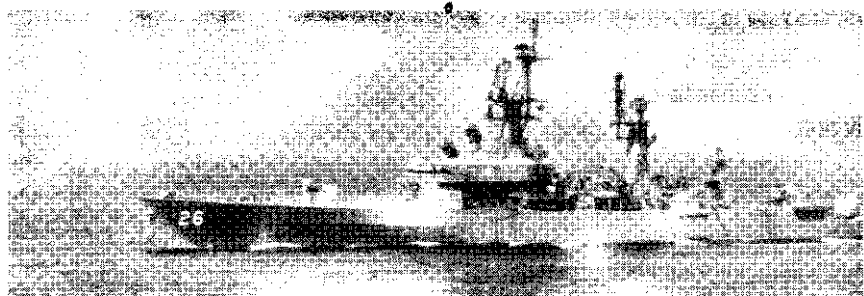
On 3rd June 1980 at 02.26 hours local time one of the computers of the Strategic Air Command (SAC) in the Offut air base in Nebraska sounded the alarm. It reported the approach of two Soviet underwater torpedoes from the North Atlantic Ocean. Immediately

## Nuclear

the crew of 76 B-52 Bombers, eight nuclear equipped FB-III-Bombers, 240 men from Intercontinental Missiles and the Pentagon were alerted.

The indicator had registered the launch of hundreds of missiles in the space of a few seconds. The duty officer contacted NORAD. No reason for an attack

could be found. Consequently the engines of the planes were turned off once again, but the crew remained on standby. A meeting between SAC, NORAD and the Pentagon reached the conclusion that it had been a transmission error by the NORAD computer. The alert was called off after exactly three minutes and twelve seconds. While the technicians were searching for the error, the system was re-run under the same conditions, and the computer announced another attack - this time from Intercontinental missiles. The official report stated that the problem lay in a defective chip worth 46 cents.



**The US cruiser "Belknap" on an exercise in 1975 in the Mediterranean. The ship was carrying nuclear weapons on board. Due to a transmission error, it collided with the aircraft carrier "John F Kennedy" with serious consequences.**

Renowned computer experts reckoned the fault lay in the internal organisation of the computer. The system lacked an efficient error detection system. As the computers were extremely outdated and already far too slow for their operational function - an adequate error detection system would bring the whole system more or less to a standstill.

When the alarm is sounded there are 3 meetings that take place in a given order between the four command centres. The first meeting is called when the enemy missiles are first spotted. If the senior commanding officer at NORAD considers it a serious

## Computer causes nuclear war

attack, then a meeting is called to analyse the threat. The type of threat is decided by high ranking officers.

Four such conferences took place between 1979 and 1980. All were false alarms.

The final stage is to call a meeting to discuss what type of counter attack should be carried out. Here all high ranking officials and the President are present. This type of meeting, according to official reports, has never taken place.

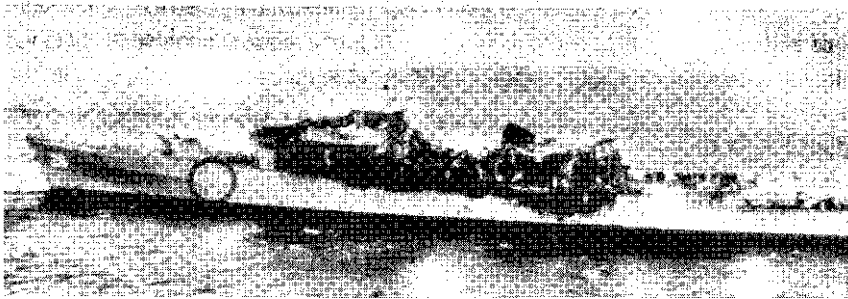
Very little is known about the former Soviet advance warning system. However it can be presumed that

their computers are even more prone to mistakes. The chance of an erroneous counter attack from their side is even higher.

The danger of an unintentional attack by nuclear weapons is not as great during peacetime as in times of a crisis. In times of detente neither side seriously expects a nuclear attack. Alerts from the advance warning systems are treated in the first place as false alarms. In times of international tension or in the case of a conventional war this would certainly not be the case. If the possibility and expectation of a nuclear

attack increased, then the danger of a false alarm with disastrous consequences would also increase.

In the event of a crisis the crew on standby is increased. The potential enemy's activities are carefully monitored. Measures taken to increase the emergency services could antagonise the enemy. During peacetime it is often very difficult



**The US cruiser "Belknap" after its collision with the aircraft carrier "John F. Kennedy". Six members of the crew died. The black ring marks the area where the nuclear weapons were stored.**

## Nuclear

to differentiate between defensive and offensive actions. The psychological pressure during a serious crisis makes it even more difficult to distinguish between them. The launching of a single nuclear weapon will, without doubt, cause the further implementation of nuclear weapons from both sides on a larger scale. A nuclear war and all its terrible consequences would be unavoidable.

### **The consequences of a nuclear war**

For many people the thought of a nuclear war and its results is a nightmare. If, in the seventies, you believed in a balance between war and peace, then today's nuclear armament is completely unthinkable. Also it is becoming more and more obvious that there will be no winners in a nuclear war and everyone will suffer the consequences. The reactor disaster at Chernobyl, a terrible accident, has given everyone lots to think about.

The reality is that, a so called "harmless" accident, by comparison to a nuclear war, can still have world-

wide results from which no-one can escape. People who previously had a carefree attitude towards the use of nuclear power or nuclear politics have changed their minds since the time of the Chernobyl disaster.

What it would be like after a nuclear war, no-one can predict with any certainty. Too many factors have to be taken into account. However scientists all agree that life on earth would change dramatically for those who survive a nuclear attack.

The dropping of nuclear bombs on Hiroshima and Nagasaki, and all the other controversial atmospheric tests that have taken place, have given us some insight into the direct effects of a nuclear explosion. Nobody exactly knows what a nuclear war today or in the future would look like. With the knowledge we have about the nuclear powers' strategic plans, a few plausible and possible scenes can be imagined.

At present NATO and the Warsaw Pact own in total approx. 24,000 strategic and tactical weapons with a total explosive capacity of 12,000 mega tons of TNT. This is the equivalent of about one million bombs dropped on Hiroshima. In the event of a war you can assume that approximately half of all nuclear weapo-



## The consequences of a nuclear war

ns available will be used. Today, it is not possible for any super power to totally destroy an opponent by initiating a major surprise attack. A build-up of arms is therefore unavoidable. It can also be guaranteed that during an initial attack a considerable amount of damage will be done to important and strategic communication systems. The chaos caused by the breakdown in the communication system, will provoke those under attack to put into practise their long planned and trained for counter attack without compromise.

The targets of the nuclear weapons are fundamental to the results. Even if only 5 per cent of all the available nuclear weapons exploded over cities or industrial areas, the after effects on the environment and the climate would still be drastic. Even if the targets of the nuclear weapons

were initially the military bases, in the policy of deterrence the cities and industrial centres would also be targeted. Cities lying within the vicinity of targeted military bases would therefore also be effected. The resulting fires, as well as the formation of smoke and soot, would have wide-spread consequences.

The following scenario was put together by 300 scientists from over 30 countries contracted by SCOPE (Scientific Committee On Problems of the Environment). They assumed that an attack could not take place without prior warning. Also that an initial attack could not realistically cause total destruction. Therefore the battle would escalate and a large part of the armed forces and weapons would be destroyed during the initial phases of the conflict.

An air explosion is different to a ground level explosion. A huge amount of radio-active dust is



**On 9th August 1945 a 20 kt plutonium bomb devastated Nagasaki. 22,000 people died on the first day, in total there were 64,000 fatalities.**

## Nuclear

thrown into the atmosphere during a ground level explosion. Therefore deadly radio-active fallout is spread out over a large area. The explosions are positioned primarily to hit military targets such as



**A picture you might expect to see at the end of time. Soldiers erect a sign "Prohibited Zone" on the edge of the 30 km death-zone around Chernobyl.**

launching ramps for Intercontinental missiles. Air explosions cause a lot less fallout, however, a larger area will be damaged by pressure waves and fires. If cities and industrial areas are the target of an attack, then air explosions are the most effective.

It is also assumed that a quarter of all Nato's and the Warsaw Pact's inflammable materials would burn. Modern nuclear weapons will devastate an area of 500 square kilometres (a city the size of Berlin) per mega ton of TNT with their heat rays and pressure waves. Fires would be lit by the heat and pressure waves and cause huge clouds of smoke, soot and poisonous gases.

More than half the radio activity of a bomb is projected into the air via the mushroom. A large part falls onto the ground during the first day. This regionalised fallout contaminates large areas with a lethal dose of radio-active radiation. Within the space of two days, 15 per cent of the NATO and Warsaw Pact countries could become death-zones because of their extremely high radio-activity. Even larger areas would have a high enough concentration of radiation for them to be considered a health hazard. It is difficult to guess what the fallout would be on a worldwide

## The consequences of a nuclear war

scale, but the after-effects will certainly be more serious than anticipated so far.

Another more important aspect would be the damage caused to all electronic facilities within a large radius from the centre of the explosion. This is caused by an electro magnetic shock that occurs during an air explosion. It is hard to imagine the consequences this would have on the technically dependent industrial countries. Numerous communication systems, control systems, control facilities, computer centres, electronic parts in cars, ships and aircrafts, medical equipment, etc would all be incapable of functioning causing chaotic results.

The thousands of intensive fires would create a huge amount of smoke and soot in the atmosphere. If this happened during the summer then, the tempera-



**After the Chernobyl catastrophe the number of abnormal births increased in White Russia. Here is a picture of an eight-legged foal.**

would experience massive problems. These areas would attract an unbelievable flood of refugees due to the breakdown in export possibilities and the resul-

ture in the continental areas of the Northern Hemisphere would drop by 20 to 40 degrees within a few days. If a large part of the smoke and soot film were to reach the stable stratosphere, the result worldwide would mean a drop of 5 degrees over the next few years. The size of the smoke and soot build-up is debatable in the models. Furthermore synergetic effects such as the icing over of large areas of the oceans, etc. are not so easy to calculate.

The survivors of a nuclear war would have to fight against starvation (no harvest due to the cold) and against the breakdowns in the structure of society. Even areas such as Australia and New Zealand that are not involved

## Nuclear

ting mass unemployment. A situation that they could never cope with. The worldwide social consequences are imaginable, but unbelievable. A comment that could become the bitter truth: The survivors will envy the dead!

### **The Chernobyl Disaster**

In the heart of Russia's corn chambers, 130 kms north-west of Kiev, is Chernobyl's nuclear power station. Chernobyl is the third largest city in the Soviet Union with a population of 2.5 million. The station is made up of 2 pairs of nuclear reactors - Soviet model RBMK-1000. The maximum power of the pressurised water reactors is 1,000 megawatts. The reactor core is water cooled. The construction design of this model is already 33 years old and hopelessly dated.

On 25 April 1986 the operators of Block 4 were to check over the safety system. They were to check that one of the two 500 megawatt engines would still have enough power left after an emergency stop, to operate

until the emergency power unit was switched on. The reactor's output was halved and the emergency cooling system was turned off. On request from the public services, Kiev was supplied with electricity until 23.10 hours. Afterwards the first serious mistake was made. They forgot to turn on the emergency cooling system again. The reactor's output was reduced by one per cent and further safety systems were turned off. The majority of the control rods were pulled out.

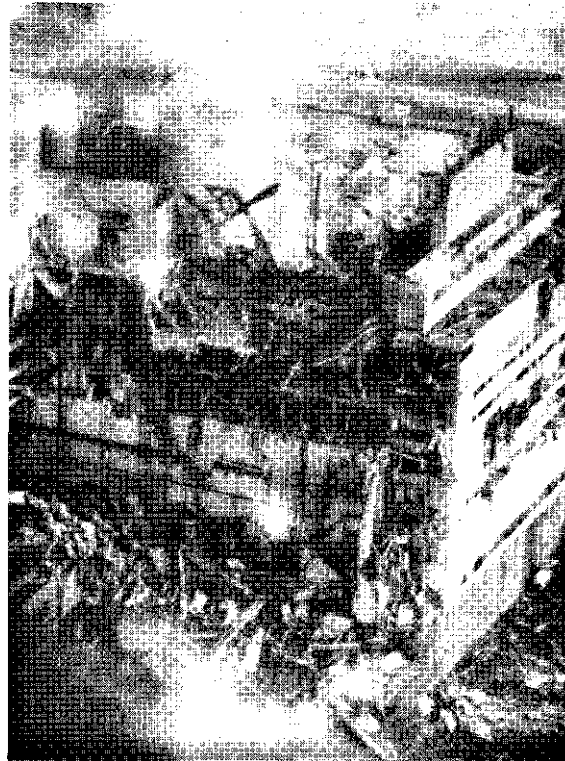
At 01.23 on 26th April the temperature in the core rose. The reactor became unsteady and threatened going out of control. The operating crew did the obvious. They pulled the emergency brake. This was certainly the fatal and deciding mistake.

The control rods are pushed into place in an emergency stop. This stops the core reacting. Due to a construction fault in this model of reactor, it does not allow you to put the control rods into place in the first metre in a particular configuration without the possibility of an increase in power. This situation can be compared to the emergency braking system in a car. The braking system accelerates one last time before finally braking.

## The Chernobyl Disaster

Furthermore the control rods were too short and took too long to put in. By activating the emergency system in an already overheated reactor, the disaster could hardly be avoided.

At 23.40 hours on 26 April the increase of power of Block 4 had reached a very dangerous level. In a few seconds the reactor had reached 200 to 400 times its rated power. Melting uranium brought the cooling water to boiling point and caused a huge steam explosion, that blew the roof of Block 4, parts of which fell into the reactor's hangar. A second heavy hydrogen explosion was caused by the red-hot graphite pieces in the boiling water. This explosion threw particles with high radio-activity miles up into the air. The core of the reactor had exploded. Pieces of burning elements and highly radio-active graphite were in the air and were being thrown around the



**A picture of the devastated Block 4 in the Chernobyl Nuclear Power Station.**

## Nuclear

surrounding area. Approximately 50 million curies of radiation, including over 3 million of the highly active cesium-137, escaped during this disaster.

Just about half of the radio-active fallout fell on an area of 30 kms around the power station. This area had to be evacuated and has been declared unfit to live in for an indefinite period of time. The other half

of the radiation was carried in the wind towards Europe.

On the morning of 28 April, the technicians of the Swedish nuclear power station registered abnormally high levels of radiation. After checking out their reactor and then comparing readings in other areas of Scandinavia, they came to the conclusion that a large

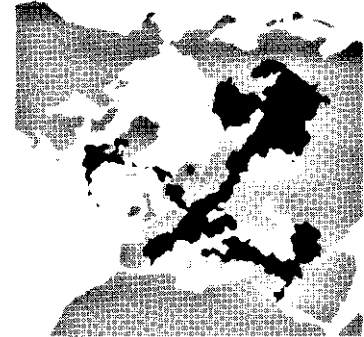
## The expansion of the cloud from Chernobyl



29. April 1986



2. May 1986



5. May 1986

accident had most likely occurred in the Soviet Union. The first announcement of Chernobyl's catastrophe was made that evening to the world.

By 30th April the radio-active clouds had reached the rest of continental Europe and 2 days later Great Britain and Ireland. Even later it reached far off areas such as North America, Greenland, Siberia and the Arabian peninsula. Countries in which it was raining at that time were hit harder. The highest levels of radiation were recorded in Lappland, Northern Sweden, as well as in South Germany and neighbouring parts of Austria, where it was raining heavily at the time. Larger areas in Europe were contaminated with higher levels of fallout than in the Soviet Union, where it was concentrated on a relatively small area.

This disaster has shown us how helpless every country really is in such a situation. The unsatisfactory response and the unsystematic safety precautions should have been spotted. In accordance with the policy of information no information was to be released or at least it was to be vague. The Soviet leaders once again tried to hush up the disaster. Some of the other governments also attempted this with consequences. The French heard hardly anything

from the government about the cloud and its effects. The British were not warned about the arrival of the cloud from the government but from radiologists at a London hospital. Within the countries there were time consuming arguments taking place between the experts about the possible dangers and how to deal with them. As usual the population were forgotten about and they continued to go walking in the radioactive rain unaware. Not knowing that by taking a walk a certain amount of people were killing themselves.

Exactly how many people were victims of the Chernobyl disaster is still unclear. Official Soviet reports claim 30 people died. A realistic estimate would be a few thousand people. Some pessimists reckon that about one million people worldwide have died from the effects of the radio-active fallout. A cautious estimate would be at least 50,000 people.

Of course, the increase in the numbers of non life-threatening cancers and the increase in abnormal births and hereditary defects has not been taken into account here. In White Russia today there is already a significant increase in cancer and in birth abnormalities.

## Nuclear

Despite everything, everyone involved in the Chernobyl disaster got off lightly. Only one small part of the radio-active substances would have been necessary, had it travelled in the air to Europe, to cause a disaster there. If the reactor had been functioning at full power and had given off three quarters of its total radiation, the level of radiation would have been 200 to 400 times higher. Many more deaths would have occurred after the radio-active cloud had left Kiev. The disaster was less serious also due to the fact that not many people lived in the area around the power station. A similar accident in one of Europe's densely populated areas would have had very different results and many more tragedies.

It is wrong to assume that something like this can only happen in the East where the nuclear power stations are dated. Even in the western plants a similar accident could happen at any time. On many occasions the western nuclear plants have just escaped a similar disaster. Above all Chernobyl is by no means the largest potential accident of its kind. The consequences of a reactor in the heart of Europe or in a densely populated area of America losing control while operating at full capacity would be dramatical-

ly different. Even reactors in the West become dated. Chernobyl has shown us that there are no limits in such a disaster. Possibly this was only a taste of what is to come - even more dreadful disasters.

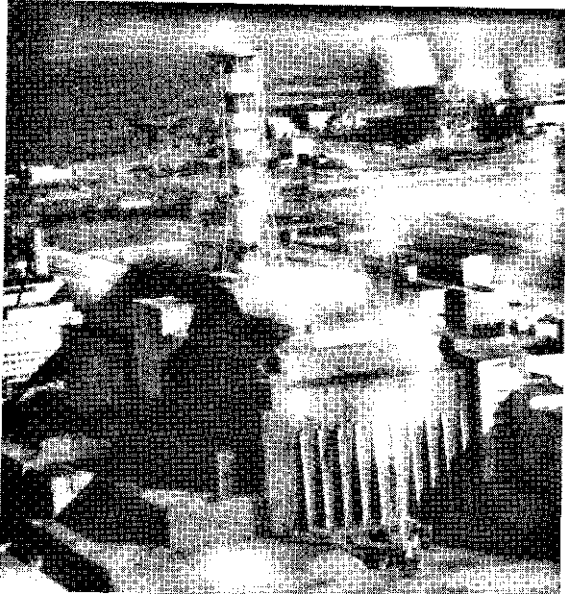
## On the Brink of a Disaster

The civil and military records kept on the use of nuclear power, is full of accounts of breakdowns and potential disasters. A complete list would fill a book the size of a dictionary. It would also only contain the events that were made public. In countries with a tight policy of information, military incidents and accidents are, if possible, hushed up. Take a look at this list and it is a miracle that a disaster similar to Tschernobyl's has not happened earlier or more often.

Records have been kept for over 45 years and here is a list of the incidents noted in 1987 only. Apart from the incident at Biblis it was a very quiet year. From a public point of view there were only a few larger incidents.



## On the Brink of a Disaster



**The huge cement tomb covering Block 4 which exploded at Chernobyl. A certain amount of the workers were exposed to radiation while building it.**

On 16th December 1987 on re-starting the reactor in Biblis-A nuclear power station near Frankfurt, the main valve between the primary circulation and the

emergency cooling system accidentally remained open. The operating crew saw the red warning light, and registered a defect. The valve remained open for 15 hours unnoticed. If one of the other two safety valves had not functioned, there would have been a disaster.

In the end, one of the less important valves began to leak. This leak also went unnoticed as the warning system was not working properly. The next morning an increase in the temperature of the cooling water in the preparation plant was registered. The open valve was only spotted when the reactor was working at full capacity. The operators, despite the dangerous situation, took more than 2 hours to reach the decision to turn the reactor off.

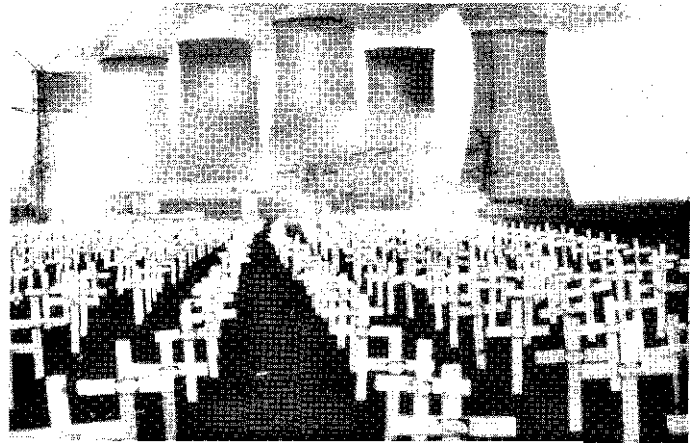
To avoid a standstill in production, they carried out a very risky manoeuvre. They opened one of the two safety valves. The stream of the cooling agent should have closed the main valve. However, the main valve remained open and the cooling agent leaked out of the primary circulation. Luckily the safety valve closed once again. A disaster would have been unavoidable, if it had also jammed like the main valve. The reactor was turned off after this very risky manoeuvre.

## Nuclear

Initially the government tried to play down the incident and said it was completely harmless. A year later the public found out that a West German nuclear power plant had never been so close to a disaster. At the same time the public found out that there were 303 serious incidents recorded in West German stations alone in 1987. Quick decisions had to be made in 11 cases.

In the same year the French 1,200 megawatt reactor Superphenix in France went into operation. It is the largest fast breeder reactor in the world. After a short time the first serious problems came to light. Liquid sodium had been seeping out of the fuel transporter and the cooling cylinder for more than five weeks into the secondary cylinder. It was necessary to switch off the reactor. The damage was evaluated at 120 million German marks, and the repairs would take, at a guess, two to three years to complete. A year later almost 100 more tears had been found in the cooling cylinder. To replace these parts completely the cost would be 300 million German marks.

A nuclear submarine swam into an Irish fish cutter's net and dragged him along for two and a half hours. Nine months later another Irish fishing boat was pulled along by a submarine. The submarine concerned disappeared without trace. Since 1980 16 fishing boats and 32 people have disappeared without trace from the Irish Sea. The American and British subma-



**A thought provoking protest action by Greenpeace Austria against the bordering, totally out-of-date and dangerous nuclear power station Bohunice in the Czech Republic.**

rines are being blamed for this as they operate intensively in these waters.

The US nuclear power station Peach Bottom was closed down by the authorities. The operators of the nuclear reactor, 50 kms from Baltimore, regularly slept while on duty. Six weeks prior, a NRC report discovered a fundamental construction error in the reactor. They confirmed that radioactivity could escape through the existing cracks and there was a fifty per cent chance that a serious accident could happen. The report stated that the operators would have to be extra vigilant.

During a fire in the one and only research reactor in Australia, two workers were exposed to radiation. Radio-active gases escaped into the atmosphere.

Near Heilbronn in West Germany a US Army transporter came off the road. A Pershing-missile landed in a ditch.

In California in the Rancho Seco nuclear power station, 45,000 litres of radio-active water escaped from 2 leaks. Some of the water poured into a stream near the plant. If you add up all the emissions of this nuclear power plant, then the population of Rancho Seco have been exposed to the highest levels of

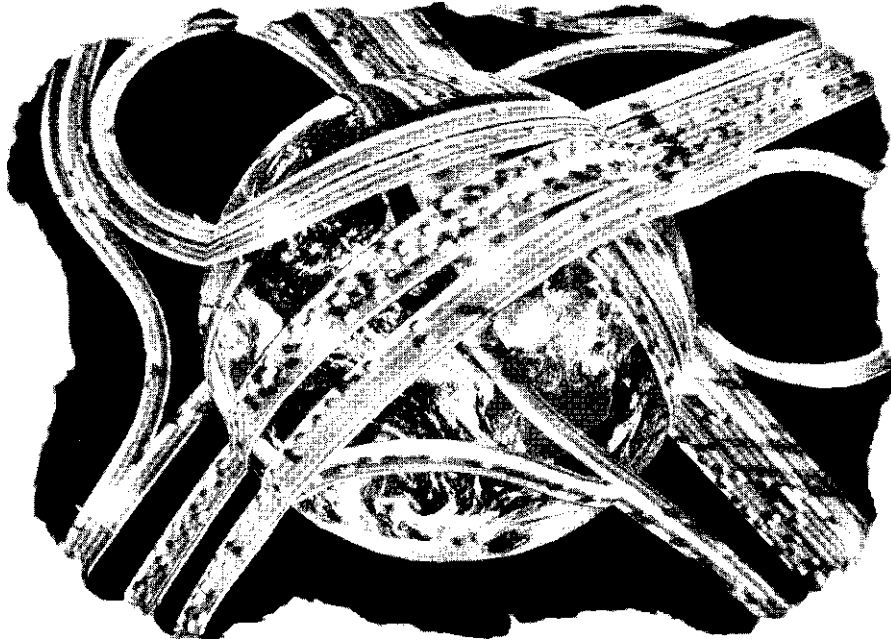
radiation compared to other people who live near commercial operational nuclear power plants that have been legally authorised.

50 tons of water managed to escape from the Argentinian nuclear reactor Atucha 1 into the open. The water contained 15 millicurie per litre of radioactivity. The reactor had only been working for a month after undergoing three months of repairs during which time it had been switched off. This was the third accident recorded in the Embalse nuclear power station inside a year.

A uranium tablet, that should have been disposed of in the nuclear plant NUCEM in Hanau, contained plutonium. The workers were exposed to radiation and 75 people had to be tested for radiation.

In the year 1987, 2,810 incidents were registered with the American authority NRC. The total output of the American nuclear power stations was for the ninth time in a row 60% under capacity.

# Burntime



We're playing Russian Roulette with the world.  
We're the ball and the stake is our life.

## On the Way to Burntime

# GREENHOUSE

**O**ur solar system is part of the Milky Way. In this galaxy there are over 200 thousand million fixed stars and an unbelievable number of planets. The Milky Way is only a tiny, unimportant point in the entire universe. Probably somewhere there is a planet like ours. But the chances of someone ever finding this planet are nil. Everyone has to accept that there is no substitute for the Earth.

The world's standards of living did not happen by accident and cannot be taken for granted. If the Earth

was only one per cent further away from the sun, the average all-round temperature would be 20 degrees lower.

Even the Earth's size plays an important part. Mars is too small and Venus is too large to create a comfortable atmosphere to live in.

When you look at both our neighbouring planets - cold Mars and hot Venus, the world lies in the golden centre, both in distance to the sun and in its size.

## The Greenhouse Effect

The atmosphere is the most important criteria in modern day life on Earth. In the beginning the atmosphere was made up mainly of carbon dioxide (CO<sub>2</sub>) and nitrogen. It protected the Earth from a decrease in temperature, as the sun was originally 30 percent colder than it is today. The forms of life used up carbon dioxide and produced oxygen. Had the sun progressively got warmer and had the atmosphere become laden with CO<sub>2</sub>, the result of the greenhouse effect would have been an increase in temperature. However the amount of living things in the oceans increased and took so much carbon dioxide out of the atmosphere, that the greenhouse effect was reduced.

A stable atmosphere, as we know it today, has existed for over 400 million years. The carbon dioxide content has decreased from 30 per cent to 0.035 per cent. Oxygen makes up for only 21 per cent and the main substance is nitrogen with 78 per cent.

In other words the atmosphere is a gaseous protective covering for the Earth. The 0.035 per cent carbon dioxide maintains the structure of stable temperature. Without CO<sub>2</sub> our planet would emit too much heat

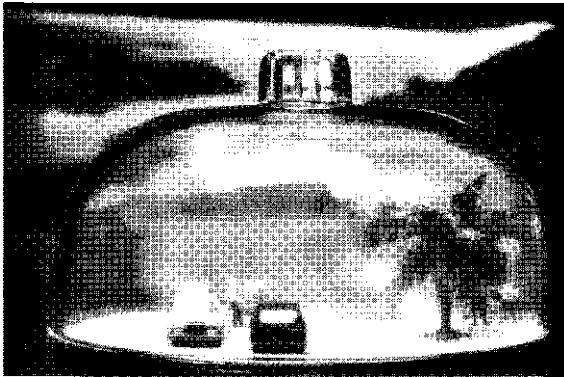
into the universe and it would slowly become cold. Part of the radiated heat is reflected by the molecules of CO<sub>2</sub>. This can be compared to a glass house. The sunrays are allowed to enter, but only part of the radiated heat can escape. For this reason this effect has been named the "greenhouse effect". The CO<sub>2</sub> in the atmosphere is, in a manner of speaking, our protection against the universe's cold.

The climate on Earth has often changed. The process of change can take thousands of years or more. The different species of forms of life take a long time to adapt to new living conditions. For many species it was still too fast just the same. They could not adapt in thousands of years, and so they have become extinct.

The atmosphere is an immensely complex setup that is interwoven with all the Earth's spheres. It can be compared more to a sensitive layer of skin rather than a thick fur. It can put up with a lot, even the strongest volcano eruption cannot damage it permanently, but it can be damaged. As a whole, the atmosphere and all that it depends on, in the entire Earth, still remains beyond our comprehension. Carbon dioxide is not the only gas responsible for creating the greenhouse

## The Greenhouse Effect

effect. There are other trace gases that also create infrared radiation reflection. When the content of CO-2 or other greenhouse gases increases, then the greenhouse effect becomes stronger. Twice, since the first Ice Age, there has been a noticeable rise in temperature. On both occasions it increased by approximately one degree Celsius. This is a lot less than what the scientists predict for the next century.



**The atmosphere has provided us with a stable climate for millions of years. In the last hundred years this stable structure has been destroyed by mankind.**

On a larger time scale, for example between the Ice Ages, the climate was for the majority of the time stable. Slight variations in temperature are normal and will occur again and again. It varies by one degree Celsius. Even such a small change in temperature can have visible results. The average temperature in the middle ages (1000 -1400 AD) was one degree Celsius warmer than today. At that time there were vineyards in south-east England and the Vikings built colonies in Greenland (Greenland meant originally green land!). Since that time to the present day the temperature has decreased by only one degree below the average but it is considered a cooler period. The River Thames has frozen over in winter, and icebergs have stretched as far as Norway. In June 1816 in the South of England there was still frost on the ground which caused dreadful losses to crops.

Since the beginning of the industrial age, about one hundred years ago, the average temperature of the world has risen by approximately 0.5 degrees. This increase can still be considered as a natural temperature variation. For this reason there are still some people today who deny that the greenhouse effect has increased, or they even play it down.

## Greenhouse

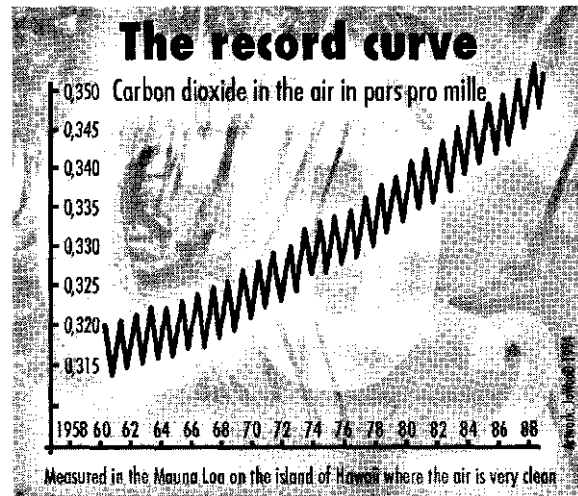
An increase in the greenhouse effect is when more greenhouse gases are emitted into the atmosphere by humans. In general the expression "greenhouse effect" today means an increase in it. Subsequent references to the greenhouse effect imply a man-made increase in the greenhouse effect.

More and more greenhouse gases are placed into the atmosphere by humans through traffic, industry, agriculture and house fires. The CO<sub>2</sub> content today in the atmosphere is 25% higher than one hundred years ago. It is the highest level ever recorded since the beginning of mankind. It causes the artificial production of heat accumulation. The atmosphere is being turned into the Earth's electric blanket by humans.

The direct connection between global warming and human interference cannot be conclusively proved because of the inertia of the world's temperature cycle. This will likely only become possible in a few decades time. By then it will be too late to reconsider our actions and prevent it. At the moment mankind is playing Russian roulette with its own planet's climate.

The Earth's climate is a highly complex structure which has many repercussions and is affected by

outside influences. Not even the most modern computer is capable of producing an exact model of the climate. Greenhouse gases, that are emitted into the air, will show no signs of change for a few decades.



The CO<sub>2</sub> content in the air is rising constantly. This can be clearly seen in the above "Mauna Loa Curve" from the island of Hawaii with its low air pollution. The curve drops during the growing period and in winter it rises.



The results of a rise in temperature on stretches of water and land will slowly become evident. The regenerative coupling and reinforcing effects that will occur, cannot be calculated. With the help of simple credible climate estimates, most of the scientists today are predicting an increase in temperature of 1.5 to 5 degrees into the 21st century. Between the Ice Ages the temperature never varied by more than 4 degrees. These facts give us thoughts for some serious consideration.

Also it should not be forgotten that the change in temperature from the last Ice Age to the present time has taken 5,000 years. Mankind is going to undergo a similar temperature change in only 200 years, if drastic measures are not taken shortly.

It is hard to imagine the effect an unprecedented increase in temperature, especially in such a short period of time, would have, on all forms of life in the world. A large part of the life forms would not be able to cope with the transfer from the Ice Age to the Warmer Age or vice versa even if it took thousands of years. How should they then cope with it in only two hundred years?

## The Greenhouse gases

Carbon dioxide (CO<sub>2</sub>) makes up for 50 per cent of the greenhouse effect. Therefore it is the most important greenhouse gas, not only because of its high radiation (CFCs are much more dangerous), but because of the huge amounts that are discharged. 25 thousand million tons of CO<sub>2</sub> a year are discharged every year into the air. The CO<sub>2</sub> content in the air has risen by 25 per cent over the last hundred years. This is the highest level recorded since the beginning of mankind.

This is caused by the burning of fuels containing carbon. The fossil fuels - petroleum, coal and natural gas - are mainly responsible for this. However the burning of timber also produces a large amount of carbon dioxide, especially in the vast areas that surround forests which are being cut down or burnt. Traffic produces the largest amount of CO<sub>2</sub> in the world.

The carbon cycle is a very important topic and it is handled in more detail in a separate chapter.

Not all countries make equal contributions to the greenhouse effect. But all of them will suffer the

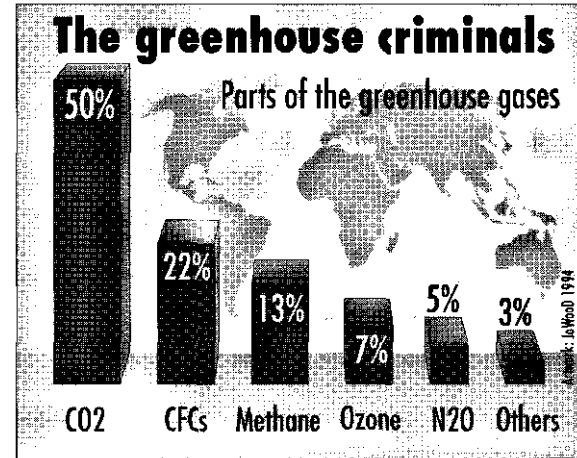
## Greenhouse

consequences. Canada and the USA waste the largest amounts of energy. In both of these countries one inhabitant discharges on average of 18 or rather 19 tons of CO<sub>2</sub> per year. If this figure was spread out globally, then 4 tons of CO<sub>2</sub> per year per capita would be released into the atmosphere. An Indian however only discharges half a ton, and remember that in the industrial north a large proportion of energy is used for heating purposes. All the same, there is still a vast difference in the amount of energy used between the industrial and developing countries.

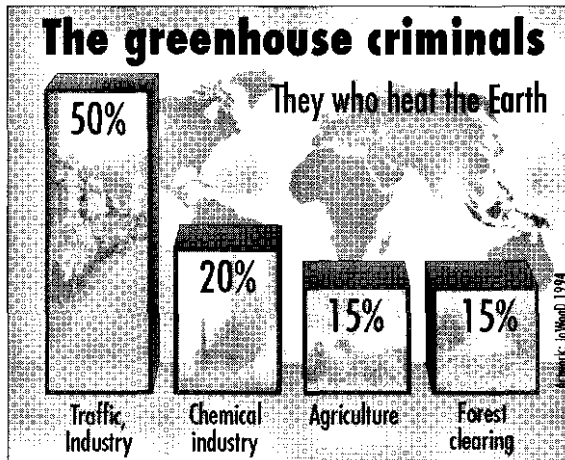
This is another highly controversial problem in our society. When the developing countries reach a level of technology equal to the industrial countries and, although their aim is not to discharge the same amount of damaging gases, the effect on the Earth's climate would be much more disastrous than has already been predicted.

**Flourescent hydrogen chloride (CFCs)** make up for 22 per cent of the greenhouse effect. Approximately one million tons of CFCs are discharged into the atmosphere every year. This amount appears to be rather small in comparison to the amount of CO<sub>2</sub>

discharged, but this gas damages the atmosphere about 18,000 times more than CO<sub>2</sub>. CFCs are used as a fuel gas in the coolant of refrigerators and air conditioning systems, to foam plastics and as a solvent. It is used in spray cans as a propellant charge and in many places its use has been restricted. However it is still used in many other areas although there are plenty of alternatives. In the future it will be substituted by part-halogenated fluorescent hydroca-



arbon or chloride hydrocarbon, but these are certainly just as dangerous. The plastic molecules, that were very cheap to produce and were previously very popular in industries, have distinguished themselves by being able to survive for up to 400 years in the atmosphere. A demand for the immediate withdrawal in the production and use of full and part halogenated CFCs can only be made when alternatives become available.



**Methane (CH<sub>4</sub>)** makes up roughly for 13 per cent of the greenhouse effect. 600 million tons of methane escape into the air globally every year. It is produced when organic matters are broken down by the lack of oxygen.

Large amounts of methane are released in the formation of petroleum and natural gas reserves, as well as in coal producing areas. Even during the transportation of fossil fuels, the methane gas contained can still accidentally escape, even today.

Methane is constantly produced in rubbish tips and sewage works in the bacteria produced during the decaying process.

Ruminative animals are small methane reactors. The bacteria present in the digestive system produce methane. When animals are naturally disposed of, methane is released into the air. Worldwide 1.2 thousand million beef cattle are responsible for a huge amount of the methane output. Add this figure to the great number of sheep, goats, donkeys and camels around. A single well fed beef cow produces up to 120 litres of methane per year. In the industrial countries the addiction to meat has become a crucial factor in deciding the future of our climate.

## Greenhouse

Even the large rice farms emit large amounts of methane into the air. Today the rice fields produce as much methane as all the natural swamps put together. 200 million tons of CH<sub>4</sub> are produced and emitted into the atmosphere every year from the swamps and rice fields - the later is an artificial swamp.



All over the world over one thousand million beef cattle produce a huge amount of methane. The love of meat has become a factor in deciding our future climate.

Since the last century the content of methane in the atmosphere has risen by 150 per cent and is still increasing very rapidly. This shows that more and more methane is being discharged into the atmosphere in a smaller scale of time.

**Ground level Ozone (O<sub>3</sub>)** makes up for seven per cent of the greenhouse effect. It is produced by sunrays which contain nitrous oxides and hydrocarbons. Car exhausts, house fires, industries and solvents are all main contributors.

Ground level ozone was practically unheard of before the industrial revolution. With the increase in the number of internal combustion engines it has become better known. It is a poisonous irritant gas and causes eye disorders and headaches when more than 200 micrograms per cubic metre are present in the air. Small children, the old and sensitive people could even suffer breathing disorders. Even plants are damaged by ground level ozone.

The most ozone at the moment is present in Los Angeles. Out of 75 days in a year over 500 to 1000 micrograms per cubic metre are measured in the air in the famous LA smog. There 13 million people

operate 6.5 million internal combustion engines on a daily basis. This amounts to over 40 million journeys by car per day.

The population is in the strange situation of having too much ground level ozone and at the same time of losing the protective ozone layer in the atmosphere. More and more propaganda issued claim that an exchange is possible, but this is not true. The life span of ground level ozone is too short to reach the ozone layer in the atmosphere.

**Laughing gas** ( $N_2O$ ) makes up for five per cent of the greenhouse effect. It is found in the micro-organisms of food stuffs that contain nitrous oxides. Agriculture is the main producer. Further deposits of laughing gas come from burning biological matter and coal. It is very dangerous because its life expectancy is up to 150 years.

Only a limited amount of micro-organisms produce laughing gas. Yet again Man has managed to manipulate nature to suit himself and his demands. He invented artificial fertilisers. The cultivated plants are "persuaded" to achieve record growth by being fed artificial nitrogen. In the fifties, three million tons of



**Agriculture is one of the main contributors to the greenhouse effect. Methane is produced in the stomachs of ruminative animals and in rice paddies. Large amounts of laughing gas are produced from overfertilised fields.**

artificial fertilisers were spread in the fields all over the world. At present more than 60 million tons per year are distributed. This is an increase of 2,000 per cent in the last 40 years. Mankind is forcefully upsetting the entire natural structure of nitrogen .

## The "unholy" beast of burden

Everyone blames the car, but no-one is willing to make any concessions when it comes to using it. Even environmentalists change their attitudes when their car is mentioned. The car is still a symbol of personal freedom. No-one realises the personal sacrifice they are making and how dependent they have become on it. Everyone maintains that someone else can do without it, but he personally always has hundreds of excuses as to why he can't. Here the irrationality of the status quo is emphasised rather than its rationality.

Traffic is the main contributor to the greenhouse effect. The total traffic worldwide produces about two thousand million tons of CO<sub>2</sub> per year. The majority is produced in traffic jams and queues and can be put to no useful purpose. Every car in Germany costs the state and its tax payers 6,000 DM per year. This cost is incurred by road works and road maintenance, rehabilitation costs, damages to the environment, etc. The principle of making the polluter pay would be to add these costs onto the price of petrol. It would reach the incredible price of 5,50 DM.

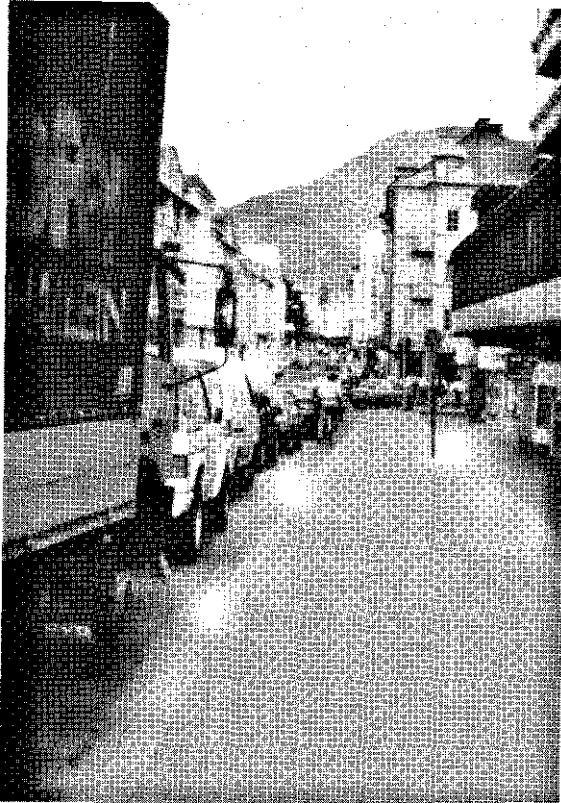
There are 550 million cars on the road all over the world. Over 400 million of them can be found between the USA, Japan and Western Europe. 1,000 Americans own 556 cars, whereas 1,000 West Europeans own 352 cars. On the other hand 1,000 Chinese people have to make do with 0.7 of a car. This figure shows the marked difference between the North and the South. If all the countries in the world were as motorised as the industrial countries, the temperature would drop and the entire energy supply system would fall apart in the shortest possible time.

In the USA, over 35 per cent of the world's total traffic energy in the world, is used. Here the volume of motorisation and traffic is the highest in the world. Part of the reason for this is the low price of petrol. In Europe it costs twice, if not three times, as much. Even the consumption rate of an American car is slightly higher than the European and Japanese ones.

Above all, air-conditioning in cars is quite common in the USA. It contains CFCs which increase the greenhouse effect. A ninth of all CFCs produced in the USA are used in cars.

The car is the worst contributor to ground level ozone. Ozone is also produced from hydrocarbons

## The "unholy" beast of burden



and nitrous oxides in the sun's radiation. Together they cause a famous and fearful smog. Apart from the effect these irritant gases have on our health directly, they also contribute eight per cent to the greenhouse effect. The intensity of ozone inevitably increases as the volume of traffic becomes greater.

Since the lifespan of ozone in the troposphere is very short, there is the chance to reduce the greenhouse effect quite quickly. If the predominant substances - hydrocarbon and nitrous oxide - could be strictly isolated the ozone levels could be reduced. A reduction in petrol consumption and, above all, in the amount of driving would also help to achieve this aim.

A sure way of curing us all would be to put up the price of petrol. If the price of fuel increased, then more money would be invested into the research for a more economical and efficient car. Higher petrol prices would reduce the amount of driving. Alter-

**550 million cars are on the roads worldwide. Four fifths are on the American, West European and Japanese roads. The total traffic causes a yearly output of about 2 thousand million tons of C-O<sub>2</sub>.**

## Greenhouse

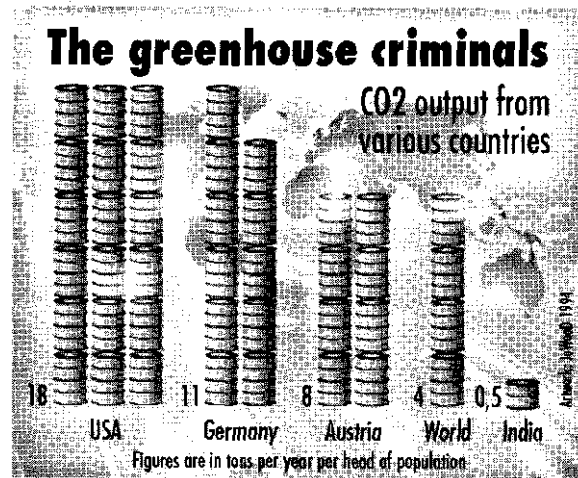
native methods of travel, like the train would become more attractive and competitive. At the moment the price of fuel is comparatively low or at least stable despite the fact that the number of kilometres driven over the last few years has increased. Even the new car designed for efficiency has been replaced by a high performance model.

Bad economical times are not beneficial. In times of a crisis the cars which run around the world are not renewed as often. In other words, fewer older cars are exchanged for the newer pollution-free and more efficient models. The amount available to us does not decrease.

You must remember that the more research carried out into the improvement of cars, the better and more pollution-free the conventional car will become, the less pressure there is to change over to an alternative more advanced form of technology. Also a limit to the amount produced or the car's performance will take the pressure off manufacturers to design a better car. It is a vicious circle.

It is perfectly clear that you cannot count on the manufacturers and drivers alone. Only strong legal measures will achieve noticeable results. This has

been proved in the past. Imagine if the entire cost of road taxation was added to the price of petrol, then the owner of a car would become more aware of the real costs of running his "beloved" vehicle. The manufacturer would have to produce a more efficient car and he would have to uphold more stringent standards when designing exhaust and petrol consumption systems.





In the hope of being able to maintain a more stable worldwide climate as well as improving the environment we live in, it is hoped that people will soon realise the car for what it is: up until now it has been a highly inefficient method of transport used to convey goods or people from one point to another. A world free of cars is as much a dream as a city full of fresh air!

### **The organic carbon cycle**

The comfortable climate on the Earth can drop with the disappearance and reduction in carbon dioxide (CO<sub>2</sub>) as we understand it. Less than a tenth of a per cent of CO<sub>2</sub> can alter the Earth's climate. The organic carbon cycle determines our future climate. Not all the details of this cycle have been totally researched to date or are fully understood. The precise amount of carbon in our planet is also unknown.

Four thousand million years ago there was one hundred times more carbon in the atmosphere than

there is today and it protected the Earth from a drop in temperature. In the days of the dinosaur there was 15 times more CO<sub>2</sub> in the air than today. The question is where has all the carbon gone? About 39,000 thousand million tons of it has been absorbed into the world's oceans. All biological matters and the ground, store about 600 thousand million tons of CO<sub>2</sub>. 13,000 thousand million tons of combined carbon are thought to be held in the form of petroleum, coal and natural gas. 5,000 thousand million tons of it have already been tapped.

The largest reserves are in the sedimentary rocks under the oceans and the ground. An incredible amount, about 30 million thousand million tons of carbon, is stored there. In today's atmosphere there are 750 thousand million tons of CO<sub>2</sub>. This does not seem very much but it is enough to protect the planet from a fall in temperature.

The plants sucked CO<sub>2</sub> from the second original atmosphere and incorporated it into their leaves, stems and branches. Deceased plants that died are buried in the depths of the earth and have been transformed over millions of years into petroleum, coal and natural gas. Large carbon cemeteries lie

## Greenhouse

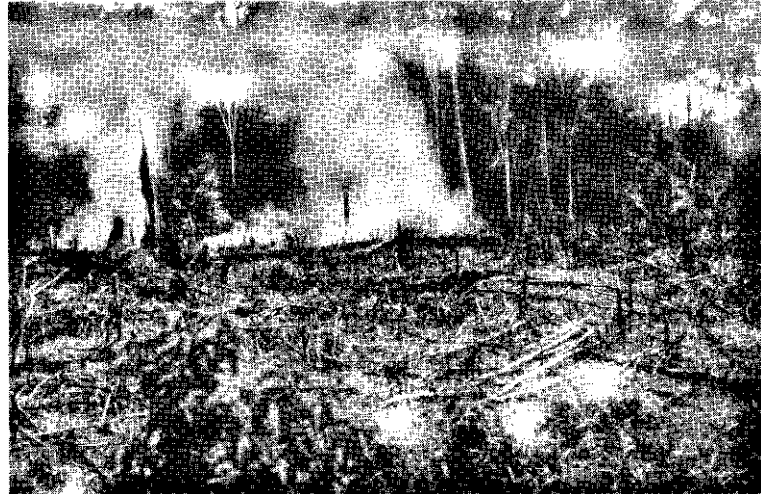
dormant in the depths of the Earth. This is a blessing for life on the planet. Huge amounts of carbon are therefore excluded from the natural organic carbon cycle. This prevents the Earth from increasing in temperature too much.

The carbon cycle functions very well on its own without the interference of humans. Plants breathe in carbon dioxide, keep some of it and exhale the rest. Their organism can grow with the CO-2 that is retained. The micro-organisms ensure that CO-2 is freed from the deceased plants in the ground. 200 thousand million tons of CO-2 are interchanged every year between the atmosphere and the biological matters. In this way the biological matter gains by three to five thousand million tons per year.

**A hundred years ago the yearly output of CO-2 was only 20 million tons. Today due to the burning of tropical rain forests alone, 100 times more carbon dioxide is released into the air.**

This is the amount that is extracted permanently from the atmosphere. The volcanoes ensure that the air does not run out of carbon. When they erupt the loss is replaced. A stable balance could be maintained for a long time if no-one interfered.

At a very early stage man discovered fire. He burned branches and stems and in this way managed to free extra carbon. However this caused very little



damage to the entire cycle. It took man a long time to discover the use for coal and even longer for petroleum and natural gas. The burning of these fuels was much more effective than wood. However in the beginning even mining did not have a de-stabilising effect. One hundred years ago a total of only 20 million tons of CO-2 was created by 1.5 thousand million people by burning fuel. Today due to the burning of the tropical rain forests alone, 100 times more carbon dioxide is released into the air.

This disastrous turn of events commenced at the beginning of the industrial revolution. As our civilisation developed and increased in population, it quickly required more and more fossil fuel energy. Man has helped himself to a great extent to these unexploited carbon cemeteries. As more and more of them have been exploited, the amount that has been used up increases all the time.

This is how man has succeeded in putting CO-2 into the atmosphere, despite the fact that there are actually good reasons for its extraction. Man has been figuratively speaking, described as an extra volcano and as the biggest of its kind. In any one day more fossil fuels are burned than can be produced in

a thousand years. In the space of a hundred years the CO-2 output has multiplied a thousand times. Today nearly 6 thousand million people emit 22 thousand million tons of CO-2 per year into the atmosphere. This is five to six times as much as all the volcanoes on the earth together release. In this way mankind is on the right course to awakening the latent fate of Venus.

## Vanishing forests

The tropical rain forests only cover eight per cent of the earth, but contain a third of the entire plants matters and four fifths of all types in the world. The foundations are barren, but a huge amount of biological wealth still manages to grow here. Nowhere is there such a maximum use made of such minimal space.

The ground of a rain forest is made up of a very thin layer of mold. It is not suitable for feeding the masses of plants that grow on it. The nutrients come from the biological matters. Deceased plants are turned into minerals within a few days, which immediately return into the nutrient circulation. The "recycling tempo"

## Greenhouse

of this process is unsurpassable as in moderate areas it normally takes a few years.

The variety of plants that grow in the rain forests is unbelievably large. Up to 300 types of trees grow on a single hectare of forest. This is 23 times more than are found in European deciduous forests. It is assumed that there are over 7,000 types of fish alone in the Amazon. At the time when the Rhein River was unpolluted, there were thought to be a maximum of 70 different types at one time.

In the multitude of different types of plants there are probably very many highly effective pharmacological types. It is believed that 1,400 types of cancer restricting substances grow here. Up until now only a small amount of the existing types have been researched. The treasure chests of evolution are being destroyed. Every minute an area the size of 50 football pitches disappears worldwide. The total area of the rain forests in the world was originally 13.6 million square kilometres and today it has almost been halved to only 7.7 million. 138,600 square kilometres are destroyed every year.

The farmers that clear areas by fire are responsible for 60 per cent of the destruction. They have been

driven out of traditional farming areas and have had to make their future in the forests. Due to the clearing of the land the thin layer of mold on the ground can only be used for a few years. New areas have to be cleared continuously. These farmers are not really to blame. Their original plans were determined by many social, economic and political factors that they did not anticipate or had no influence on. At the same time the number of people affected increased dramatically and in the process the pressure put on them, and consequently on the forests, always increased. When their problems are solved in the long run the problem of the rain forests will also be solved.

Others responsible for destroying our forests are the timber exporters and the mining companies. To be able to meet orders for exotic timbers, masses of it is being cut down in the tropical forests. Only when the population of the industrial countries finally realise that furniture made out of local timber is good enough, and by forbidding imports this over-exploitation will stop.

Rare mineral resources and ores are also mined in the rain forests. For this large areas are cleared and even larger areas are poisoned by the research waste.



**The tropical rain forests are home to four fifths of the entire types of animal and plant life. At a breathtaking speed these treasure stores are being destroyed. Every minute a rain forest area equivalent in size of fifty football pitches vanishes.**



## Greenhouse

It would almost be cynical to accuse the rain forest countries of cutting down their timber for financial gain. At the moment it is the industrial countries that are first class examples of how to over-exploit local forests. In Europe the original area covered by forests has been reduced by one per cent, and in the USA by five per cent.

It is not only the rain forests that are being threatened but also the vast forests in Eurasia and North America, where the Bora wind blows. Up until now these forests have been inconspicuous to the public who have only been aware of the large variety of the graceful rainforests. They have a similar influence on the climate to the tropical forests.

The burning down of the "Bora" forests does not play a significant part. Its timber is used for heating purposes and the vast majority for the production of paper. In Siberia alone an area of forest about the size of Switzerland, is cut down every day.

The main aggravation is that the "Bora" forest grows very slowly. A larch tree in the Taiga takes about 130 years to reach a height of six metres. A German larch tree can reach the same height in little more than 20 years.



**The over-exploitation of the coniferous forests in the northern Hemisphere - even if it has gone unnoticed by the public - contributes to the greenhouse effect.**

When burning down forests large amounts of combined carbon dioxide are released into the air. More and more methane and nitrogen oxides escape into the air during forest clearing.

The cutting down of timber is responsible for producing one to two thousand million tons of CO<sub>2</sub> per year. The total output worldwide is five thousand million tons per year. The destruction of forests makes

When the temperature rises

up for 20 to 30 per cent of the greenhouse effect after all the greenhouse gases have been taken into account. It is hard to estimate the exact increase of the effect because there are more areas being cleared all the time. It should also be noted that by cutting down timber, large forestry areas as well as their capabilities to absorb CO-2, disappear.

It would be cynical to say that this problem will sort itself out. If the same rate of timber clearing is maintained, then by the year 2000 at the latest, there will be nothing left to cut down. Is this really a solution?

## **When the temperature rises**

The consequences and the extent that an increase in the greenhouse effect would have, cannot be predicted exactly. Only with the help of simplified, but still highly complex climate models could an estimate be made of how the climate will be in the future. Some of these estimates are quite different from one another. Even by studying the Earth's history which is limited, conclusions can be reached as to the expected consequences that an increase in the green-

house effect would have. All the scientists agree that it will become warmer. The predictions are that in the next century the temperature will rise by 1.5 to 5 degrees. In this estimate the existence of recoupling effects (see next chapter) has not been taken into account as it is very complex. Even if the output of the greenhouse gases was reduced by 50 per cent, the temperature on the Earth would still rise slightly over the next few decades.

The increase will not be the same in all areas. Areas nearer to the poles will warm up more than areas in the vicinity of the equator. Land will also warm up more than the oceans.

There are lots of speculations as to what the effects on life will be in the event of a change in temperature. Here similar facts from the world's history could be helpful. However since a rapid increase in temperature has never happened, it is again difficult to use these figures.

From the history of the world it is already known that a change of one degree in the temperature can, in certain climate zones, make farming possible and in other areas impossible. It is expected that the climate zones will be shifted by 300 to 500 kilometres

## Greenhouse



in the direction of the poles. The deserts will be further to the north. In countries, with a good productive harvest at the moment, the output will decrease. In the southern states of the USA, South Europe and Western Australia farming will come to a standstill. Even in the mid-west of the USA in the corn chambers of the Earth, definite periods of drought can be expected. The production of grain worldwide will be drastically reduced. In particular agricultural countries, already prone to droughts, will experience extremely bad times. Dramatic hunger catastrophes are predicted. It is unlikely that the tundra areas and the coniferous forests of the north, whose temperature will go up, could be used as alternative areas for cultivation.

Many types of plants will be overworked by the rapid increase in temperature. In order to survive

### **What is not enough for one ...**

**The Earth's warming will increase the areas of drought. More and more countries will suffer from a lack of water, drought disasters will effect large areas of the Earth.**



most plants migrate in the event of a quick change in temperature. The prognosed speed of the change in temperature will be greater than the ability of the plants to migrate by 100 to 1000 times. During the migration the forests will not be able to balance out losses in the south with gains in the north. The Earth will become a wilderness. Many types of plants will die.

The water level of the world's oceans will rise as the ice cover in the Antarctic melts. A rise of up to one metre is expected by the end of the next century. This will be fatal for coastal regions. The rich industrial countries can more or less solve the problem by building dams. This turn of events would be disastrous for the poorer countries. In Egypt alone 15 per cent of the arable countryside would be flooded. Islands, such as the Maldives, could disappear totally

... is too much for the other.

As the water level rises large areas of land will be flooded by the oceans. Poorer countries such as Bangladesh and Egypt will be affected the most.



## Greenhouse

under the ocean. Massive problems in supplying drinking water to the coastal regions would develop because of the increasing amount of salt in the ground water.

What is too much for one is not enough for the other. When it does not rain in regions that are used to a lot of rain, there will be a lack of drinking water. This will be one of the major problems in most parts of the world. The developing countries will yet again be hit the hardest as they are already today short of water. However areas, such as California, Texas and south Europe, will also have to learn to live with these drastic water shortages.

Above all when the oceans warm up, the climate researchers predict a strong increase in the number of devastating whirlwinds. Warm water temperatures create whirlwinds. The water's temperature also directly increases the possibilities of devastating natural disasters. Even in the more temperate areas terrible storms with no rain can be expected. The insurance companies all over the world have already been alerted. In the last decade there have already been an abnormal amount of extremely intensive whirlwinds and storms.

More people than ever before will migrate in search of a more comfortable climate to live in. At the moment some countries are already experiencing problems with only a small amount of refugees. They will have to be prepared to cope with the consequences of a migration flood.

## **A networked system**

The biggest problem in producing a climate model is the complexity of the worldwide climate systems. Different effects can have influences on one another. They can either cause an increase or decrease in temperature. This regenerative coupling system overlaps in many ways. No one aspect of the climate can be considered or calculated individually. This is why it is also not possible to produce suitable climate models that take into account all the regenerative couplings even with the most capable computer. However some of the regenerative coupling effects can be examined in isolation and allow the possibility of deviating from simplified models.

## A networked system

Generative couplings in nature react rapidly when compared to man's linear pattern of reasoning. For example take the human body: when a sick person has a body temperature of 40 degrees he is not well. When he has a temperature of 44 degrees he is not 4 degrees "sicker" but dead. Another example is a store in a large chemical factory. If this store is set on fire, then when a certain temperature is reached the che-

micals in the store will start to react. This causes further reactions and finally an uncontrollable inferno erupts. It is possible that a dangerous and up until now unknown substance has been produced by the numerous inter-reactions.

It is far easier to investigate a large chemical store than the climate of the Earth. No-one has had the experience to produce a model of climate recouplings. The fact that there is no comparison possible, makes the greenhouse effect even more dangerous than predicted up until now.

Steam is a factor that is underestimated in the greenhouse effect. Since it is spread out variably it does not only have one role. During a large



**On the one hand when forests are cut down and destruction increases, more methane and laughing gas get into the air, on the other hand the number of plants that absorb CO<sub>2</sub> is cut down.**

## Greenhouse

increase in temperature more water evaporates. When the steam content in the atmosphere increases, the greenhouse effect is enhanced.

The colder the sea water is, the easier it is for the carbon dioxides to be dissolved into the atmosphere. A rise in temperature can reduce the ocean's CO<sub>2</sub> absorption capacities and can lead to a positive intensification.

When ice melts and the water becomes free of ice, less radiated heat is reflected. In these areas this causes a rise in temperature and a heat spiral begins to turn.

In the large areas of the northern hemisphere huge amounts of CO<sub>2</sub>, methane and nitrous oxides are permanently stored in the permafrost surface. When the temperature rises in these areas the ground thaws and the greenhouse gases are released.

The cutting down of large areas of forests exposes large areas of the ground that release methane and nitrous oxides into the air. At the same time a large amount of the biological matter that absorbs CO<sub>2</sub> is destroyed.

The distribution of the clouds is unpredictable. Clouds both warm up and cool down the Earth at the

same time by intercepting sun rays and withholding the infra red rays. High, thin clouds heat up the earth. They allow more sunrays to pass through them to the Earth than lower, fatter clouds. When evaporation is high there are more clouds formed. Nobody can say which type of cloud is in the majority.

In winter there are more downpours of rain than snow. A reduction in the cover of snow lengthens the



**We are in the process of turning the Earth into a desert.**

What can I do?

summer and therefore the length of time with no snow, can cause a heat accumulation in certain areas.

These are only a few examples of positive regenerative couplings. In general there are more increasing rather than decreasing regenerative couplings. It is still not known where the "boiling point" of the individual systems are. When you are in top gear any action to the contrary would be impossible and pointless.

## What can I do?

Everyone can help to reduce the greenhouse effect. Every individual - that even includes you, dear reader too - must make a contribution. We cannot afford to wait for the others to do something or to make a start.

Start making use of the public transport systems. Use your by bike or your legs more often as this will not only improve your health but also your finances. If you cannot do without a car then choose a small and pollution-free model.

Save energy where possible. For heating purposes use an energy that can be replaced such as wood, sun and waves.

Only buy products that are free of CFCs. Avoid PET bottles, cans, deep frozen products and goods made from tropical timbers.

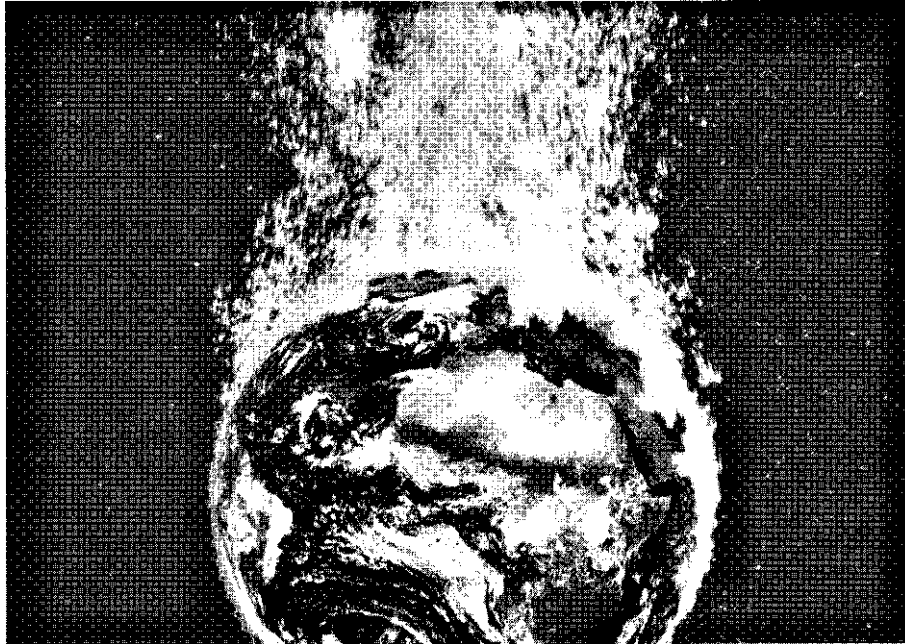
Convince your relatives, and friends to follow suit. Put pressure on local politicians.

For people with a morbid sense of humour: Two serious solutions that have been put forward to help the greenhouse effect. Both come from the USA.

The geochemist, Wallace Broecker, from Columbia University in New York suggests that 35 million tons of sulphur dioxide per year should be released into the atmosphere. The resulting drops of sulphuric acid would reflect some of the incoming sunrays. In this way the excess of CO-2 would be evened out. For this, 700 jumbo jets would be required to fly continuously. The rain would certainly be a little bitterer and the blue in the sky slightly faded.

The second solution sounds more like an April Fool's joke but it is just as seriously intended. A few researchers want to cover large parts of the ocean with white polystyrene. This would be like ice and reflect the sun rays. What else can be said?

# Burntime



Water is the original source of life.  
Man is causing it to dry up.

# On the Way to Burntime

# WATER

**W**ater is life. Without water the Earth would be a dusty, stony wilderness. Life on Earth has been due only water. The first form of life was created in water. Even man starts his journey through life in water.

No living being can survive without water. Humans would die without water. The body, which is mainly made up of water, would dry up totally causing the entire metabolism to break down. A healthy person can normally survive for two weeks without food, but a maximum of three days without water.

Water is recognised and considered by most cultures and religions to be the original strength of life. In the western industrial society it is no longer seen in this light. It has been turned into a commercial commodity which is more or less being taken for granted.

Water today is valued more for its commercial and pastime purposes rather than for what it really is: an essential and vital part of life. It can be stated that we treat water thanklessly and use it wastefully.

## Water

Ninety per cent of the number one food for life is used by the industrial society for commercial purposes. It is used to wash dishes, clothes and cars, disposes faeces , keeps the lawn green even in the height of the summer and serves industry and trade as a cheap system for sewage and refuse disposal. We act as if water is never going to run out.

The supply of water is great but not inexhaustible. In certain areas of the world, clean drinking water is a luxury product. Water is not equally distributed throughout our planet. Those who waste the largest amount of water are those who have the largest reserves on hand. In most developing countries water is either, already a scarce commodity or is threatening to become one.

The possibility of a war breaking out if the amount of drinking water at our disposal drops must not be ruled out. In the event of a scarcity of water on a worldwide scale, deep seated social and economic consequences can be feared. This would not only be the case in the developing countries, but even in the industrial countries of the northern hemisphere that up until now have had enough water.

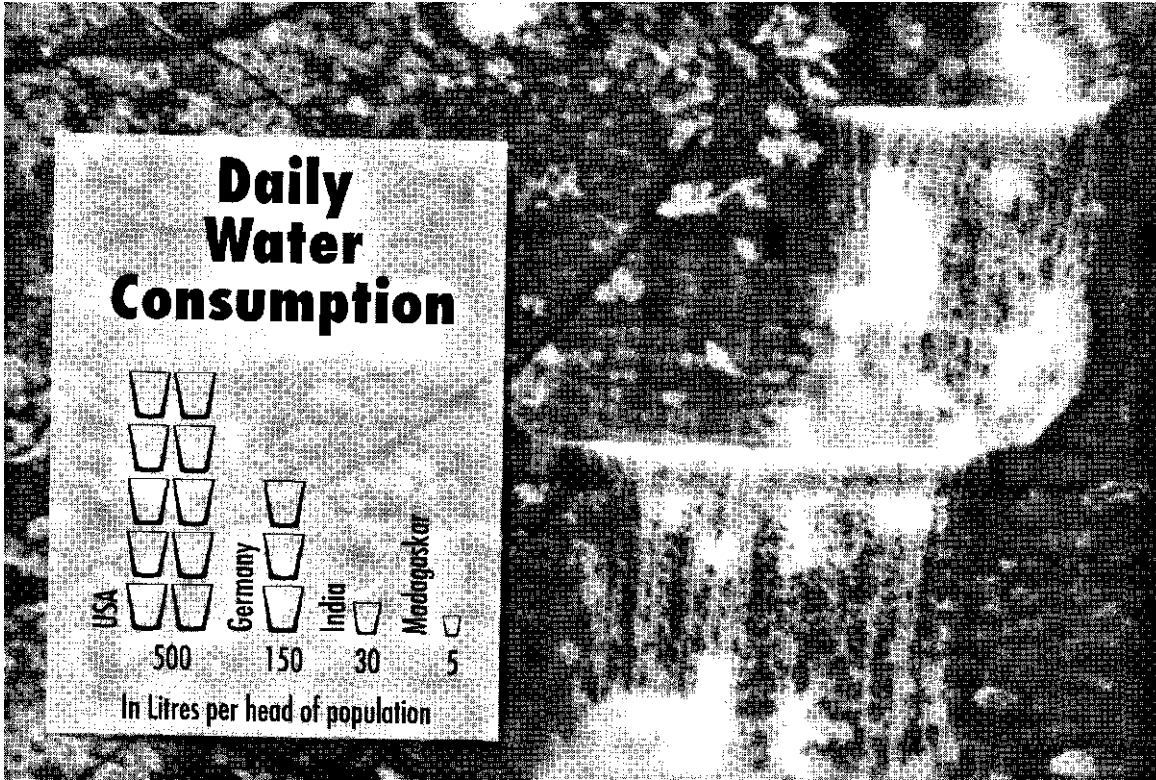
## The water wasters

Fresh water runs out of the tap. It is cheap and available at any time and in any amount. There is so much of it that it will never run out. This is the attitude most western people have towards water. This attitude has turned them into the biggest water wasters. People from areas in the world with not enough water would be horrified, to see how this precious raw material was being handled.

Most of the drinking water is used for industrial purposes or in other words wasted. Only a modest three litres are used for drinking and cooking. The lion's share is used for washing and rinsing. Lawns stay green due to large amounts of drinking water being used in the height of the summer. By flushing the toilet, every German person uses 50 litres of drinking water per day. With the same amount, an Indian would have enough for his daily needs.

The Americans waste the largest amount of water. Each American citizen uses on average 500 litres of water per day. In the modern industrial countries such as West Germany the average daily consumption is 150 litres per inhabitant. Indians use on aver-





## Water

age 20 to 40 litres per day. An inhabitant of Madagascar uses 5.4 litres per day. The World Health Organisation (WHO) claims that 80 litres of water per day is needed per person, for drinking, cooking and washing.

Power stations and industries are the largest users of water. All the industries in West Germany together use eleven billion litres of water, of which 4.2 billion litres are used by the chemical industry alone. In the production of a single car 380,000 litres of drinking water is turned into sewage. The manufacturing of one kilo of PVC dirties 550 litres of water. 85 litres are used to produce a kilo of new paper where as only 16 litres are used for a kilo of recycled paper.

At present, "clean" drinking water is being unnecessarily wasted not only in industrial manufacturing but also in the home. For most purposes like cooling or rinsing 'used' water would be sufficient. It seems absurd to cool manufacturing and power factories with clean drinking water. Drinking water is also not necessary in the toilet cystem. After all no one ever drinks out of the toilet. In addition to this, exists the pollution to water above and underground caused by industry and trade. Every day huge amounts of

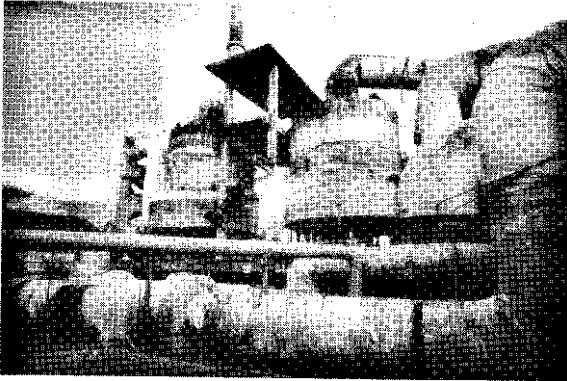


**The manufacture of paper has a particular effect on running water. The rivers turn into lifeless, brown sludge due above all to the chlorine bleach.**

manufacturing remnants and poisonous sewage flow into rivers, lakes and ground water reservoirs. Water is mercilessly abused as a cheap alternative for sewage and refuse disposal.

The WHO claims that about one thousand million people worldwide live without a guaranteed supply of water. Every year 25 million people die from epidemics that are caused by unclean water. Even in Northern Hemisphere where water is in abundance,

## The water wasters



**Large accidents in the chemical factories are drawing attention to themselves. But even without accidents the chemical industry is the biggest water poisoner.**

a major problem is how to maintain the supply of healthy and harmless drinking water.

The surplus of food in the rich countries can only be guaranteed in two ways - by the excessive addition of chemicals and with an enormous supply of water. In the dried-up ground of the mono cultures water has to be supplied. Without artificial watering installations in many areas of the world farming, as it stands today, would not be possible. The earth is

more or less barren due to the increase of efficiency in the destruction of weeds by the monocultures. Without a layer of humus and undergrowth the earth will dry up. The flattening of fields and the regulated watering installations let the rain water drain away far too quickly. Also dried-up ground cannot store rainwater and therefore is simply washed away.

Only by intensive artificial watering can the record harvest be achieved. Three quarters of the water is used up by agriculture partly in order to produce even more surpluses.

The eco-farmers have shown that it could be done differently in agriculture. In times of drought, the fields can survive due to the existing water storing function operating in the ground. Apart from this the industrial countries could still continue living very well with a reduced yield. If there was a general all round water shortage, the present form of agriculture would be doomed to failure. And this development is definitely in sight.

## Exploitation of the reserves

About 40 per cent of the world's population suffers from a lack of water. It is mainly the developing countries that have been hit. But even in those areas with plenty of water, the supply clean drinking water is becoming more difficult. The public at large are not really aware of this problem. The inhabitants of the countries with abundant rain water only become aware of the fact that their water supply is inexhaustible when they have a particularly hot summer or after a spectacular chemical accident.

The water from above the ground such as from rivers and lakes is already so polluted that ground water is being drawn upon as the supply. However it is a fallacy that the layers of earth keep the ground water permanently clean.

In the majority of the industrial countries the ground water that is up to 30 metres under the surface of the earth is just as badly polluted as the rivers and lakes. In the large cities the ground water is already a chemical soup made up of chlorinated solvents and industrial chemicals. In the rural areas, intensive agriculture has turned the ground water into a pot of

up to fifty pesticides. The regenerating capabilities of ground water are very limited by comparison to the fast flowing rivers.

One avoids areas with clean water. Drinking water is pumped into the cities from the national park areas in endless pipelines. Existing contaminated wells are shut down, no attempt is made to rescue them. The water supplies of the cities are being written off and the further pollution is being left over.

Another way out is in the depth. From the deep ground water wells the water is either used directly or for the conditioning (say: dilution of pollution) of unclean water.

These deep ground water sources are as old as the stones surrounding them, mainly thousands of years old. They are protected by the ground water that is closer to the surface but still 30 to 100 metres under the ground. This protective skin of water regenerates itself on average only every 50 years with the flow of fresh water.

It is precisely this protective layer that is being damaged and contaminated to an even greater extent. Therefore pollution is also reaching the underground water wells. Water supplies that have existed

## Exploitation of the reserves



**Without pesticides and mineral fertilisers in farming it seems that nothing can work. A lot of underground water is nothing more than an unpalatable brew of toxins.**

for thousands of years are being ruined permanently. Deep waters cannot be cleaned by high technology. Only 10 to 15 per cent of the rain water is fed into or renews the underground water wells. When the deep water is polluted man has lost it for thousands of years.

More and more drilling is taking place to supply clean water. This method is only profitable for a short time. The actual problem is only handed over yet

again to the following generation. The old water supplies will most probably last for another few decades. However as they can only be replaced really slowly the end of their use is in sight.

As the underground water near the surface is being contaminated more and more the pollution is increasing in the deep water. One has to therefore drill deeper and deeper, until salt leading layer make the use of the water impossible.

Due to the over-exploitation of the underground water the ground-water level is sinking. Consequently due to the drying up of wet areas a decrease in the variety and number of plants and animals is occurring. Half of the animals that live in these areas are already threatened by extinction. Looking at the really popular themes of the agricultural posters, photo pictures etc, it is noticeable how man is surprisingly damaging every form of farming, that he instinctively looks forward to seeing.

We are treating our thousands of years old water supplies in a very irresponsible way. In the true sense of the word we are burying water for our descendants.

Water

## **Drinking Water or Toxic Cocktail**

Those were the days when we could quench our thirst in the streams and lakes. Anyone who risks doing this nowadays will at least suffer stomach problems or diarrhea. The natural waterways have been robbed of their innocence. They are potentially making people more sick rather than saving lives and quenching thirst.

In many areas even drinking water from the tap has to be handled with caution. More and more babies are being fed mineral water out of a bottle by careful mothers. The water works are connected more and more with chemicals. Water has to be prepared by highly technical methods. Unclean water is fed with activated carbon, fluoride, chloride and many more chemicals and transformed into drinking water. It is mixed with clean water from the deep underground water wells to dilute the pollution concentration so that it resembles drinking water again.

Often the devil is driven out by Beelzebub. The disinfection with chloride can have unexpected and unwanted side effects on the large amounts of toxins in the water. The large amounts of possible water

polluters makes the tracking down enormously difficult.

Drinking water today has become in many places not more than an expensive recycled product. The user has hardly the possibility to recognise the dangers in good time. Pollution that damages the health normally are found in the dilution areas that makes smelling or tasting impossible. It is the effects that show us that something is wrong with the drinking water. Industry, trade and agriculture are ruining man's enjoyment of drinking water.

Industry and trade are playing their part in poisoning the water mainly by using chloride solvents and heavy metals.

The most notorious water polluter in the last years is PER (perchloroethylene). It is a chloride hydrocarbon that is used as a fat solvent especially in dry cleaning shops and in the metal industries. It is one of the most widely used chemicals with a yearly use of over one million tons. Hardly anything can stop PER and with time it can penetrate one metre thick concrete walls. It causes bad nervous disorders, damage to organs, circulation breakdowns and fainting spells. Above all it is a potential cancer generator.

## Drinking Water or Toxic Cocktail

PER and its associates made headline news by contaminating the Mitterndorf Valley in Austria. About 70 faulty rubbish dumps and several chemical operations badly contaminated one of the main ground water lakes in Central Europe. The water supply to over half a million people has been endangered in this area.

The farmers are even larger contaminators of ground

water than industry and trade. When they over-fertilise with dung water and mineral fertiliser, the nitrogen compounds in the ground water increase above the official limit in order to maintain record yields of corn and root vegetables. A lot of water companies in certain areas have to close down because they are not capable of getting the high nitrate level in the water under control any longer.



Even the excessive and thoughtless use of pesticides contaminates the ground water badly. In West Germany alone there are about 30,000 tons of pesticides bought every year. A large part of it seeps into the ground water. A considerable amount is not used for pest control. To achieve record results nearly all(!) the other plants in the

**Not so long ago you could still quench your thirst in the rivers and streams. Anyone who does this today risks in many cases at least getting a very bad stomach upset.**

## Water

field must be destroyed. Highly poisonous substances such as Atrazin, a specially developed plant toxin, are used to allow on the corn plants to survive.

In the developing countries the use of pesticides is even more unscrupulous. Poisonous substances such as DDT and Lindan, which have been prohibited in the meantime in the West, are used. The consequences that these have had on the ground water in countries already suffering from a water shortage, need not be described.

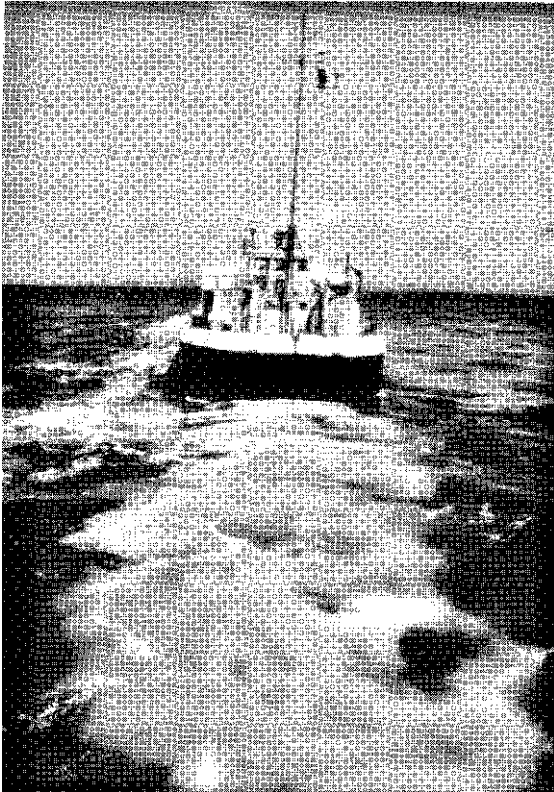
Private homes are also responsible for a small amount of water contamination. Excessive hygiene and cleaning mania - created by refined advertising - discharges considerable amounts of washing and cleaning substances into the environment. The whiter than white shirt can contribute to shortages in drinking water.

**On the ground ...**  
Out of many wastepipes sewages and poisonous substances flow into the countryside, rivers and lakes.





## Water as a rubbish tip



The pollution of surface water and ground water, which make it necessary to use the deep ground water reserves, creates a real problem. The final result is a worldwide shortage of drinking water with serious consequences.

## Water as a rubbish tip

For thousands of years, rivers and lakes have been used as a refuse and sewage dumping ground for man. This system functioned well for a long time as the population was much smaller than it is today. The amount of poisonous substances that had to be disposed of were nowhere as high as they are today. In the year 1000 AD there were not even 500 million people living on the Earth.

**... and in the water.**

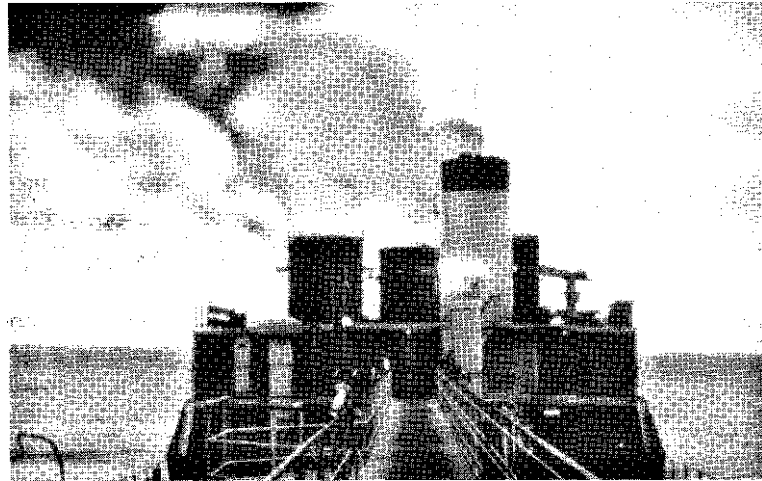
**The oceans are being used as a cheap form of refuse and sewage disposal. The poisonous substances are just thrown into the water and the refuse simply sunk.**

## Water

The population multiplies but the amount of water remains the same. For this reason the water is burdened. It seems like an easy calculation to make, but this calculation cannot be worked out in this way.

It is not the number of people that threatens the water supply but more our sophisticated technology with its (refuse) problems that tip the scales. Up until 50 years ago this system was still very stable but since that time a rapid decline has taken place. The refuse of the industrial society has become too much and too poisonous.

The waters today are being burdened beyond reasonable and justifiable limits due to the sewage and refuse from industry, trade, agriculture and the private home. For profitable reasons, laziness and ignorance, the existing system for refuse disposal is still dominant yet no longer suitable for today's civilisation. In the interests of economy, rivers, lakes and oceans are



**The dumping of refuse into the high seas has become a tradition. Tankers full of toxins eject their contents into the water and ships usually burn poisonous refuse. Entire nuclear reactors can even be found at the bottom of the sea.**

used as a cheap system of disposal. It would go too far to mention all the sins against water in detail. Only a few facts concerning the pollution of the North Sea have been documented.

Every year 103 million tons of refuse is dumped into the North Sea. This consists of 1.1 million tons

of nitrate, 102,000 tons of phosphate, 33,900 tons of zinc, 11,800 tons of lead, 6,300 tons of chrome, 4,900 tons of copper, 2,440 tons of nickel, 857 tons of cadmium, 83 tons of quick silver, 6. 7 tons of polychlorinated BIPHENYLE (PCB) and many more hydrogen carbon chlorides. A further 150,000 tons of illegally disposed oil and 60,000 cubic metres of illegal waste from the chemical tankers. Anyone who now considers a bathing holiday in the North Sea as fun is beyond help.

Spectacular accidents such as the fire in the chemical store of the Sandoz Co. in Basel in 1987, are only the visual tip of the icebergs. Every day unimaginable amount of poisonous substances are being dumped into the seas in the world without explanation. And this is not because there are no alternatives but because of mainly wanting to save money. The industries are still refusing to advise us of the type and amount of substances that are being dumped in this way. And they have all the reasons for this.

The existing recession is a main reason. Measures to clean up the environment are blocked widely by the arguments that costs could not be met and threats from customers. There is no politician that

would risk cutting hundreds of workers in an increasing environment of unemployment. An understanding for the environment cannot even be expected from the employers and their families. Therefore the polluters have the advantage.

The developing countries who are fighting for prosperity and an increase in production do not take the environment into consideration. Mining and chemical industries contaminate to a large extent rivers and lakes to an uncontrollable level - to an extent that even the most hardened employer in the modern industrial countries would not dare to do. The population there, hardly ever notices any slight trend. The majority of business belongs to western companies. Money disappears in corruption and the people are only left with the polluted water as a salary.

Everyone knows of a stretch of water in their area that is used as refuse tip, even if it is only the obligatory old bicycle rusting away silently at the bottom of the stream. This shows us the systematical attitudes even if only on a small scale that is then carried out on a large scale. The seas have been down-graded into rubbish dumps. The Russians even sank entire used-up nuclear reactors into the sea. In the Eastern

Water

Sea a large amount of poisonous grenades are rusting and are contaminating swarms of fish. An uncoun- table number of time bombs are ticking away on the bottom of the seas. And everyday more are added.

## Oil - The black death

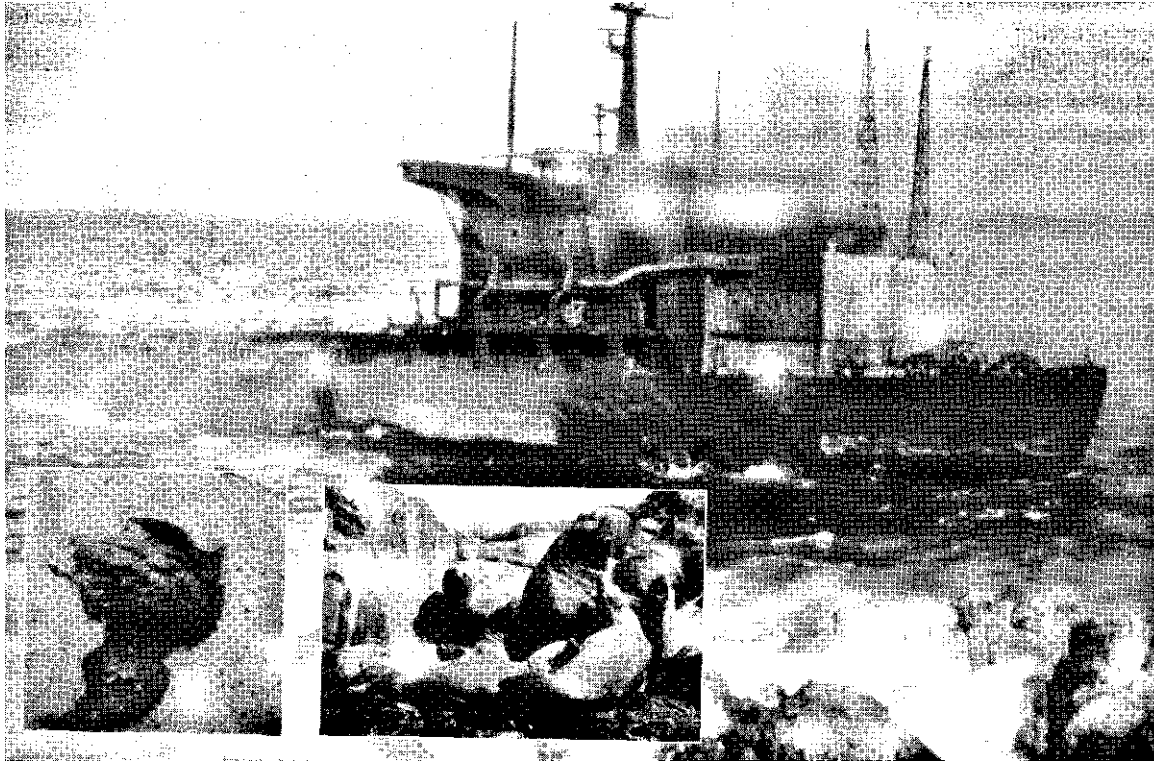
Accidents involving oil tankers are considered to be the largest water polluters. Even some people with no environmental awareness are horrified of pictures of this type of disaster. What is even more horrifying is the fact that in reality these disasters involving tankers are only a small part of the total oil polluters in the oceans.

One of these so-called "super-tankers" is up to 400 metres long and can carry half a million tons of petroleum. Supertankers are principally similar to a normal ship but on a larger scale. The oil is stored in external tanks protected from the ocean by a one to two centimetre metal plate. By comparison to the size of the ship it can be compared to the shell of an egg.



**On the whole pictures of oil tanker disasters shock the entire population. What is even more horrifying is that these spectacular catastrophes are just the tip of the ice-berg. Most of the oil ends up in the oceans of the world.**

Oil-The black death



## Water

The huge ones are already a constant risk due to their extremely difficult manoeuvring capabilities. When travelling at full speed they take half an hour to come to stop. For financial reasons the size of the crew is constantly being reduced. Safety regulations are permanently being ignored and in the event of fog, ships divert from the official routes in order to save time. The majority of supertankers travel as cheaply as possible to avoid expensive safety conditions. As we have seen from the "Exxon Valdez" example, even the brand new supertankers that fulfill all the regulations are not accident proof.

If we take this tanker accident as an example you can see the effects that such a catastrophe can have. Three months after the "Exxon Valdez" ran aground on a reef on the coast of Alaska the spilt petroleum polluted 1,160 kms of the coastline. Despite the fact that 9,000 workers, 60 planes and helicopters, 800 ships and boats at a total cost of 200 million dollars were employed to clean up the oil, in reality they only managed to clear one kilometre of the coast. Only a very small part of the polluted coastline was being temporarily cleaned. It is estimated that 2.6 million birds died due to the oil. The damage to the

fish cannot be estimated. The vital plankton would have been reduced by 25 per cent. The plans for tourism and the hopes of the neighbouring cities and villages were instantly destroyed.

Petroleum is a very complex matter that is made up of hundreds of substances. It can spread out very quickly with the help of the wind and the weather. The volatile components have a euphoric effect on animals, especially sea hounds, that kills them off. Humans suffer from difficulty in breathing and changes in the skin. After about a day a thick emulsion appears and this has been cynically named "Mousse au Chocolat" by the experts. It sticks to everything it comes into contact with. It can also be swallowed with water by animals or can seep into the ground.

Birds that get covered in oil die. The oil damages the structure of the feather covering, cold water reaches the skin and causes undercooling. As the feathers are all stuck together the bird is no longer capable of flying or swimming. It continually tries to clean itself and forgets to eat in the meantime. In its panic, a bird uses up all its fat reserves in the space of two days and its immune system is dramatically reduced. If oil gets into the intestines then eating is

## Oil-The black death



At work trying to clean up the damages caused by the "Exxon Valdez". Despite astronomical costs it was only possible to clean up a tiny part of the polluted coastline.

no longer of any help. The stomach is coated over with the gunge and cannot digest food. Even the cleaning-up campaigns do more for the conscience of the "do-gooder" than actually managing to clean anything. Only a very small amount of the animals

will survive. And only half of them will survive the cleaning procedure. As the birds cannot return to their oil contaminated homes they have to be moved. But only one per cent of the treated animals can be moved successfully to an unfamiliar area.

## Water

The numerous oil platforms also contribute to the pollution of the water. Large amounts of oil end up in the ocean due to accidents and the fuel water. Also other industrial chemicals and waste from the fuel platforms add to the pollution. Around the platforms you can find every possible type of organic chemical.

The cleaning of tanks is another nail in the coffin for the ocean. Oil tankers cannot sail if empty. Soon an empty journey its tanks must be filled with water to weigh it down. This polluted water is then pumped back into the sea. Also oil tanks are cleaned out in the open sea despite the fact that is forbidden due to the lack of funds.

Two to three million tons of oil are discharged into the oceans worldwide from the most different sources. It might sound surprising that by far the most end up in the ocean indirectly. Even in the rain volatile components of oil from mining and leaks get into the ocean. Also the waste from refineries, factories and many more contribute to the pollution. Even the weekly car wash outside your home is partly to blame too. Tar and oil residues are carefully washed off the beloved car and are disposed of cheaply by

running into the gully or ground. But didn't we learn at school that despite the fact that all roads don't really lead to Rome, that all water does flow into the ocean? Maybe you'll think about this the next time you're washing your car. Be good to the environment and wash your car in a machine that has a legal authorised oil separator.

## What can I do?

There are many possibilities of how to change things to the advantage of the environment in your own behaviour to think about and without any loss in the quality of life. First of all convince your friends and relatives. Make environmental sinners feel ashamed. Support your local environmental groups morally, financially and perhaps even with a little help. Only massive protests supported by the public at large can have an effect. A list of the different environmental organisation can be found in the appendix.

Check your daily use of water. Do without a full bath and have a shower instead which is anyway more hygienic. 150 litres of water are used when



having a bath and about 5 litres of water run down the plughole when having a shower.

Check your taps. Leaking water taps can waste up to 16 litres of water daily. A water tap that is running at full speed release 1 litre of water in ten seconds.

Replace your old water cystem with a modern one. It only uses 3 litres of water when flushed.

Don't dispose of any waste down the plughole or drain. Wash your car in a machine with an oil separator.

Use recycled paper instead of new paper. If you use new paper then make sure it is produced with chlorine bleaching. Think about the fact that paper production high pollutes the waterways and therefore make an effort to save paper.

Boycott the use of dry cleaners. The majority of stains can be removed even more effectively with soap, water, a brush and some muscle power. Only use washing and cleaning substances sparingly and use if possible building kit washing systems. Wait until the washing machine is full before you turn it on.

Refrain from using aggressive household cleaning products. Biologically reduced cleaning agents or

simply soap will do the same job. Don't be manipulated by advertising. White is white there is no physical grading.

Save petrol. Avoid giving the oil multinational companies the business. Cycling protects the environment and will trim you up rather than at the cost of an expensive fitness studio.

Don't be one of the sheep. Avoid the main tourist resorts in the high season. Or ask your tour operator if the sewage plant is large enough to cope with the resort. Check out these details.

Do without a green lawn that requires intensive watering. Plant a field of flowers with a garden pond. Your reward is that you'll have splendid blooms all year round and save yourself lots of work.

Remind yourself that water is not inexhaustible. Even your children and their children want to have enough fresh water. Treat it with a sense of responsibility!

# Burntime



The existence of another Earth-like planet is probable.  
But wherever it is it will certainly be too far away.

## Instructions for the game

# Operation

**A**lthough Burntime is a very complex strategy game we have tried to keep the instructions as simple as possible. We believe it is important to allow the player as much freedom as possible to make decisions and to trade.

After a few minutes of playing Burntime, you will be able to use the game easily and will not be troubled by operational problems allowing you to concentrate on fighting your opponent.

In this chapter you will be given comprehensive information about all the operational elements. You

will learn how to use and steer Burntime and all the moves you can carry out with a mouse.

In the next chapter you are introduced to the tactics of the game. Of course you will have to discover the niceties of the game for yourself, but we have taken care to ensure that you have a real successful start to the game.

After reading both chapters you can start playing the game with style.

To win you have to get rid of all your opponents or to occupy all settlements except the capital cities.

Instructions for the game

**Burtime requires 8 megabytes of free storage space on your hard disk**

**Install Disk A with INSTALL**

**You can change the path of the register during installation**

## **Installation of Burtime**

### PC Version

The PC Version cannot be played from the disk! Beware that at least 8 megabytes of free storage must be available on the hard disk!

To install the game put disk A into drive. Now start the installation programme INSTALL on this disk.

During installation you can enter another path in the register. Normally Burtime is installed on hard disk C as default.

Example 1:

Disk A is in drive A and Burtime should be installed on hard disk C.

- Enter: A:\INSTALL and press [ENTER]
- When you are asked which installation path is desired press [ENTER]
- Disk B should be put in drive A when requested.

Example 2:

Disk A is in drive B and Burtime should be installed on hard disk D.

- Type B:\INSTALL and press [ENTER]
- When requested for the desired installation path enter D.
- Disk B should be put in drive B when requested.

Start the game by typing the following:  
C:\BURN\BT

**Start the game with:  
C:\BURN\BT**

## **AMIGA Version**

If you want to play Burntime from the disk, put disk A in the drive. Now turn the computer on. You can also call it up by double clicking the Burntime Icon on the on-screen display.

You can load Burntime onto the hard disk as well. Call up the INSTALL Icon on the on-screen display. To start the game call up the Burntime-Icon on the on-screen display.

**The AMIGA-Version can also be played from the disk**

**Install on hard disk with INSTALL**

**Start the game from the on-screen display with the Burntime-Icon.**

## **Standard game disk AMIGA**

Standard game disk AMIGA The standard game disk is not allowed to be write protected! To make a standard game disk you must format a disk (see user's manual) and name it "BURN S".

**Standard game disk is not allowed to be write protected**

Instructions for the game

**Imperative to make backup copies**

**Store the master disks in a safe place**

**Only use the backup copies**

**If your disk is damaged call our Hot line:**

**Tel: ++ 44 438 / 840 004**

## **Backup Copies**

Disks can get damaged. Normally when you are least expecting it or when no backup copies from your master disk are available.

Therefore it is imperative to make backup copies from your master disk. From then on only use the backup copies. Store the master disks in a safe and protected place. You should only use the backup copies to install the game.

Protect your disks from dust, dampness, intense heat and magnetic influences! In this way you will get years of enjoyment from your software.

## **Defective Disks**

All attempts are made to ensure that great care is taken in the manufacture of the disks but despite this it can happen that a few disks do not function perfectly. Disks and packaging can be damaged in the post.

If this, unfortunately, has happened to your disks, please call our Hot line.

Hotline in the UK: 0438 / 840 004

Please return faulty disks directly to:

Kompat UK Limited

Richard Holmes

Fulling Mill Barn

Fulling Mill Lane

Welwyn Herts, AL6 9NP

United Kingdom

Please note that we can only exchange master disks in special cases!

## Guarantee Card

Take time to fill in the guarantee card that accompanies the game. Send it to us and you will be put on our mailing list and advised of all Max Design's new releases.

## Pirate Copies

We have invested a lot of time and energy into creating this game to ensure you have the best of fun playing it. Please remember this and do not make copies for your friends and relatives.

Playable demos are available from us for trial use!

## Return faulty disks

**Fill in your guarantee card and receive information about new releases**

**Pirate copies hinder the creation of well developed good games.**

**Please play fair!**

Instructions for the game

**Intro can be interrupted by clicking the mouse**

**Make starting adjustments to start screen**

- enter names
  - choose a portrait
  - pick a colour
  - enter degree of difficulty
  - start the game
- 
- or load an old game

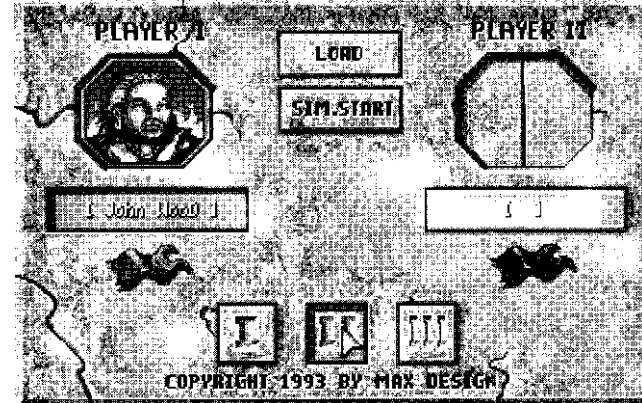
*Make all your adjustments or load an old game on the start screen.*

## Starting up the game

After you have started the game up, an intro will follow. This relates to the events that happen in the game.

This can interrupted at any time by pressing any of the mouse buttons.

After the intro the start screen will appear. Here you can enter a name, pick a portrait, enter the degree of difficulty and load an old game.





## Player's name

By clicking on the name gadget a player is activated. You can give your game figure a suitable name.



The normal confirmation with <ENTER> is not necessary. The name that has been entered will *be* automatically introduced on commencement of the game.

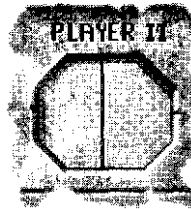
**Enter player's name in the name gadget**

## Player's portrait

By clicking on the name gadget the corresponding portrait window will open. Now you can choose a portrait to match the game figure you have selected.

You can scroll up through the portraits by clicking the left mouse button and you can review them by clicking the right mouse button. There is a choice of six portraits at your disposal.

The choice of portrait does not affect the development of the game.



**Choose a suitable portrait from the portrait window**

**Scroll up with the left mouse button**

**Scroll down with the right mouse button**



**The choice of portrait does not influence the structure of the game**

Instructions for the game

**By clicking on the flag the player's colour can be changed**

**The player's colour does not influence the course of the game**

**Degree of difficulty from easy to hard can be selected**

**Beginners should start on the easiest level**

## Player's colour



When you click on the flag, the two flags are interchanged. They denote the colour of a player. Should player 1 have something against the colour red, he can change it for the calm colour green.

The choice of flagcolour has no influence on the course of the game.

## Degree of difficulty



When starting a new game you have the choice of three degrees of difficulty. The higher the degree of difficulty, the more cunning the opponents are, the harder the fight for survival becomes. Also the distribution of vital items is influenced by the level chosen. For example certain items are more difficult to come by when playing at a higher degree of difficulty than a lower one.

Of course you cannot select how well a human opponent will play.

## Loading a previous game

You are also able to load an old game. By clicking on the load gadget you will have access to the game options menu. At this point you can select to load a previous game.



Load an old game from options menu

Up to eight games can be saved

## Starting up the game

Once a few preparations have been made, you can enjoy the game.

We wish you lots of fun and success in your fight for survival and power!



Start up the adventure via simulation start

## Mouse cursor gives information

With the help of the mouse cursor you will always get information about the items listed. In the case of locations and items the corresponding name will appear over the mouse cursor. The colour of the person's name indicates its affiliation (white = neutral).



Mouse cursor gives information about names and items

People with white names are neutral, other people are identified by the player's colour

Instructions for the game

**Main screen is the key control element**

**Major actions are controlled via the main menu**

**Review some of the settlements via the main screen**

**Travel on the main screen only**

*The main screen is the key control element in Burntime. It is only here that you can travel from location to location.*

## The main screen

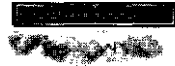
The key control element of Burntime is the main screen. Here you can check the time remaining during the course of the game, the amount of food and drink necessary for journeys, your opponent's position, the location of individual locations and the present whereabouts of your troops. Only on the main screen are you able to start journeys and review the places that you are not personally going to stop at. You can finish your game here and the opponent does not get a turn before time runs out.



By moving the mouse cursor on the edge of the main screen you can move the map excerpts of the entire game area.

### Time remaining for each move in the game

Burntime is organised in moves. Each player has five minutes to carry out his desired actions. The time remaining can be seen in the time frame on the main screen.



**Game area is larger than the visible map**

**Time frame shows remaining time for each move in the game**

**A move in the game lasts five minutes**

### Position of the players

The player's symbols show the present position of the players they represent. They are distinguished by the player's colours and numbers.



**Player's symbol in the corresponding colour shows the position of the player**

### Settlements

In the inhospitable world of Burntime there are many different types of locations, ranging from dilapidated industrial cities to campsites.



**Settlements can only be reached from the main screen**

Instructions for the game

**Flags in the player's colours indicate which player is in control of that location**

**Name, profession, portrait, date in the game and health of the boss are shown in the column at the bottom of the screen**

## Locations controlled by players



If a flag is flying over a location then the corresponding player is in control. Locations with no flag flying can be entered at any time and incorporated into your own empire.

## Player's status



This is the name and profession of the player who is playing at the moments.



For people who cannot or do not want to remember names, there is a portrait of the player, whose turn it is.



Here at a glance you can see how many game days have been played and what sort of shape you are in. The frame only shows the health of the boss.

## The pop-up menu

On the main screen and on the location scenarios you can activate the pop-up menu by clicking the right mouse button. With the help of the pop-up menu you can carry out various actions that are explained in more detail later on.



Click on any other part outside the menu to make it disappear.

**Pop-up menu is a recurring control element**

**Click right mouse button to activate**

**To close click somewhere outside the menu**

## Travelling from location to location

You can only travel from one location to another via the main screen. Activate the pop-up menu and choose »Travel«. The travel symbol will appear next to the mouse cursor - you are now in travel mode.

Red lines show the travel routes which are possible at the moment.

Click the mouse cursor on the chosen location and the journey can start.



**You can only travel on the main screen**

**Turn on the travel mode in pop-up menu**

**Click on choose location**

**Travelling is a complete move**

**The player cannot move again until he reaches his chosen destination**

Instructions for the game

**The player's symbol travels along the red line and shows the progress of the journey**



The player's symbol now travels along the red line. Starting on a journey ends the move.

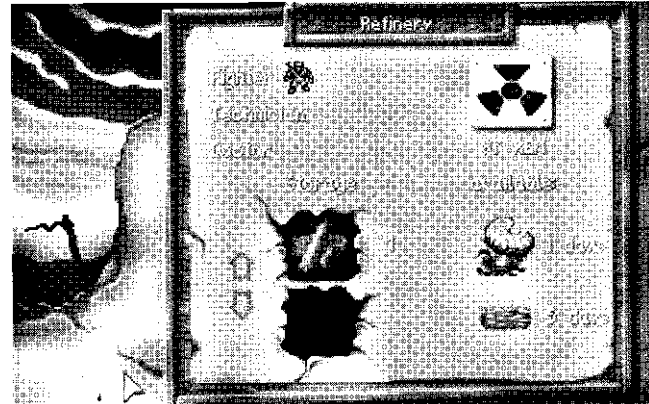
**Point to menu "Info" to get information about settlements**

**In the main screen call up information about the occupied locations**

**In the location scenarios only information on locations is available**

## Information about settlements

Select "Info" in the menu and click on a location to get information on it. You will be given information about the number of men stationed there, the storage, the degree of contamination and the gain in foodstuffs.



*With the help of the info option you can get information about locations even if you aren't personally there.*



### Name of settlement

The name of the settlement will appear in the name window.



Name of settlement appears in the name window

### Level of contamination

Some locations are more contaminated than others. Before entering a location you must check out the level of contamination, otherwise after only a few minutes your game could be over.



Pay attention to level of contamination in the settlements

If highly contaminated only a short stay is possible

### Number of troops

If you take control of several locations it is hard to keep a count of the amount of troops you have. Here it is possible to see at a glance how many technicians, soldiers and doctors in a location will answer to your command.



Regular check of how many men are stationed in one

Possibility of loss due to lack of food and water

Instructions for the game

**Amount and type of stored items can also be checked on the main screen**

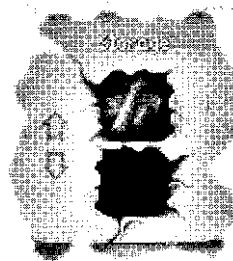
**Page up with arrow**

**Here you can enter the type of food you will be producing. Only one type of foodstuff can be produced at a time**

**Figures shown, denote the daily rations that could be produced by the men stationed there**

**Tools for the production of foodstuffs must be stored in the houses!**

## Supplies in storage



If you have items in stored at this location, you can ask for information about the amount and types of items stored.

By using the arrows you can scroll up and down the item report.

## Food and water deposits



To survive you have to be able to find food and water. Your men will only be capable of doing this if they are equipped with the essential items in the newly captured places. Here you can allocate what type of food should be produced by the men stationed there. By clicking on the individual picture symbols you can continue to the next type of foodstuff. To produce certain types of foodstuff special items of equipment are necessary.

## Handling modes

The figures in the game can be moved into a particular handling mode through the pop-up menu. The chosen mode stays activated until you choose another mode. The symbol for the activated mode always appears beside the mouse cursor as a reminder.

### Info mode (main screen)

This mode can only be used on the main screen. Click on any location and the corresponding information board will appear.



**Various handling modes are possible**

**The symbol for active handling mode appears next to the mouse cursor**

**On the AMIGA the symbol is next to portrait**

**In info mode receive information about the occupied locations on the main screen**

### Travel mode (main screen)

This is also only at your disposal in the main screen. Click on a location and you can travel there.



**You can travel on the main screen in travel mode**

### Talking mode (location scenarios)

Only possible in the location scenario. Click on a person to talk.



**By activating the talking mode you can talk to people in locations**

### Fighting mode (location scenarios)

Only in the location scenarios. Click on a person or animal, and you can attack him / it.



**To attack people the fighting mode must be activated**

Instructions for the game

**Inventory is the back bone of the game's strategy**

**Important data about health and degree of saturation**

**With no food or drink health deteriorates**

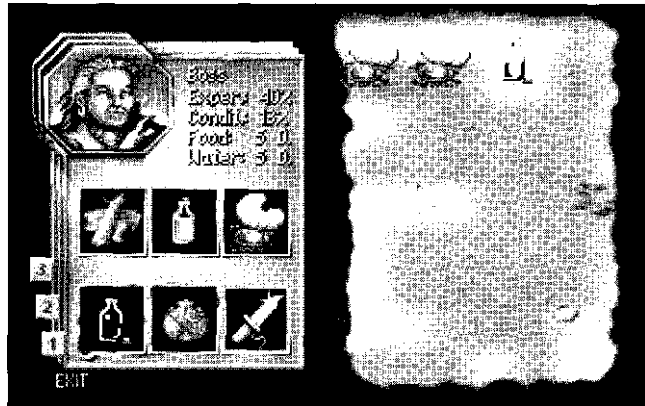
**Health drops to zero, person will die**

*In the inventory you can pick up and get rid of equipment, as well as check the constitution of the men.*

## Inventory

In the inventory you can check your health and that of your crew, as well as the equipment you are carrying.

In the written text you will find information on the profession, experience, health and the degree of saturation of the person in question. The food and water supply is always given in daily rations. Therefore you can get info on how many days a person could survive without taking in any food or liquid. If this level sinks to zero, his health will also



deteriorate. When health reaches zero then even the best doctor cannot help any more. Your team is then short of a man. It pays off to check the health of all the members of your team from time to time.

You can activate the inventories of people present in the small figure boards. In the boss' group all the people present are available. However you must position yourself very close to the activated figure.

Each person can carry a maximum of six items. If the inventory is already full and a new item should be added, then first of all, an old item should be disposed.

Click on an item with the left mouse button and it will be disposed. It will appear in the right of the large field of the inventory. The item will lie on the ground in front of the person in question. From there you can pick it up again in the same way. Similarly you can also exchange items between different members of the group.

Click on an item with the right mouse button and you can use it.

If the person present is a technician then he will give you info on the item that has been clicked on. In other words what he can do with these items and also which items he still needs for their completion.

**Switch between two individual people in the figure boards**

**Maximum of six items are allowed**

**Click left mouse button to dispose of items**

**Disposed items can be picked up again with the left mouse button**

**With right mouse button use an item as intended (drink water,...)**

**Technicians give info on what you can do with an item and which items are needed for completion**

Instructions for the game

**Options menu is used to:**

- load, save and delete game score
- to turn music on and off
- to start a new game
- to adapt speed to computer
- to end game and return to DOS

**Menu point "Screen":**

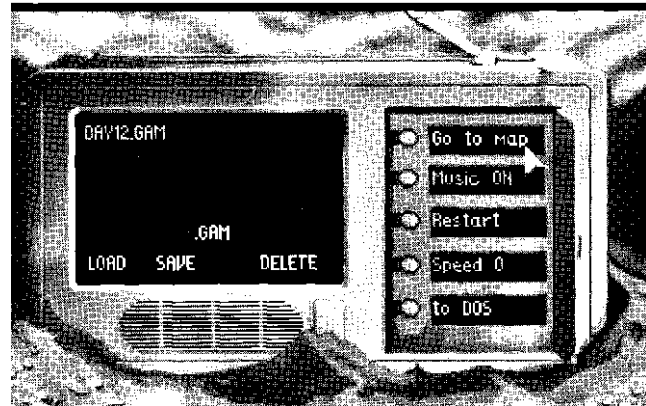
Returns to main screen

*This old-fashioned television does not transmit any national football games any more, instead it can load and save the score of the game.*

## Options

You can reach the options menu via the pop-up menu on the main screen. Move the mouse cursor onto the right hand side of the television and the control panel will open and release the control elements. You can then load or save the scores of the game, turn the music on and off or also end the game.

**Back to screen:** Choosing this point in the menu will return you to the main screen. All adjustments will be carried out.



**Music:** Maybe you need silence for thinking about your strategy. Therefore you can also turn the music on or off.

New start: You can start a new game

**Speed:** The speed of the animations can be slowed down for very quick computers (0 = no delay, 3 = maximum delay)

**To DOS:** You can return to DOS - end of game.

**Load/save/delete:** Up to 8 scores of the game can be saved. To save, choose a free space, enter the name and click on save. Old game scores can also be either simply overwritten or deleted.

## Capital cities

No fighting can take place in the five capital cities and they can also not be captured. Items stored here are at everyone's disposal.

In the capitals you can find doctors, bars, restaurants and also trading centres.

**Menu point "Music": music on or off**

**Menu point "New start": start a new game**

**Menu point "Speed": Adjusts speed to suit computer**

**Menu point "To DOS": End of game**

**Menu point "Load, save, delete": Load, save or delete game scores**

**No fighting in capital cities**

**They cannot be captured**

**Items are at everyone's disposal**

Instructions for the game

**Click on eating and drinking with the right mouse button and the crew can eat as much as they want**

**Food and drink is equally divided among the group**

**Various foodstuffs have different levels of nutritional value**

**Note the capacity of the water containers**

## Eating and drinking

Click on food or water with the right mouse button and it will be consumed. It will always be equally distributed among the group of people present. What seems to be plenty for one person, is often not enough when shared among a group of people. If you only want to feed one person then you must cut yourself off from the group for a short time so as not to have to share it out. Be careful not to sign up more people than you are capable of feeding for the duration of the game.

### Nutritional value of food provisions (daily rations)



**Maggots**  
3 DR



**Rats**  
5 DR



**Snakes**  
7 DR



**Meat**  
9 DR

### Capacity of water containers



**Bottle**  
2 DR



**Waterbottle**  
3 DR



**Waterbag**  
5 DR



## Moving within the location scenario

To move a person or an entire group in the location scenarios to a particular point, simply click on the point. The person or the group will now attempt to get there by the shortest possible route.



Sometimes it can happen that a person takes the wrong route and ends up in a dead end. Help him by tapping in shortest routes.



**Click on desired point**



**Person or group takes shortest route to get there**

**Be careful that people do not run into a dead end by mistake, work out the possible shortest routes**

## Activating the figures in the game

You can recognise the active figure as its border will be flashing. In a group it is always the boss. If you want to move a single person, you must first activate him. To do this simply click on the person. If the person has already been activated and you click on him, this will automatically open the inventory.



**Active person recognised by flashing border**

**Click with mouse on person to activate him**

**Click on activated person with mouse to open inventory, in fighting mode only via the pop-up menu**

Instructions for the game

**Contact other figures by clicking on them**

**Handling mode determines type of contact**

**When talking to a person you can sign him up or get important information from him**

## Making contact with people

Click on a game figure to make contact with him. By clicking on them, irrespective by clicking on them of what handling mode you have tuned into, you can now speak or fight with the person. If the desired person is too far away, the active figure will first of all begin to move in the direction of the person. The active figure will always make contact first.

When speaking to a strange person you can sign him up, obtain information from him or trade with him. Making contact could also present the chance of trading.

*A discussion with another person can often reveal important information.*

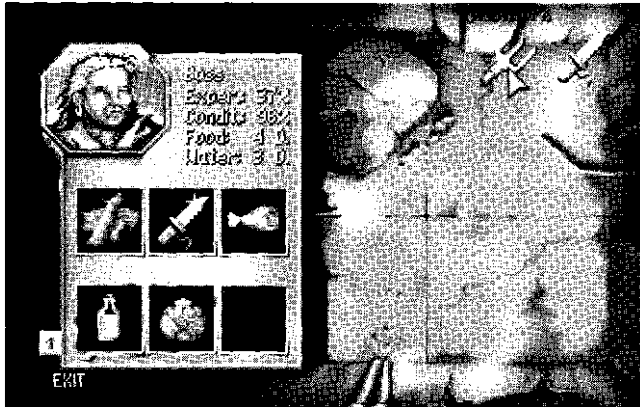


## Storage of items

As you can only take a limited number of items with you, you need somewhere to store items for the time-being. The most suitable places are houses, caves or tents.

When you enter such a store you can call up the store inventory. It is operated in the same way as the person inventory.

Items produced in the bases will automatically be transferred to the stores.



**Do not leave items lying around in the open, better store them in houses or caves**

**Enter a storage place to open the inventory**

**Items produced in the bases are put in storage places**

**Houses can only be entered when the location is not occupied by a player, or it is his own base.**

*If you have too many items some of them must be put into storage.*

Instructions for the game

**Person entering a water source will automatically drink**

**Frame at bottom right gives information about amount of water available**

**Deposited containers are filled up, this can take a little while**

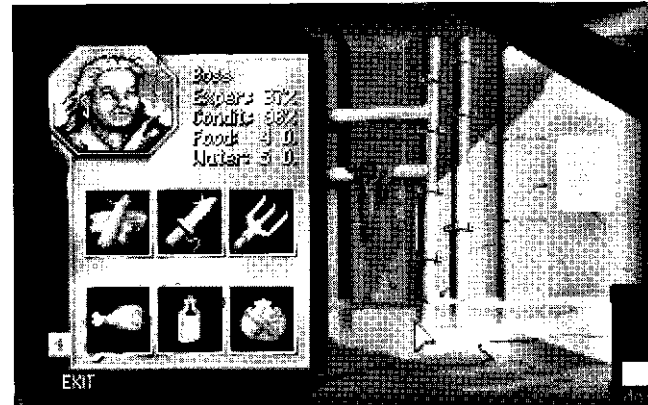
**Water pumps must be erected in the water sources**

## Water sources

If you enter a water source with a person or a group, he / they will automatically drink.

The window at the bottom right of the screen gives you information about the amount of water at your disposal in daily rations. The water available could vary as wells can dry up. Deposited containers are filled up again and how long this takes depends on the amount of water. Click on the containers with the right mouse button and an attempt will be made to fill them up too.

*Knowing where productive water sources are could give you a definite advantage.*



## Fighting

If you want to attack a person or an animal, you will need to change to fighting mode. You will fight with the activated figure or group. Weapons, to be used in the fight, can be activated by clicking on the group inventory with the right mouse button.

By clicking on a particular figure you are indicating who should be attacked. Fights against computer opponents happen in real time. Two human opponents fight against one another stroke for stroke for five rounds.

You can recognise a hit by a flashing white circle that appears over the person in question.



- to attack switch to **fighting mode**
- **always fight with active person or group**
- **activate weapon in inventory with right mouse button**
- **click on figure to be attacked, white circle shows hit**

**Personnel in the base automatically defend themselves, on request however manual defence can be entered in the main screen**

**In the fight between human opponents each figure can only attack once. It is then the turn of the opponent. For each move in the attack one minute is allowed. There are five moves per attack.**

*It is a hard and merciless world.  
You have to reckon with an attack at any time.*

Instructions for the game

**Money has no value, bartering rules the world**

**Everything can be swapped**

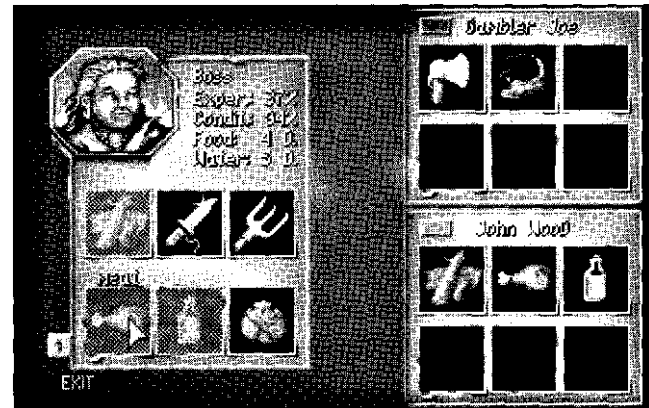
**Supply and demand determine exchange value**

*What is useless to one person  
is life-saving to another.  
Bartering has its own rules.*

## Exchanging items

In the world of Burntime money has no value. Here bartering is the name of the game. To obtain a desired item you have to offer to exchange it for another item which, depending on your bartering abilities, may be more or less valuable.

You can exchange goods with players or traders. Items or provisions have no fixed value. Supply and demand determine the real exchange value.



If the mouse cursor is on the left-hand side of the screen, you can see your own figures on the inventory. If the mouse cursor is on the right-hand side of the screen then the inventory of your bartering partner will appear.

If you now click on an item in your own inventory, it will appear on the exchange board above. The inventory is listed as a sign that it was approached to exchange. The approach for receiving items from exchange partners is exactly the same. Click on the inventory of the exchange partner and it will reveal his exchange board. By clicking on the item of equipment once again it will disappear.

If you agree to the exchange then click on "Exchange OK". On the exchange board itself the exchange light will change to green. When both exchange lights are green, then the exchange has been confirmed.

It can occur that you have to give up several less precious items to obtain a more valuable item. On the other hand you can take perfect advantage of the serious situations of individual people.

If you click on an item with the right mouse button, it will be positioned beside the inventory board. When you leave the exchange scene you will find these items still on the ground. By clicking on them again they can be picked up again.

**Use the mouse cursor to switch between your inventory and that of the exchange partner**

**To exchange click on designated item**

**To recall an item from exchange simply click on it again**

**Click on OK gadget to state agreement of exchange bid**

**When both exchange lights are green, then the exchange is agreed upon**

**With the right mouse button surplus items can put aside on the ground**

Instructions for the game

**Fighters are trained to fight**

**Level of experience reflects fighting power**

**Without weapons the best fighter is useless**

**Click on weapon in the inventory**

**With guns watch ammunition**

**Technicians create or repair items**

**Items needed must be in the technician's inventory**

## **Fighters**

Fighters are the men for the rough work. They work with their muscles not with their heads.

Depending on the amount of experience they are most suitable for guard duties or capture moves. However the best fighters cannot achieve very much with their bare fists. You must pay special attention and make sure your fighters are always equipped with weapons. The desired weapon must be activated otherwise it is useless. To do this click on the inventory with the right mouse button. A red frame marks the active weapon. With guns pay attention to the limited amount of ammunition. When ammunition has run out, you must stock up again with new ammunition (click on ammunition with right mouse button).

## **Technicians**

Technicians work with their heads. They can create very useful things from bits of scrap metal. They should only be involved in a fight in an emergency.

If a technician has an interesting item on his inventory, you can click on this item with the right mouse button and the technician will tell you what you can do with this item.



He will also tell you what he needs to be able to finish a certain item.

## Doctors

Small injuries will heal themselves. However if your health sinks below 70%, you must have a doctor in your troop to cure it. Small injuries will heal quicker with a doctor in the troop.

If your health sinks below 50%, only an expensive doctor based in one of the capital cities can help you. You must offer him food provisions. If it is enough the figure at the front of the inventory will be cured.

## Traders

With traders you can make good deals depending on your skills in trading. The price of the goods depend on supply and demand. You will have to pay a lot for goods that are urgently required and rare.

Traders are also found in trading posts in the capital cities. They are heavily armed and for this reason it is better not to attack them.

**Click on technician's inventory with right mouse button for information about an item**

**Health over 70%: Heal yourself, with doctor in troop healing quicker**

**Health between 70% and 50%: Cure only possible with doctor in troop**

**Health below 50%: Cure only possible by doctor based in capital city**

**Traders exchange items or provisions**

**Price depends on demand**

**Traders are heavily armed to protect themselves against robbers**

# Burntime



Burntime: It's not hard to play,  
but difficult to win.

## Instructions for the game

# The game

The adventurer John Wood set of on his first journey through the world of Burntime. We thought this would be more help to the beginner than the notes of an experienced player. It certainly was not easy to get a hold of this well serviced bean pole's treasures of experience.

Nobody willingly gives up their secrets. But experience gained under difficult circumstances can be the deciding factor in gaining victory over an opponent.

It was not until we reminded Mr. Wood of a few dark moments in his past - and we do not want to reveal them here - that he was willing, even if through gritted teeth and silently swearing at us, to allow us to print at least the first pages of his notes.

We have provided these notes for the players of Burntime with remarks that should help them to come to terms with the rules of Burntime in the shortest possible time.

Instructions for the game

## Inventory

### Open inventory:

- click mouse on active person
- choose from pop-up menu

### Information from inventory:

- experience
- profession
- health
- survival without food in days
- survival without water in days
- items in your possession

By clicking on the small number gadget you can change to and from the inventories of the people present

*The inventory tells you what items you have taken with you, your health, experience and saturation level.*

## What do I own?

Before I set off to explore and overthrow the world, maybe I should look at the items of equipment I have. I already know that these are always different at the beginning of the game.

A quick look at the inventory tells me that I own a knife, a rat, a piece of meat and a full waterbag. In this dangerous world the knife will be of great help.

As I am aware of the nutritional value of the foodstuffs and the capacities of the water containers, I can very easily

calculate how far I can travel without any problems.

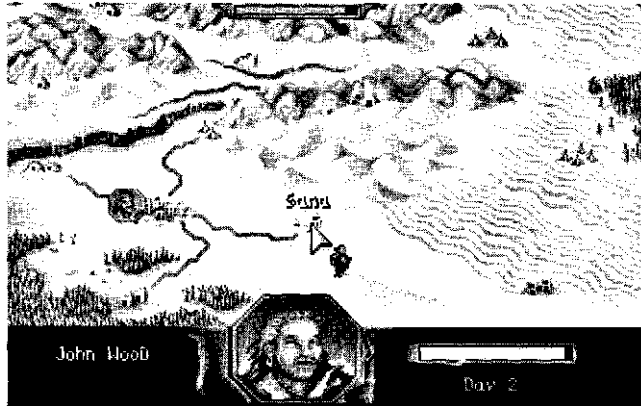
I must be very careful as it is certainly no fun to die of thirst in the desert.

In this case I can survive without food for nine days and without drink for five days.



## The initial journey

I have a choice of four journeys that I can make. They are marked on the main screen by red lines. As I do not do know any of the four locations, I have to rely on my instincts. I have also got to take into consideration possible further travel to locations even further away when I make my choice of destination. I look at the main screen more closely and decide that Sana, a location over to the east, might be the right destination for me. As the journey takes a few days, I have to be patient until it is my turn again.



## Travel

**Travel from one location to another is only possible on the main screen.**

**Possible travel routes are marked by red lines on the main screen.**

**Choose your destination by clicking on the desired location.**

**During a journey the present position of a player is represented by the player's symbol.**

*Only on the main screen can you travel from one location to another.*

Instructions for the game

## Houses and stores

**In empty houses items can be found abandoned. The house will become a store but the location will NOT become a base.**

**Items found in houses in neutral locations are at everyone's disposal.**

**You can often find useful items in houses**

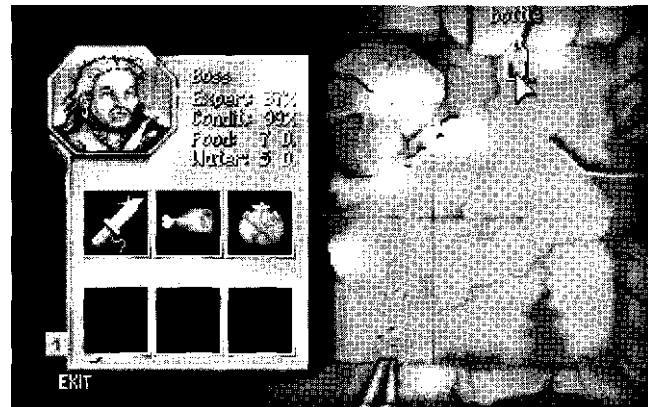
## An empty bottle

At last I arrived in Sana. It was a hard and arduous journey, but I am thirsty for action. I explore the area a little and find several houses. Naturally I search them, maybe I will find some useful things.

In the first house I found an empty bottle that I will be able to use as a water container.

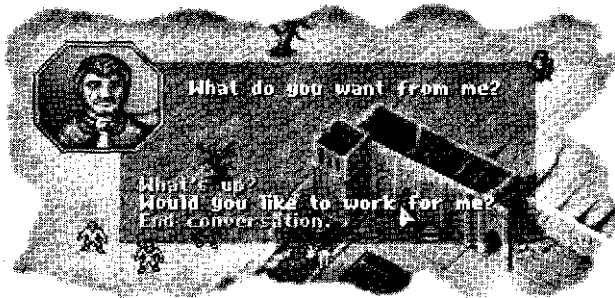
I hurry up my search as I already know: he who arrives late will be punished. Where did I hear that?

*Items found in houses can be picked up or got rid of with the mouse.*



## The soldier

' As I left the house a man approached me. As he obviously did not intend to do me any harm, I spoke to him. After asking him for news, he told me he had a sore leg. Despite this I asked him if he wanted a job. He offered his services as travel companion for the price of a rat. Rats are very precious, so I asked him cautiously what his profession was. He boasted about being a good fighter and I liked him, so I employed him as a soldier. His name was Hias, but I doubt that was his real name.



At least I am no longer alone. I now have to take care of my companion, too. But what can I achieve on my own in the world?

## Signing up people

**In talking mode you can sign up people. To do this you have to speak to them and offer them a job.**

**Items which he will ask for as a salary must be in the boss' possession (in an emergency swap items among the group)**

**Find out about people's profession in conversation.**

**In a conversation with people you can find out about any new developments.**

*During a conversation with people you can get news and even sign them up.*

Instructions for the game

## Order mode

Followers can be lead individually or as a group.

To steer an individual, click on the desired person. You cantell he is now active-figure is flashing.

To recall an individual to the boss' group, choose the order mode "All" from the pop-up menu.

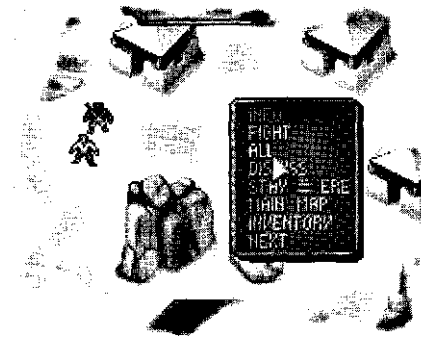
*Via the pop-up menu recall the men to the troop.*

Personnel from the bases (called up with the command "To the camp") do not react any longer to the order mode.

## Follow me, follower

I wanted to explore the area further, and head for the next houses. As I looked behind myself I could see my companion still standing helplessly by the house instead of following me.

I called him and ordered him to stay by my side.



It is not so easy being the boss. In the future I must remember to give clear orders to my crew. I cannot expect them to react independently.

Who knows what they would actually do?

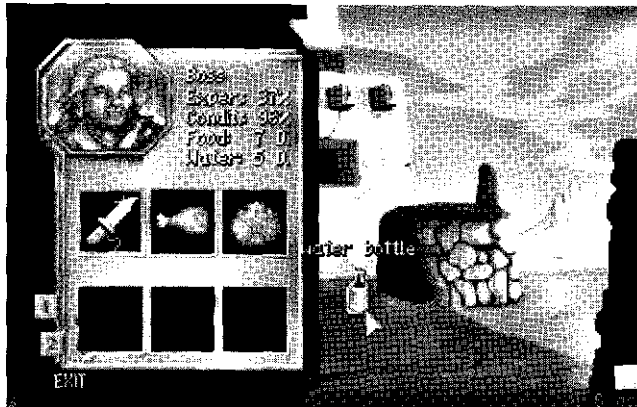
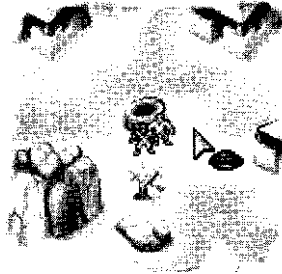
So when I send someone from the group off on a special contract I must remember to recall him when he has to join the group again. I will have to get used to thinking for my people.



## The well in front of the gate

Between the houses I saw something that could be a well. And it really was a well with fresh water.

We quenched our thirst and filled up the bottle. Since Hias did not have a water container I gave him the bottle.



## Locations with water

When you enter a location with water, all the members of your group that are in the vicinity of the boss will follow (only when order mode is active).

*When you approach a well make sure that all the members of your group go with you.*

**All members of the group automatically drink when they enter a watering location.**

**In some watering locations it takes longer to fill up a water container. Therefore leave the containers there overnight or for a few days.**

**The maximum yield of the daily rations can be read in the bottom right corner.**

*At watering locations you can fill your empty water container up right away or overnight.*

Instructions for the game

## Exchanging items

**For two people to exchange items, the item must be put down on the ground. Then the second person can simply pick it up again. The main for houses is the same.**

## Picking up items

**Items found lying on the ground can be picked up in the normal way.**

**First approach it, then the active person can pick the item up by clicking on it.**

*He who keeps his eyes open when looking around the area, can often find useful items.*

## Exchanging items

I simply put the bottle next to the well. Then I called up Hias' inventory. Now Hias can pick up the bottle in the normal fashion.

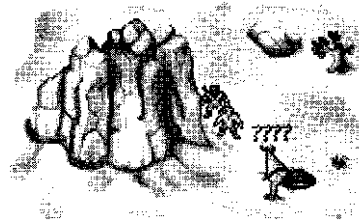
This only functions so simply when both people are in the same group and when they are not too far away from each other.

## He who looks, finds

Time to explore the surrounding area. Hias and I roamed between the rocks and the bushes like two blood hounds. We were successful in our search. Near a rock I found a knife. As I already had a knife, I gave it to Hias.

At last he was also armed. What is the use of a soldier without a weapon?

A little further on we also found a snake. We took this delicacy with us, too.



## The first base

I like the town of Sana. I think it could be a very useful base. It was finding the well that confirmed my decision. Then I activated Hias and ordered him to stay in the camp.

I am now the proud ruler of a town. I have occupied Sana.



## Power is knowledge

A few pieces of information about my base would be quite helpful. To get this I choose "Info" from the menu.



## Occupying a base

To occupy a base, at least one man must be ordered to guard it.

This happens via the command on the pop-up menu "To the camp".

The more men in a base, the safer it is.

*Via the pop-up menu active people are ordered to return to the camp, they then stay there.*

## Info board

Via "Info" in pop-up menu, call up a location's info board.

*Similarly you can call up the info board in the location scenario via the pop-up menu.*

Instructions for the game

**Information on info board about:**

- number of soldiers at base
- number of technicians
- number of doctors
- items in storage
- daily production of food
- daily rations of water (if water is available)

## Producing food

Programme into the info board the desired type of foodstuff that should be produced. Click on the corresponding picture.

The number next to the picture is how many daily rations can be expected.

For rats or snakes you need the corresponding devices. These should be stored in a house.

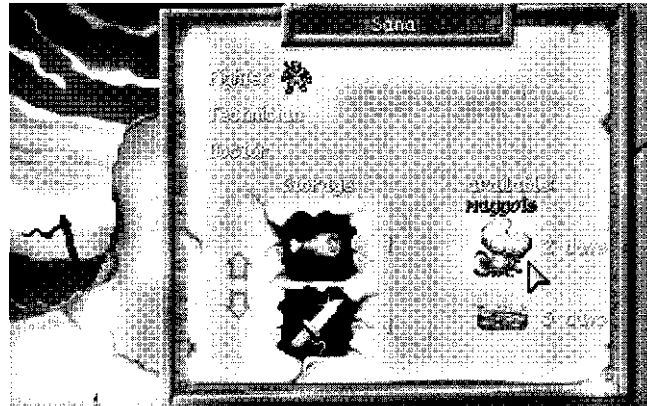
*Info board gives info about bases and is used to manage the production of foodstuff.*

On the info board I can see all the most important information about my base.

Hias appears as my only member of staff. With his knife he can scratch two daily rations of maggots from the rocks. He is missing the equipment to catch rats or snakes.

In order for Hias to do the right thing, I must enter the desired foodstuff. In this case it is clearly maggots.

The well has plenty of water available. It is sufficient for five people.

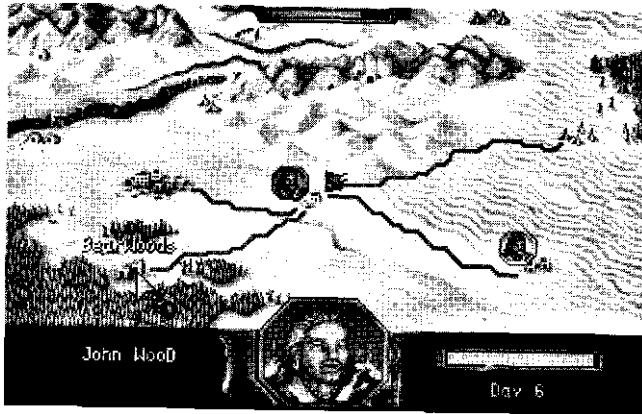


## Getting away from this location

It is time to move on. To do this I must move to the edge of the town to be able to call up the main screen.

## On the road to new destinations

On the main screen my base is marked by a flag in my colours. I decided to stay in the vicinity of the big city. Therefore I travelled to Bearwood, a location in the middle of a dead forest.



## Leaving a location

To escape from a location scenario, you must move to the edge of the town. Then select "Main Screen" from the pop-up menu.

## Marking the base

Bases are identified on the main screen by flags in the colour of the respective players.

*Your bases are marked on the main screen by small flags in your colours.*

Instructions for the game

## Fighting mode

To be able to fight, the fighting mode must be activated by selecting "Fighting" on the pop-up menu.

## Select type of weapon

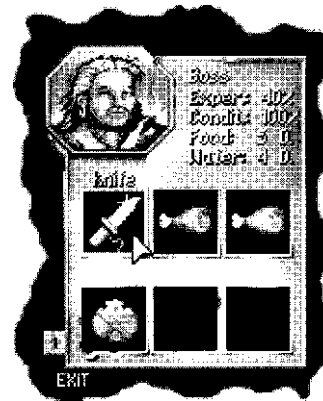
Before a fight click on the desired weapon with the right mouse button (red border) to activate it.

Certain weapons only have a limited amount of ammunition. Press right mouse button to stock up again (only when ammunition is on hand).

*Activate the best weapon you have with you to avoid fighting with your bare hands.*

## Equipped for the fight

After arriving in Bearwood I was fascinated by the eery and graceful remains of the trees. A stray dog took advantage of my inattentiveness and attacked me. But luckily enough he let go of me again.



Now I realised that up until now I had been very lucky. I had been running around carelessly without having activated my weapon. I would have to alter this as fast as possible or I will most certainly come to a sticky end.

I opened my inventory and equipped myself with my knife. So when I switched to fighting mode, I was equipped with a weapon. And not a minute too early, as another dog attacked me. This time I could defend myself. It tried to escape, but I set off after him. A bitter fight followed. I had to put up with a few bites, but in the end I managed to overcome the animal. In



Instructions for the game

## Bartering

**If you want to exchange goods with a trader, then you have to speak to him.**

**How to carry out an exchange, see instructions.**

**Deals made in trading houses are carried out in the same way as with travelling traders.**

**Traders are normally heavily armed and should not be attacked.**

*Think carefully about deals carried out with traders, they are not always to your advantage.*

## Nothing is for free

A lot is going on in the town. We met a trader who offered us his goods. I was interested in the waterbag. I offered him a rat in exchange, but it was not enough. Gritting my teeth I added a snake. Hopefully this was a good deal.



I have realised that I have got to be on my toes when dealing with traders. They attempt to take advantage of emergency situations. I hope that I am never in such a desperate situation to have to give up half of my worldly belongings for urgent items of equipment. You can't count on generosity in the trading houses.



## At the doctors

In a building I met a doctor. He was prepared to heal my wounds. But in return for his services he wanted my entire supply of meat. I had faith in my natural healing powers and turned his services down.

Perhaps I ought to sign up a doctor for my troop. I was told that bigger injuries could only be cured with the services of a doctor who was resident in the troop. In very serious cases, only the services of a doctor stationed in one of the cities will be of help.



## Doctors

**If a person's health is over 70%, then he will get better again naturally. If a doctor is in the troop, the healing process is quicker.**

**If the person's health is between 50% and 70%, he will only get better with a doctor in the troop. A doctor based in the city can also be of help.**

**If the person's health is under 50%, then he will only get better with treatment from a doctor based in the city.**

City doctors will demand payment before they carry out their services. Therefore you must offer your goods first (left mouse button), then click on heal. If the doctor accepts your offer then you can pick out the person to be treated. The healing takes place immediately.

*Doctors based in the cities can heal even the most serious injuries on the spot, but have exorbitant prices.*

Instructions for the game

## Bars

**In the bars you can pick up important information by simply talking to the guests.**

**There are bars and restaurants. In the bars you can get water in return for payment, in the restaurants food. You cannot take it with you, it must be consumed on the premises by the troop.**

**Before you can enjoy it the offer must be made. Procedure as with doctors (see previous page).**

*Delicious meals in the restaurant, but the prices are not everyone's cup of tea.*

## In the bar

I could hear lots of voices coming out of another building. Lois and I entered the house and found ourselves in a bar again. I received some information from two guys but I do not know what I can do with it. I wanted to get some water from the barman but it was too expensive.

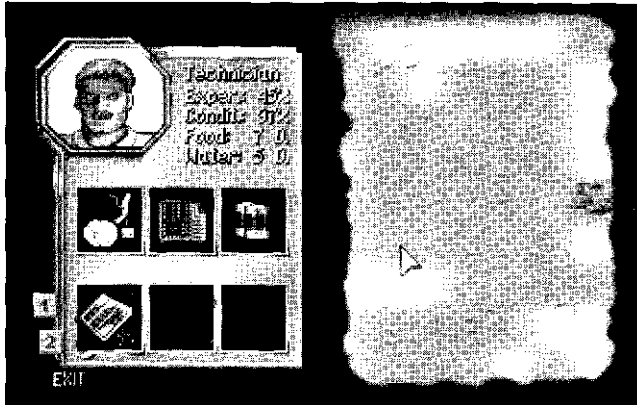
The aroma of a roast drew us into the restaurant. It was a mockery as five stars were hanging on the wall of this filthy restaurant. The exorbitant prices made us draw a hasty retreat.



## He, who likes to make things

While rummaging through many of the houses we found batteries, electrical scraps, a broken display and a broken mine detector. I asked my technician what he could do with the broken detector. He told me that he could make it work again with the pieces we have found.

As he could not think of anything else to make with the items, I gave him the contract to carry out the repair. A mine detector would certainly be useful.



## Making items

**Technicians can make useful things out of other items.**

**The items necessary must be in the technician's inventory.**

**Click on an item in the technicians inventory with the right mouse button and he will tell you what he can make with it, or what he needs to complete it.**

**If everything is on hand, then you can give him the contract. The new item is available immediately. The items used will disappear from the inventory.**

*Only technicians can make things out of scrap metal or repair broken things.*

Instructions for the game

## Contaminated locations

**The info board tells us the degree of contamination of a location.**

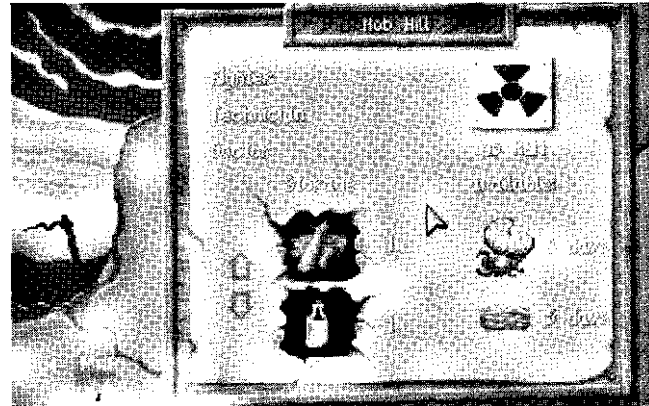
**The more contamination present in a location the less time you can stay without protective clothing without damaging your health.**

**You should avoid contaminated towns without the correct protective clothing.**

*Avoid contaminated places without proper protective clothing.*

## The contaminated location

In the bar I heard some wonderful things about a location called Nob Hill. On the main screen I can see that this is a neighbouring town to the west of Neu Sandez. So I decided to travel there as there was nothing else for me to do in the town. When I arrived in Nob Hill I had a bad feeling about the location. A quick look at the info board confirmed that my bad feelings were justified. The town was contaminated with radioactivity. As we were not in possession of protective suits we left immediately.



## Back in Sana

We returned to our base in Sana. Hias had been working hard there. He had collected three daily rations of maggots and had hidden them in one of the houses. I only had room for one daily ration, so I gave Lois the other two rations.

We found a rat trap. Hias can catch rats with it now. I entered "rats" under production on the info board.

After a last chat with Hias we set off for Neu Sandez again.

## A new base

In a trading centre I came across an axe for Lois. He is now armed too and in this way we set off for Bearwood. I ordered Lois to go to the camp and I now have two bases.

I should now see to it that I get more followers. But I have to be careful as I also have to be able to feed them.

I also want to explore the surrounding area. Above all the caves in the north appear to be worth a visit. But also another large city would appeal to me. However this is another adventure!

## Storing produced foodstuffs

**Food produced is stored in a house in the base.**

**With the right equipment you can clearly increase production.**

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