



Bundesministerium
für Umwelt, Naturschutz
und Reaktorsicherheit



INTAKE OF IODINE TABLETS

as protective measure in the event of a
severe accident in a nuclear power plant

IMPRINT

Editor: Federal Ministry for the Environment, Nature Conservation and Nuclear Safety
(BMU), Division RS II 5 - Radioecology, Environmental Radioactivity
Surveillance, Emergency Preparedness and Response
Robert-Schuman-Platz 3, 53175 Bonn, Germany

E-Mail: RSII5@bmu.bund.de | Internet: www.bmu.de

Concept: :response

Editing: :response; BMU - RS II 5

Layout and graphics: :response (Gudrun Barth)

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INTRODUCTION

Why iodine tablets? Should radioactive iodine be released as a consequence of a serious accident in a nuclear power plant, this iodine can be absorbed by the human body by inhalation and be stored in the thyroid. This would increase the risk of developing thyroid cancer.

To ensure that in the unlikely event of such an accident you are protected from this risk, the emergency response authorities have planned suitable protective measures (these measures are called emergency management measures); one of these measures is the distribution of special iodine tablets. These iodine tablets prevent the storage of radioactive iodine in

the thyroid. If iodine tablets are taken in time, the thyroid gland will already be saturated with non-radioactive iodine before radioactive iodine can be absorbed by inhalation – this is called iodine blockade. By following this procedure you can significantly reduce the risk of developing thyroid cancer.

On the following pages you will find everything you should know about the intake of iodine tablets and about how iodine blockade works.

Additionally, this brochure will provide you with information on other emergency management measures, outline appropriate behavior in the case of emergency, and give you further background information about radioactivity.



1.0 IODINE BLOCKADE

Our thyroid gland needs iodine in order to produce vital thyroid hormones. Nature supplies us with the necessary iodine and our thyroid constantly absorbs iodine from the air, from food and from drinks. This natural iodine is not radioactive.

In a nuclear power plant, the nuclear fission process produces radioactive iodine, amongst other radioactive and non-radioactive material. In the event of an accident radioactive iodine may be released. In principle, radioactive iodine possesses the same characteristics as natural iodine. It will therefore be absorbed by the body and stored in the thyroid in the same way as would natural iodine. This has a considerable downside: the radiation of the radioactive iodine can increase the probability of thyroid cancer, especially in children and teenagers.

However, if tablets containing a high concentration of non-radioactive iodine are taken in time, the thyroid gland will be saturated with „healthy“ iodine and cannot absorb any radioactive iodine. This so called “iodine blockade” therefore prevents the radioactive iodine from being stored in the thyroid. The important factor is to ensure that the iodine tablets are taken in due time to maximise their effectiveness.



The reactor accident of Chernobyl has been the only nuclear accident that required the implementation of iodine blockade for the protection of the population. In Poland which at the time was affected by the passing through of the radioactive cloud, more than 10.5 million children and more than 7 million adults were treated with iodine. Follow-up examinations have proven the positive effect of iodine blockade. No increase in the frequency of thyroid cancer oc-

currence was observed. However, in Belarus – where iodine blockade was not implemented – unfortunately a hundredfold increase in the usually extremely rare thyroid cancer occurred in children after the Chernobyl accident.

The following pages will tell you about the right time to take iodine tablets, where to obtain them and how to take the tablets correctly.

2.0 IODINE TABLETS

High-dosage iodine tablets – the scientifically correct name is potassium iodide tablets – saturate the thyroid with non-radioactive iodine. If taken in time, they prevent the accumulation of radioactive iodine in the thyroid.

Should radioactive iodine be released into the environment as a consequence of a severe nuclear accident the authorities will distribute iodine tablets free of charge to the population in the affected areas. It is reassuring to know that in Germany enough iodine tablets are held in stock to ensure the sufficient supply of the affected population – especially for children and teenagers.

The tablets which will be distributed directly to the affected population within a 25 to 100 km radius around the nuclear power plant (target group: children/adolescents up to 18 years and pregnant and breastfeeding women) come without a box and will be distributed in strips of 6 tablets each. Together with the tablets you will also receive an information leaflet.



Strip of 6 tablets

People living within a radius of up to 25km around a nuclear power plant will receive so-called family-size packages from the authorities in an emergency (target group: every person up to 45 years). You can recognise these tablets by the red stripe on the box. One box contains 20 potassium iodide tablets containing 65mg potassium iodide each. If you live within 10km of a nuclear power plant, you may already have received these tablets.



„Family-size package“ with 20 tablets

Should you wish to build up your own stock of iodine tablets, you may also buy them without prescription in pharmacies.

The packages available from pharmacies are recognisable by a green stripe or a stripe with colour gradient. For these tablets the same intake instructions apply as for the tablets from the emergency supplies.



Tablet packages available from pharmacies

Attention!

The iodine tablets described above must not be confused with those iodine tablets which are prescribed by General Practitioners (GPs) for the treatment of thyroid diseases. The concentration of those GP-prescribed tablets is far too low to be used for iodine blockade.

Reversely, those iodine tablets taken for the purpose of iodine blockade must not be used for the treatment of thyroid diseases due to their high iodine concentration. For your own safety, these high-dosage iodine tablets must only be taken on the recommendation of the emergency response authorities in the case of a nuclear accident.

2.1 WHO SHOULD TAKE IODINE TABLETS?

Whether or not a person should take iodine tablets in the case of a nuclear accident is dependent on the person's age and location at the time of the accident.

Location

A decision as to which areas might require the administration of iodine tablets after an accident in a nuclear power plant will be made depending on the area's distance to the plant and the direction in which the radioactive cloud is travelling. Computer based dispersion models for severe accidents in nuclear power plants show that the intake of iodine tablets can be especially important for child-

ren in areas within 100km of the plant. This radius will be significantly smaller near reactors used for research purposes, as there is a lower potential of radioactive iodine being released.

Detailed information on the distribution of iodine tablets in areas within 100 km of a nuclear power plant are available from your public emergency response authority.

Age

Children and adolescents are the main target group for the administration of iodine tablets because of the development and sensitivity of their thyroid. Their body is in a growth phase and needs considerably more thyroid hormones than an adult, in order to control vital functions (including growth itself). A child's thyroid is therefore considerably more active and absorbs distinctly more iodine than an adult's. In addition, the thyroid of a child is considerably smaller than in adults. Hence, the absorption of radioactive iodine by a child results in a considerably higher exposure of the infantine thyroid tissue than it would in an adult.

From approximately the 12th week of pregnancy, unborn babies also absorb iodine in their thyroid.

Pregnant women can therefore protect their child from possible consequences of radioactive iodine by taking iodine tablets. During the **breast feeding period** iodine is dispensed in various amounts into the breast milk. However, as these amounts are not sufficient to ensure iodine blockade in the breast-fed child, iodine tablets should also be given to newborns and infants.

The age group of **18 to 45-year-olds** is less susceptible to radiation induced thyroid cancer than children and teenagers. Therefore, it may happen that children are encouraged to take iodine tablets but not adults. The best thing to do is to follow the advice given by the authorities.

Those aged 45 years and older should refrain from taking iodine tablets, according to the recommendations of the German Commission on Radiological Protection. The risk of thyroid metabolism dysfunctions increases with age. This so-called functional autonomy increases the risk of iodine tablets' side effects. Additionally, as people get older the risk of developing thyroid cancer caused by ionizing radiation considerably decreases.

The authorities also keep a special contingent of iodine tablets for the emergency staff and other support organisations.

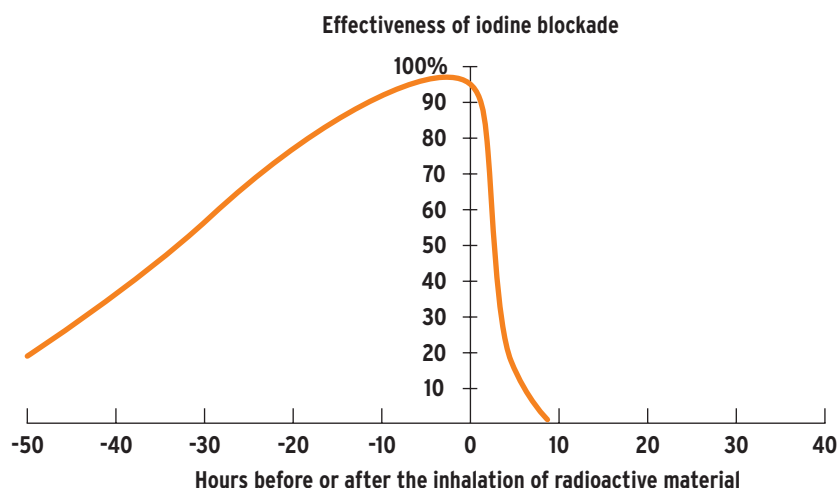


2.2 CORRECT TIMING OF INTAKE OF TABLETS

The thyroid alternately absorbs and releases iodine, which means that the iodine in the thyroid gland is continuously substituted. Therefore, the correct timing of the intake of iodine tablets is the prerequisite for the effectiveness of iodine blockade. If the iodine tablets are taken too late, radioactive iodine may already have been absorbed by the thyroid. If the iodine tablets are taken too early, the additional non-

radioactive iodine may already have been released partially or completely. In either case iodine blockade will be of no or only reduced effect.

The correct timing of the tablet intake ensures that the non-radioactive iodine as supplied by the iodine tablets is either already in the thyroid or still stored sufficiently to prevent radioactive iodine from being absorbed and stored in the thyroid.



The administration of iodine tablets must happen shortly before or after the inhalation of radioactive material in order to be effective.

In the case of a severe nuclear accident, the emergency response authorities are the first to have access to all necessary information on the release of radioactive iodine and its atmospheric dispersion. Therefore, only the emergency response authorities are able to decide whether iodine blockade is necessary, and to issue recommendations as to the where and when

the iodine tablets should be taken. In order for iodine blockade to be the most effective, it is vital that members of the public obey the emergency response authorities' announcements and recommendations. In their announcements the authority may mention which group of people should take the tablets.

Attention:

The distribution of iodine tablets by the emergency response authorities is a precautionary measure and does not constitute an instruction to take the tablets immediately.

Please pay close attention to the authorities' announcements on the radio or television regarding the timing of the tablet intake.

2.3 THE CORRECT DOSAGE

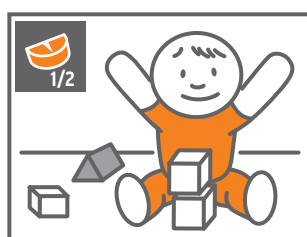
The correct dosage of iodine tablets for iodine blockade is dependent on a person's age. It is therefore important that you follow these instructions closely, as you may put your own and your child's health at risk by administering a dosage that is too high or too low.



Up to 1 month

Up to 1 month

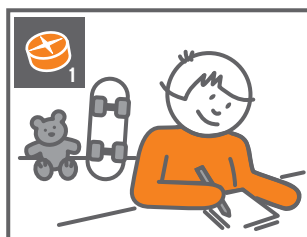
Babies aged one month or less should be given a dosage of 16.25 mg of potassium iodide, once the emergency response authorities have given instructions to proceed. This is the equivalent of a quarter of a tablet.



From 1 month to 3 years

From 1 month to 3 years

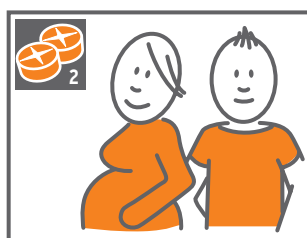
Infants and toddlers aged between one month and three years should take a dosage of 32.5 mg potassium iodide. This is the equivalent of half a tablet.



From 3 to 12 years

From 3 to 12 years

Children aged between three and twelve years should take 65 mg potassium iodide. This is the equivalent of one iodine tablet.



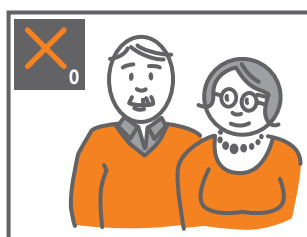
From 12 to 45 years and pregnant women

From 12 to 45 years

Those aged between 12 and 45 should take two iodine tablets or 130 mg potassium iodide to protect themselves against radioactive iodine.

Pregnant women and breastfeeding mothers

Women who are pregnant or who breastfeed should take two iodine tablets with a total dosage of 130 mg potassium iodide, regardless of their age. Pregnant women are also advised to inform their GPs about the intake of iodine tablets. This will ensure that the newborn's thyroid screening will be paid special attention.



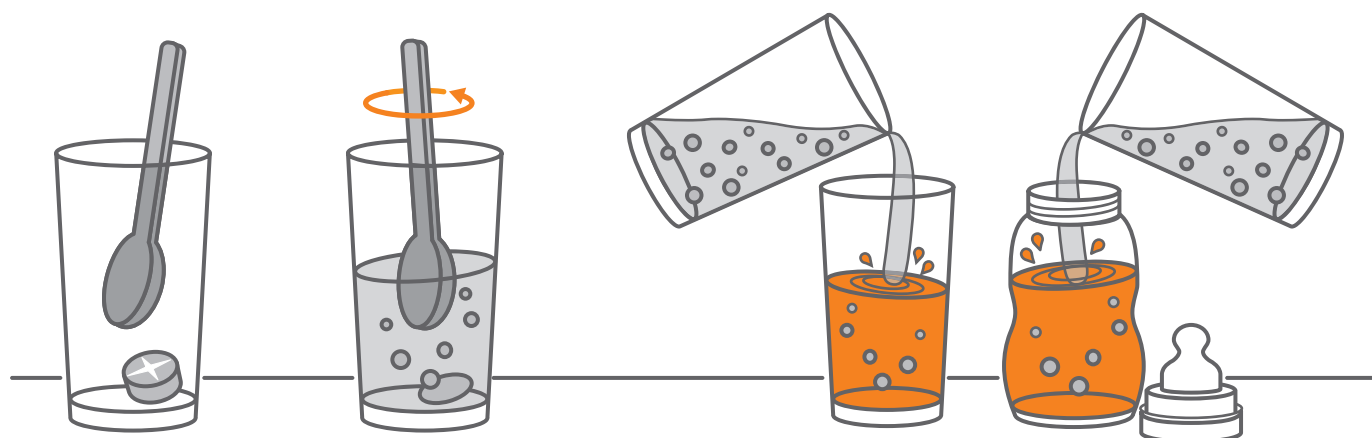
45 years or older

45 years or older

Adults aged 45 or older should not take any iodine tablets. The risk of metabolism dysfunctions in thyroids increases with age. This so called functional autonomy increases the risk of the iodine tablets' side effects. Additionally, as people get older the risk of developing thyroid cancer caused by ionizing radiation decreases considerably.

The required dosage of iodine tablets may be swallowed with some water. To make it easier for children to take their tablet, the required dosage may also be dissolved in a drink. The liquid should be drunk immediately as it is rather perishable.

Either take the required amount by swallowing or by drinking it after dissolving the tablet in a liquid.



Dissolve the tablet in water.

To facilitate the administration – especially for babies and children – dissolve the required amount in a drink, e.g. juice or tea.

Suggestions for the intake of iodine tablets:

To ensure infants and toddlers are given the correct dosage break the tablet apart along the break line and only give the recommended amount or the adequate portion of the tablet to your child. The iodine tablets should be taken with or after a meal.

2.4 TREATMENT DURATION

Usually a single administration of the recommended dosage is sufficient. Additionally tablets should only be taken, if the responsible authority recommends it..

2.5 SIDE EFFECTS AND CONTRAINDICATIONS

Taking the tablets on an empty stomach may lead to an irritation of the stomach lining. In rare cases, the intake of iodine tablets may trigger allergic reactions, such as: skin rash, itching and burning eyes, a cold, dry cough, diarrhoea, headache, high temperature or similar symptoms.

In individual cases the intake of iodine tablets may cause an iodine-related thyroid-hyperfunction. Symptoms can include an accelerated pulse, sweating, insomnia, shakiness, diarrhoea or weight loss. Please contact your General Practitioner (GP) should you notice any of these symptoms.

Persons, who suffer or suffered from thyroid-hyperfunction should only take iodine tablets after having consulted their attending doctor.

When should potassium iodide not be taken?

If you or your child has been diagnosed with the following diseases or allergies, you or your children must not take any iodine tablets:

- Intolerance to iodine (this rare type of allergy must not be confused with the much more frequent allergy to radiopaque material);
- Dermatitis herpetiformis Duhring, also called Duhring-Brocq-Disease (a chronic skin disease whose symptoms include itching, skin eruptions, skin redness, hives and small blisters);
- Hypocomplementaemic vasculitis (a disease of inflamed blood vessels caused by an allergic reaction).

If you are not certain whether you suffer from any of the above diseases please contact your GP.

3.0 BEHAVIOUR IN AN EMERGENCY

The intake of iodine tablets in the case of an accident in a nuclear power plant is one of several measures to protect the public. Depending on the severity of the accident and the distance from the affected plant, the emergency response authorities will instruct for additional measures to be taken. Further details on specific emergency response plans for areas in the immediate vicinity of nuclear power plants (e.g. assembly points, evacuation routes, distribution centres for iodine tablets etc.) are available from your emergency response authority, as well as from the information brochures of the respective power plant operators.

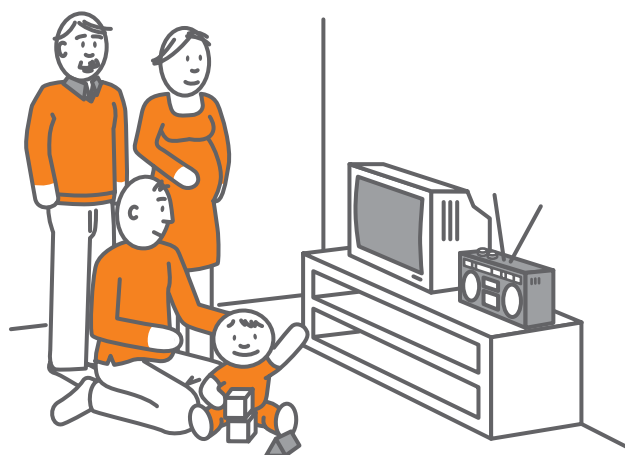
Read on below to find out how you can protect yourself and those around you.

3.1 INFORMATION CHANNELS

In the event of an accident in a nuclear power plant, the emergency response authorities will alert you and keep you informed of any developments via various information channels.

Therefore, please pay close attention to sirens, loud speaker announcements, news and alerts on regional radio and television channels, as well as information on teletext.

It is important that you follow the instructions and recommendations of the emergency response authorities, so as not to endanger yourself, your children and family members. Please also pay attention to the instructions of emergency staff and emergency support organisations.

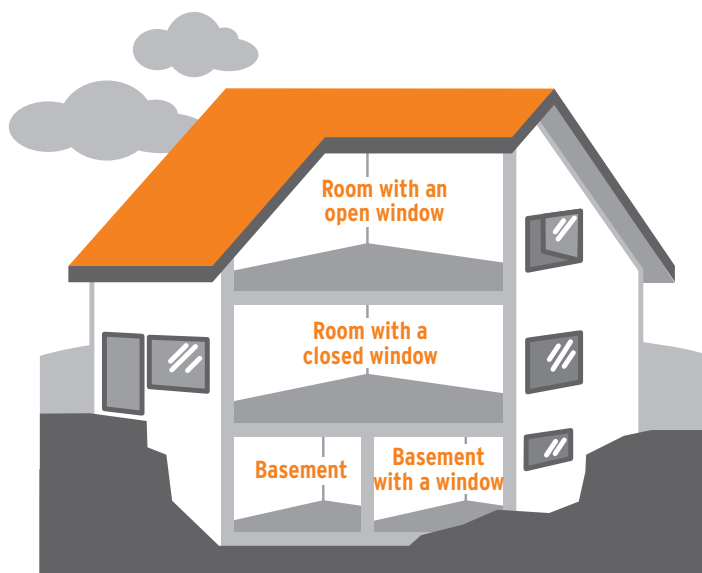


3.2 GENERAL BEHAVIOUR ADVICE

The authorities' emergency management plans are designed to ensure that all measures for your protection can be implemented quickly and effectively. In addition, there are several measures you can take to protect yourself and your family members. **Please find below some general guidelines on how to behave in an emergency:**

(1) Stay indoors!

Radioactive material which is released following an accident in a nuclear power plant is transported through the air and deposited on the ground. Therefore, buildings can to a large extent protect you and your children from inhaling radioactive material or other radiation emitted by radioactive material. Only go outdoors if this is absolutely necessary, and only stay outside as briefly as possible! Should your children be at school or at nursery, please do not pick them up until the emergency response authorities have given explicit instructions to do so. Your children will be taken care of in public buildings and evacuated if necessary.



(2) Seek shelter in windowless basement rooms if possible!

The level of your protection against radioactive material depends on where you are inside a house. The best shielding against radiation exists in windowless rooms or basements where walls and surrounding soil prevent radiation from entering.

(3) Keep windows and doors shut and switch off any air conditioning or ventilation systems!

This will minimise the exchange of air and prevent radioactive material from entering the house unobstructed.

(4) Do not wear clothes that are contaminated by radioactive material and wash yourself thoroughly!

If circumstances are such that you can't avoid going outside, it is vital that you take off your shoes and the outer layers of your clothes before or immediately after entering the house. You should then put those items in plastic bags and seal them tightly. This will help you avoid bringing radioactive material into the building.

After your return, wash your hands and head thoroughly under running water, as well as any other

body parts that were not covered by clothes. Only then should you proceed to have a shower!

(5) Do not harvest and eat any fruit or vegetables from your garden!

Fruit and vegetables from your garden may be contaminated by radioactive material. It is advisable to use tinned or frozen food instead. In the case of a nuclear accident you must not drink milk from animals that are kept outside. However, the consumption of dairy products from dairies will be safe because routine checks assure their edibility.

You may also continue to drink tap water as this will be subject to rigorous controls and, if radioactive pollution is found, will not be fed into the mains water.

(6) Keep up to date by listening to the radio!

Keep your radio switched on and follow the authorities' instructions. That way, you will also find out for how long the recommendations issued by the authorities will remain valid.

(7) Do not strain the emergency phone lines of police and fire brigade by making unnecessary calls!

Unnecessary calls can lead to a capacity overload of phone lines. Instead, listen out for announcements on the radio, news on teletext or loud speaker announcements – these will provide you with details on everything that is important for your safety.

In areas within 25 km of a nuclear power plant, additional measures will be taken in the event of a serious accident. Brochures with further information are available from the respective power plant operators.

4.0 BACKGROUND INFORMATION

Are you interested in learning more? Then please find below some general background information on radioactivity and radiation, on safety and the potential risks, on the possible effects of a release of radioactive material due to a nuclear accident, as well as on emergency planning in Germany.

4.1 RADIOACTIVITY, RADIATION AND RADIOACTIVE MATERIAL

In a large variety of situations, human beings are exposed to the radiation of radioactive material – sometimes more, sometimes less. There are many different varieties of radiation – most radioactive material in the environment come from natural sources.

Natural background radiation can be distinguished into cosmic radiation and terrestrial sources. Terrestrial radiation originates from the soil, rocks, water, air. Cosmic radiation relates to sources found in outer space. Cosmic radiation for example leads to a higher radiation exposure for people on an airplane compared to those staying on the ground.

Additionally, there is man-made radiation, which originates from man-made devices, and which is commonly found in modern medicine, e.g. x-rays, nuclear medicine or other types of radiation used during cancer therapies. Man-made radiation is also caused e.g. during the technical use of radionuclides, during the transportation of radioactive substances or radioactive waste, and during the operation of nuclear power plants.

Both natural and man-made radiation have the same effects because they are both based on the same physical and biological processes. The effects are only dependent on the type of radiation (alpha- beta-, gamma-

(α -, β -, γ -) or neutron radiation) and the energy or rather the doses absorbed by the body. The differing effects of those radiation types can partly be explained by differing levels of penetration into the human body and the varying spread of the absorbed energy inside the body as a result of this penetration.

Atoms are the main building blocks of matter. They are comprised of an atomic nucleus and an electron shell. The atomic nucleus is made up of protons and neutrons. This combination is called nuclide. The neutrons and protons are always arranged in specific

proportions. These proportions determine whether a nuclide is stable or whether it may transform itself into a different nuclide by emitting radiation. This characteristic is called radioactivity or radioactive decay. Depending on the type of decay, the nuclide will either emit α - or β - particles, γ -radiation or neutrons of certain energy.

This process of nuclide transformation – also called radioactive decay – is measured in Becquerel (Bq). 1 Bq equates to one transformation or decay per second. Over time, the activity levels of radioactive material decrease. It is a law of nature that a given amount of a radioactive nuclide will decrease by 50% over a given period of time. This is the so-called radioactive half life, which varies with each nuclide and which is a distinctive feature of each individual nuclide. It can range from a split second to several billion years.

The dominant man-made radiation source is x-ray radiation. X-ray radiation is not a result of radioactive decay and does not originate in an atomic nucleus, but is produced in x-ray equipment by the deceleration of electrons inside atoms.

When radiation energy – regardless of whether it is caused by the transformation of atomic nuclei or produced in x-ray equipment – impacts on humans, it is absorbed by the human's tissue and may cause damage to it. The absorbed energy is called dose. It is measured, depending on the radiation type (for α , β , γ , neutrons and x-rays) in Sievert (Sv) or Millisievert (1 mSv = 1/1000 Sv). In Germany, people are on average exposed to a dose of 2.1 Millisievert (mSv) of natural radiation annually; the mean dose emitted by medical treatments is also approximately 2mSv, while other man-made contribution to the exposure is considerably lower.

4.2 SAFETY IN NUCLEAR POWER PLANTS

Nuclear power plants have engineered safety features at their disposal as well as pre-planned measures which in combination should practically rule out a severe accident happening in a nuclear power plant. A number of active and passive systems ensure the safe operation of the plant. In the case of undesired operating conditions, for example, systems will automatically switch off the reactor without requiring staff to take action. In Germany, high maintenance standards and strict regulatory requirements are continuously surveyed by authorities and their entrusted experts. A severe accident can only happen if the numerous existing graded levels of safety measures have failed and if the additional measures for the prevention of severe damage to the reactor core and for the mitigation of radiological consequences were unsuccessful.

Even though the probability of such an accident happening in Germany is extremely low, certain dangers may exist during the operation or after the shut-down of a nuclear power plant. This is due to the fact that heat is created as a result of the radioactive decay of the fission products in the reactor core, which only cools down slowly, even after the power plant has been shut down. Should this heat not be dissipated safely, the power plant's safety features may be threatened or even destroyed. For this reason, the reactor core of a nuclear power plant is located in a pressure-vessel with a closed cycle cooling system behind thick concrete walls. Additionally, staff is trained in the implementation of ad hoc measures to create a temporary cooling system in order to avoid or at least minimise the release of radioactive material into the environment.

For further information on safety principles and supervision procedures please visit the websites of the Federal Environment Ministry:

http://www.bmu.de/english/nuclear_safety/safety/doc/42500.php

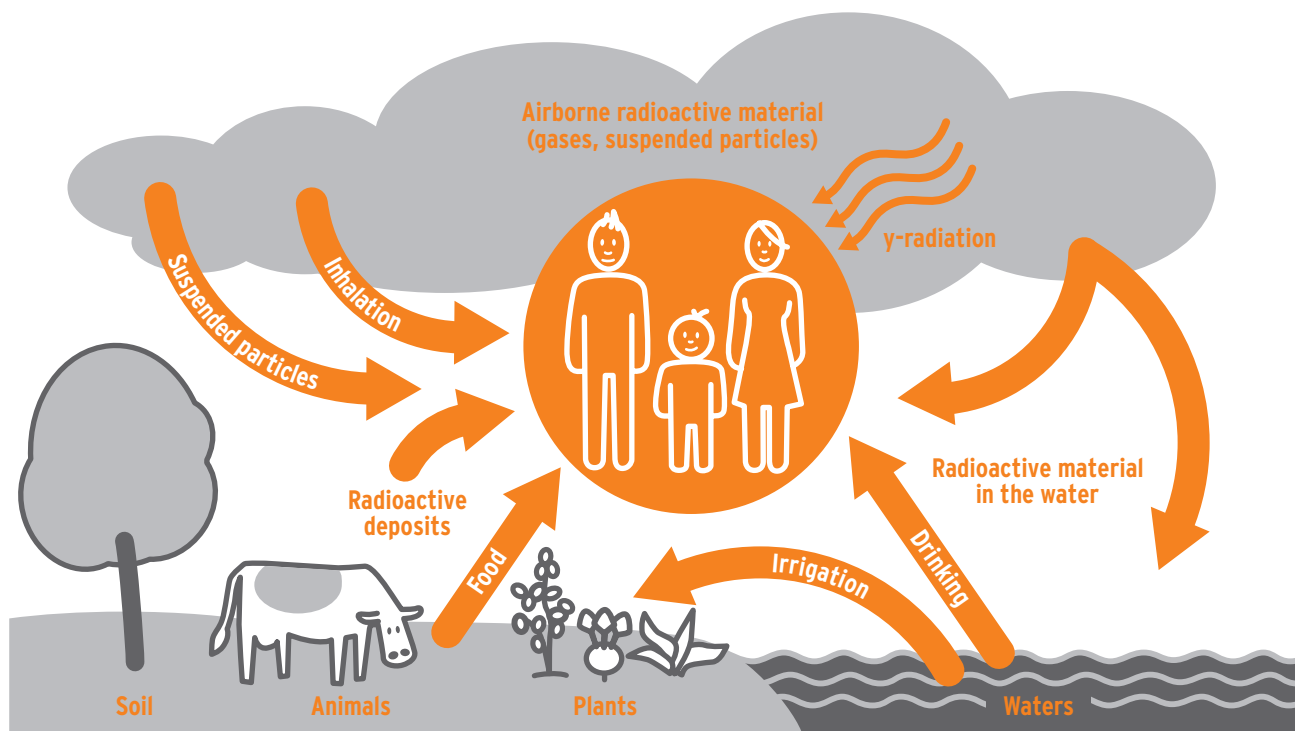


4.3 CONSEQUENCES OF ACCIDENT-CAUSED RELEASES

During a severe accident in a nuclear power plant, radioactive material may be released either as gases or as suspended particles. Suspended particles are a mix of fine airborne particles and gases as e.g. are caused during the process of spraying varnish and colouring onto a surface with a spray can.

Radioactive material may lead to radiation exposure of humans in a number of different ways:

- by direct radiation in the air,
- by direct radiation of deposits on the soil, on houses and possible also clothes,
- by inhalation as well as
- by ingestion of contaminated foodstuffs.



Health effects from radiation exposure are dependent on the absorbed dose, the period over which the dose was absorbed and on the concerned person's health constitution. The consequences can therefore vary accordingly from one affected person to the next. The higher the dose the more severe is the damage caused by radiation. If there is a high radiation exposure of 300 to over 1,000 mSv, severe cell damage can lead to radiation illnesses. In technical usage these are "deterministic radiation effects", which in the case of lower radiation exposure comprise e.g. vomiting, skin burns as well as opacity of the eye

lens. If after the absorption of doses of considerably more than 1,000 mSv no medical treatment occurs, fatalities cannot be ruled out.

In addition to these deterministic effects, there is the possibility of developing long-term consequences such as cancer or leukaemia. These illnesses mostly appear years after the radiation exposure and are also referred to as "stochastic radiation effects". In this case it is not the severity of the illness that is dependent on the amount of the dose but the probability of developing such an illness. The radiation therefore increases the probability of developing such an illness.

4.4 CLASSIFICATION OF EMERGENCIES

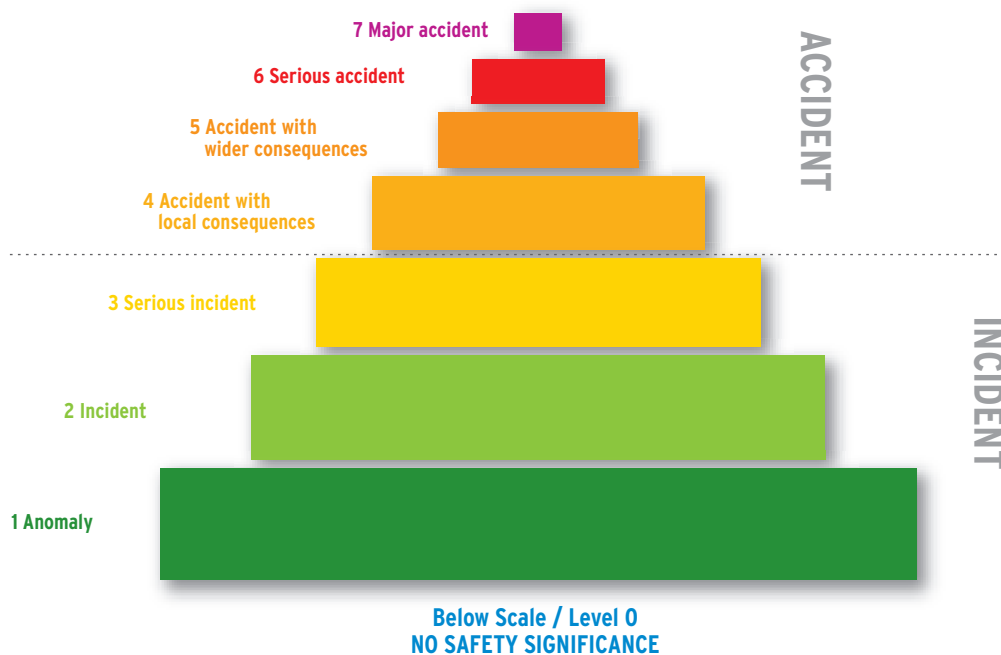
The INES-scale (International Nuclear and Radiological Event Scale), issued by the International Atomic Energy Agency (IAEA), is a classification scale for the safety significance of nuclear and radiological events. This scale is used worldwide and in an event facili-

tates the communication with the public and the media. The uniform assessment criteria allow for a consistent description of the type and severity of the event and thus result in a common understanding of incidents and accidents.

INES classifies nuclear and radiological incidents and accidents by considering three areas of consideration:

- Radiological consequences outside of the plant
- Radiological consequences within the plant
- Impact on safety provisions

Apart from Level 0 for events without safety significance, the scale classifies events at seven levels, from Level 1 „Anomaly“ to Level 7 „Major Accident“.



4.5 EMERGENCY PREPAREDNESS IN GERMANY

Despite the high safety standards, accidents in a nuclear power plant which result in radioactive material being released into the environment cannot be completely ruled out. Therefore, emergency response

authorities and operators of nuclear plants attach high importance to emergency management. In the field of nuclear technology, on-site emergency preparedness goes hand in hand with off-site emergency preparedness.

- On-site emergency preparedness is the responsibility of the respective nuclear power plant operator and is subject to strict monitoring by the supervisory authorities. It includes technical and organizational measures for the control of an accident and the mitigation of possible consequences. According to § 53 of the Radiation Protection Ordinance, plant operators are liable to publish information brochures in regular intervals for the information of the general public. These brochures contain general information on the plant as well as details on the emergency management plans.
- Off-site emergency preparedness falls under the authorities' responsibility. It is divided into emergency response and precautionary radiation protection.

Whilst emergency response aims at the protection against deterministic and stochastic radiation effects, i.e. is aimed at the direct defence against hazards in an accident, precautionary radiation protection aims at the implementation of preventative measures for the health of the public.

The responsibility for emergency response lies with the Federal States which have enacted special laws for this purpose (disaster control laws). If several Federal States were to be affected by a nuclear accident, the States would coordinate the measures among each other.

The responsibility for precautionary radiation protection provision lies with the Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, which coordinates the precautionary measures.

Further information on emergency preparedness in Germany is available via the German report under the Convention on Nuclear Safety (chapter 16) on the websites of the Federal Ministry of the Environment at http://www.bmu.de/english/nuclear_safety/doc/6418.php

5.0 FREQUENTLY ASKED QUESTIONS (FAQ)

1. What is the thyroid and what is its purpose?

The thyroid is a hormonal gland which is found in the neck underneath the larynx (adam's apple) and in front of the air tube. The thyroid's main function is the storage of iodine and the production of thyroid hormones containing iodine. It plays an important role for the catabolism as well as for the growth of individual cells and the entire organism. Thyroid hormones e.g. control basic life functions such as heart beat, body temperature and digestion. Thyroid illnesses may lead to disruptions of the hormonal metabolism and – depending on how the thyroid hormones affect the human organism – may become noticeable either as hyperthyroidism or thyroid sub-function.

2. What is iodine blockade?

Iodine blockade is the name given to the „blocking“ of the thyroid with non-radioactive iodine by the intake of special iodine tablets as a protective measure in the case of a severe accident in a nuclear power plant. These special iodine tablets prevent radioactive iodine from being stored in the thyroid. The iodine blockade allows you protect yourself against an increased danger of developing thyroid cancer.

3. What do and don't iodine tablets provide protection against?

Iodine tablets only provide protection against radioactive iodine and against an increased danger of developing thyroid cancer. They do not provide protection against other radioactive material.

4. What exactly are potassium iodide tablets and what are their ingredients?

Potassium iodide tablets are special iodine tablets which protect the thyroid against radioactive iodine in the case of a severe accident in a nuclear power plant. The potassium iodide tablets which the German emergency response authorities hold in stock contain 65 mg potassium iodide per tablet, which is equivalent to 50 mg iodide.

5. When should I take these iodine tablets?

The correct timing of the intake of these iodine tablets is the prerequisite for the iodine blockade to work. If the iodine tablets are taken too late, radioactive iodine may be absorbed by the thyroid. If the iodine tablets are taken too early, the additional non-radioactive iodine may already have been catabolized partially or completely. In the event of a nuclear accident, the emergency response authorities are the first to have access to all relevant information on the release of radioactive iodine and its dispersion in the environment. Therefore, only the emergency response authorities are in a position to decide if iodine blockade is necessary and to make recommendations as to in which areas and at what time the iodine tablets should be taken. In order to ensure the correct functioning of iodine blockade, it is impor-

tant that you follow the announcements and instructions of the emergency response authorities.

6. Who can take the iodine tablets?

Who should take the iodine tablets in the case of a nuclear accident depends on the age and the location of the persons concerned. Children and adolescents are the main target group for the intake of iodine tablets because of the development and sensitivity of their thyroids.

7. Why are children and adolescents particularly vulnerable?

Children, whose bodies are in their growth stage, need considerably more thyroid hormones than adults for the control of life processes (including growth itself). The thyroid of a child is therefore considerably more active and, compared to that of an adult, absorbs considerably more iodine. In addition, the thyroid of a child is considerably smaller than that of an adult. Hence, the absorption of radioactive iodine by a child results in a considerably higher exposure of the infantine thyroid tissue than it would in an adult.

8. Why should individuals over 45 not take these iodine tablets?

The risk of thyroid metabolism dysfunctions increases with age. This so called functional autonomy increases the probability of side effects of iodine blockade. Additionally, as people get older the risk of developing thyroid cancer caused by ionizing radiation considerably decreases. Those aged 45 years and older should therefore refrain from taking iodine tablets, according to the recommendations of the German Commission on Radiological Protection.

9. Can iodine tablets also be taken during pregnancy and the breast feeding period?

As from approximately the 12th week of pregnancy, unborn babies also absorb iodine in their thyroid, pregnant women can protect their child from possible consequences of radioactive iodine by taking iodine tablets.

10. I breast feed my child. Am I allowed to take iodine tablets? Should I additionally give iodine tablets to my child as well?

During the breast feeding period iodine is dispensed in various amounts into the breast milk. However, as these amounts are not sufficient to ensure iodine blockade in the breast-fed child, iodine tablets should also be given to newborns and infants.

11. How should I take iodine tablets?

The required dosage of iodine tablets may be swallowed with some water. To make it easier for children to take their tablet, the required dosage may also be dissolved in a drink (water, juice, tea). This liquid should then be drunk immediately as it is rather perishable.

12. Should I take the tablets before or after a meal?

The tablets should not be taken on a completely empty stomach.

13. How many tablets should I take?

The correct dosage of iodine tablets for iodine blockade is dependent on a person's age. It is therefore important that you follow the instructions closely, as you may put your own and your child's health at risk by administering a dosage that is too high or too low.

14. How often do I need to take the iodine tablets?

Usually a single administration of the recommended dosage is sufficient. Additional tablets should only be taken, if the responsible authority recommends it.

15. Are there any intolerances and risks?

Taking the tablets on an empty stomach may lead to an irritation of the stomach lining. In rare cases, the intake of iodine tablets may trigger allergic reactions, such as: skin rash, itching and burning eyes, a cold, dry cough, diarrhoea, headache, high temperature or similar symptoms.

In individual cases the intake of iodine tablets may cause an iodine-related thyroid-hyperfunction. Symptoms can include an accelerated pulse, sweating, insomnia, shakiness, diarrhoea or weight loss. Please contact your General Practitioner if you notice any of these symptoms.

Persons, who suffer or suffered from thyroid-hyperfunction should only take iodine tablets after having consulted their attending doctor.

If you or your child has been diagnosed with **any of the following diseases or allergies**, you or your children must **not take any iodine tablets**: Intolerance to iodine (this rare type of allergy must not be confused with the much more frequent allergy to radiopaque materials); Dermatitis herpetiformis Duhring, also called Duhring-Brocq-Disease (a chronic skin disease whose symptoms include itching, skin eruptions, skin redness, hives and small blisters); Hypocomplementaemic vasculitis (a disease of inflamed blood vessels caused by an allergic reaction).

If you are not certain whether you suffer from any of the above diseases please contact your General Practitioner.

16. I have a thyroid disease and am already taking iodine tablets. Are these tablets the same as those used for iodine blockade?

Potassium iodide tablets must not be confused with

those iodine tablets which are prescribed by General Practitioners for the treatment of thyroid diseases. The concentration of those GP-prescribed tablets is far too low to be used for iodine blockade.

Reversely, those iodine tablets taken for the purpose of iodine blockade must not be used for the treatment of thyroid diseases due to their high iodine concentration. For your own safety, these high-dosage iodine tablets must only be taken on instructions from the emergency response authorities in the case of a nuclear accident.

17. How can I get iodine tablets?

In Germany enough iodine tablets are held in stock to ensure the sufficient supply of the affected population – especially for children and teenagers.

In the case of an accident in a nuclear power plant, iodine tablets will be distributed by the authorities in the affected area. If you live within 10 km of a nuclear power plant, you may already have received these tablets. Should you wish to build up your own stock of iodine tablets, you may also buy them over the counter in pharmacies.

18. Who is in charge of distributing iodine tablets in Germany in the event of a nuclear accident?

The communities prepare distribution points. Citizens will be invited via media to pick up their tablets in the distribution points. Please contact your emergency response authority to find out more information.

19. Who will distribute iodine tablets in Germany in the event of a nuclear accident happening in a foreign nuclear power plant close to the German border?

In such a case the emergency response authorities will look after the distribution of iodine tablets in the same way as if it had happened in a German nuclear power plant (see answer to question no 18).

20. What is the best way to store the tablets?

Iodine tablets should be stored in their original packaging and away from light, humidity and heat (not over 25 °C). The tablets should be kept out of the reach of children.

21. Do the tablets have a use-by date?

Please check the expiry date on the packaging. If the storage life is longer than five years the manufacturer is not required to indicate an expiry date. In this case you should note the date of purchase on the packaging.

6.0 FURTHER PUBLICATIONS

The following publications are available for download in English language on the site www.jodblockade.de:

- Brochure „Intake of Iodine Tablets“
- Flyer „Intake of Iodine Tablets“
- Package insert from the tablet package
- Council Directive 89/618/Euratom of 27 November 1989 on informing the general public about health protection measures to be applied and steps to be taken in the event of a radiological emergency, OJ L 357, 7.12.1989, p. 31–34

The following publications regarding iodine blockade in Germany can be downloaded from the internet in German language:

- Broschüre „Einnahme von Jodtabletten“
- Faltblatt „Einnahme von Jodtabletten“
- Ausdruck zur Mitnahme in die Apotheke
- Beipackzettel aus der Tablettenschachtel
- Jodmerkbblätter der Strahlenschutzkommission
- Rahmenempfehlungen für den Katastrophenschutz in der Umgebung kerntechnischer Anlagen
- Radiologische Grundlagen für Entscheidungen über Maßnahmen zum Schutz der Bevölkerung bei unfallbedingten Freisetzungen von Radionukliden
- EU-Richtlinie 89/618/Euratom – „Unterrichtung der Bevölkerung“
- Strahlenschutzverordnung (StrlSchV) § 53 Abs. 5 - Verpflichtung zur Information der Bevölkerung

7.0 YOUR CONTACTS FOR FURTHER QUESTIONS

7.1 NATIONAL INSTITUTIONS

- **Federal Ministry for the Environment, Nature Conservation and Nuclear Safety (BMU)**

Berlin: Alexanderstraße 3, 10178 Berlin-Mitte,
Tel. +49/30/18 305-0, Fax 030/18 305-43 75
Bonn: Robert-Schuman-Platz 3, 53175 Bonn,
Tel. +49/228/99 305-0, Fax 0228/99 305-32 25
E-Mail: RSII5@bmu.bund.de
Internet: www.bmu.de

- **Federal Office for Radiation Protection (BfS)**

Willy-Brand-Straße 5, 38226 Salzgitter
Tel. +49/30/ 18 333-0, Fax 030/18 333-18 85
E-Mail: ePost@bfs.de
Internet: www.bfs.de

- **German Commission on Radiological Protection (SSK)**

Postfach 12 06 29, 53048 Bonn
Fax +49/228/67 64 59
E-Mail: info-ssk@bfs.de
Internet: www.ssk.de

7.2 INSTITUTIONS IN THE FEDERAL STATES



Interior Ministry of Baden-Württemberg

Referat 51, Dorotheenstr. 6, 70173 Stuttgart, Germany
Tel. +49/7 11/231-4
www.innenministerium.baden-wuerttemberg.de



Bavarian Ministry of the Interior

Odeonsplatz 3, 80539 Munich, Germany
Tel. +49/89/21 92-01
www.stmi.bayern.de



Berlin Senate Department for Health, Environment and Consumer Protection

Brückenstr. 6, 10179 Berlin, Germany
Tel. +49/30/90 25-0
www.berlin.de/sen/umwelt/



Ministry of the Interior of the State of Brandenburg

Henning-von-Tresckow-Strasse 9-13, 14467 Potsdam, Germany
Tel. +49/3 31/866-0
www.mi.brandenburg.de



Senator of the Interior and Sport of the Free Hanseatic City of Bremen

Contrescarpe 22/24, 28203 Bremen, Germany
Tel. +49/421/3 61-90 11
www.inneres.bremen.de



Department of the Interior and Sport of the Free and Hanseatic City of Hamburg

Johanniswall 4, 20095 Hamburg, Germany
Tel. +49/40/4 28 28-0
www.hamburg.de/innenbehoerde



Hessian Ministry of the Interior and of Sport

Friedrich-Ebert-Allee 12, 65185 Wiesbaden, Germany
Tel. +49/6 11/353-0
www.hmdi.hessen.de/



Ministry of the Interior of Mecklenburg-Western Pomerania

Alexandrinenstrasse 1, 19055 Schwerin, Germany
Tel. +49/3 85/588-0
www.regierung-mv.de/cms2/Regierungsportal_prod/Regierungsportal/de/im/index.jsp



Lower Saxon Ministry of the Interior and of Sport

Lavesallee 6, 30169 Hannover, Germany
Tel. +49/5 11/120-0
www.mi.niedersachsen.de



Ministry of Home Affairs and Local Government of the state of North Rhine-Westphalia

Haroldstr. 5, Referat 72, 40213 Düsseldorf, Germany
Tel. +49/2 11/871-01
www.im.nrw.de



Rhineland-Palatinate Ministry of the Interior and of Sport

Aufsichts- und Dienstleistungsdirektion (ADD)
Willy-Brandt-Platz 3
54290 Trier
Tel. +49/651/9494-0
www.add.rlp.de



Saarland Ministry of the Interior and European Affairs

Franz-Josef-Röder-Str. 21, 66119 Saarbrücken, Germany
Tel. +49/6 81/501-00
www.innen.saarland.de



The **Free State of Saxony** is located further away than 100 km from any nuclear plant. Therefore, no measures for the distribution of special iodine tablets are planned in this region.



Ministry of Agriculture and Environment of the State of Saxony-Anhalt

Olvenstedter Str. 4, 39108 Magdeburg, Germany
Tel. +49/03 91/567-1950
www.mlu.sachsen-anhalt.de



Ministry of the Interior of the State of Schleswig-Holstein

Düsternbrooker Weg 92, 24105 Kiel, Germany
Tel. +49/4 31/988-0
www.im.landsh.de



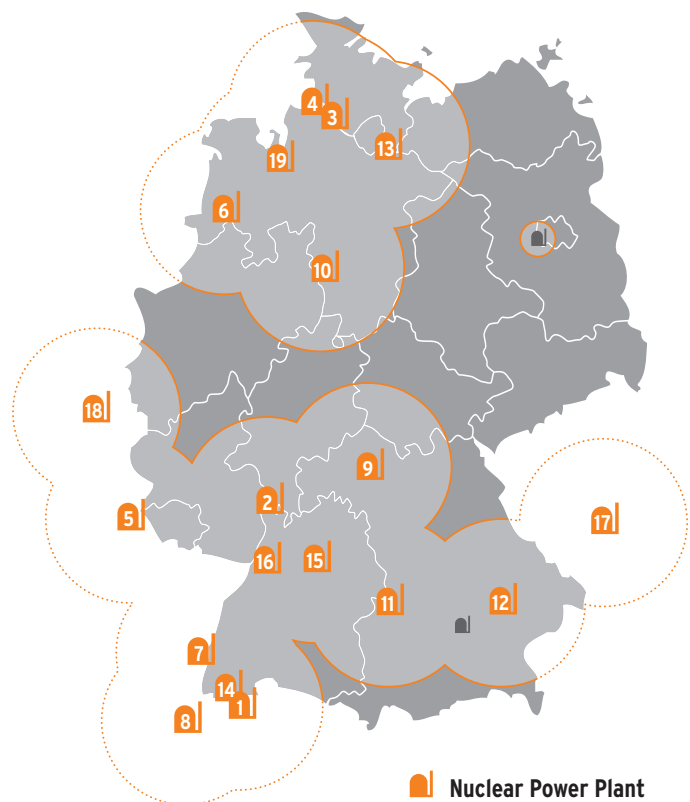
Thuringian Interior Ministry

Steigerstrasse 24, 99104 Erfurt, Germany
Tel. +49/3 61/37-900
www.tlug-jena.de/de/tlug/umweltthemen/umwelt-radioaktivitaet/Jodprophylaxe/

7.3 NUCLEAR POWER PLANTS IN GERMANY AND FOREIGN NUCLEAR POWER PLANTS CLOSE TO THE GERMAN BORDER

Here you find the contact details of those German and foreign nuclear power plants, for which the emergency response authorities have planned emergency management measures for the distribution of special iodine tablets.

- 1. Beznau (Switzerland)**
Nordostschweizerische Kraftwerke AG
Kernkraftwerk Beznau NOK
5312 Döttingen, Switzerland
Tel. +41/56/2 66 71 11, Fax +41/56/2 66 77 01
- 2. Biblis (Hessen, Germany)**
RWE Power AG
Postfach 1140, 68643 Biblis, Germany
Tel. +49/62 45/21-48 03, Fax +49/62 45/21-43 15
- 3. Brokdorf (Schleswig-Holstein, Germany)**
E.ON Kernkraftwerk GmbH
Osterende, 25576 Brokdorf, Germany
Tel. +49/48 29/75-0, Fax +49/48 29/16 66
- 4. Brunsbüttel (Schleswig-Holstein, Germany)**
Vattenfall Europe Nuclear Energy GmbH
Otto-Hahn-Strasse, 25541 Brunsbüttel, Germany
Tel. +49/48 52/89-0, Fax +49/48 52/89-2019
- 5. Cattenom (France)**
EDF, Centrale nucléaire de Cattenom BP 41
57570 Cattenom, France
Tel. +33/3 82 51 70 00, Fax +33/3 82 82 00 78
- 6. Emsland (Lower Saxony, Germany)**
RWE Power AG
Am Hilgenberg, 49811 Lingen, Germany
Tel. +49/591/806-16 11, Fax +49/591/806-16 10
- 7. Fessenheim (France)**
EDF CNPE de Fessenheim
F – 68740 Fessenheim, France
Tel. +33/3/89 83 50 00
- 8. Gösgen (Switzerland)**
Däniken AG
4658 Däniken SO, Switzerland
Tel. 041/622/88 20 00, Fax 041/622/88 20 01
- 9. Grafenrheinfeld (Bavaria, Germany)**
E.ON Kernkraftwerk GmbH
Kraftwerksstrasse, 97506 Grafenrheinfeld, Germany
Tel. +49/6 22 88 20 00, Fax +49/6 22 88 20 01
- 10. Grohnde (Lower Saxony, Germany)**
E.ON Kernkraftwerk GmbH
Postfach 1230, 31857 Emmerthal, Germany
Tel. +49/51 55/67-23 77 , Fax +49/51 55/67-23 79
- 11. Gundremmingen (Bavaria, Germany)**
Dr. August-Weckesser Strasse 1, 89355 Gundremmingen, Germany
Tel. +49/82 24/781 , Fax +49/82 24/78 29 00
- 12. Isar (Bavaria, Germany)**
E.ON Kernkraftwerk GmbH
Postfach 1126, 84049 Essenbach, Germany
Tel. +49/87 02/38 24 65, Fax +49/87 02/38 24 66
- 13. Krümmel (Schleswig-Holstein, Germany)**
Vattenfall Europe Nuclear Energy GmbH
Elbuferstrasse 82, 21502 Geesthacht, Germany
Tel. +49/41 52/15-0, Fax +49/41 52/15-20 08
- 14. Leibstadt (Switzerland)**
5325 Leibstadt, Switzerland
Tel. +41/5 62 67 72 50, Fax +41/5 62 67 79 01
- 15. Neckarwestheim (Baden-Württemberg, Germany)**
Im Steinbruch, 74382 Neckarwestheim, Germany
Tel. +49/71 33/13 32 97
- 16. Philippsburg (Baden-Württemberg, Germany)**
Rheinschanzinsel, 76661 Philippsburg, Germany
Tel. +49/72 56/95 45 99
- 17. Temelín (Czech Republic)**
CEZ, a. s. JADERNA ELEKTRARNA TEMELIN
37305 Temelín, Czech Republic
Tel. +42/03 81/10 11 11, Fax +42/03 81/10 22 98
- 18. Tihange (Belgium)**
Electrabel M. V. Nucleaire Productie
Avenue de l'Industrie 1, 4500 Tihange, Belgium
Tel. +32/85 24 30 11, Fax +32/85 24 39 79
- 19. Unterweser (Lower Saxony, Germany)**
E.ON Kernkraftwerk GmbH
Dedesdorfer Strasse 2, 26935 Rodenkirchen, Germany
Tel. +49/47 32/80-0, Fax +49/47 32/86 59



 Nuclear Power Plant
 Research Reactor

Overview of the planning areas for iodine blocking