Abstract. One of the major goals of the institutions for statutory accident insurance is the prevention of occupational diseases. To perform a successful prevention work it is necessary not only to count the number of accidents or diseases in the various working fields but to look for details of the conditions of work and the human’s response to those conditions. The institutions for statutory accident insurance have engaged the institution for statutory accident insurance in the precision engineering and electrical industry to carry out documentation, in form of a data bank, for all cases of occupational diseases which could be caused by ionising radiation. Those are not only the cases which are accepted as occupational disease but also the cases where a suspicion of an occupational disease is announced but finally rejected. At the moment about 1700 cases are included in the data bank. For preserving the anonymity information to name and residence are deleted. Various data to one single case are linked by a case-specific key-number. Information to occupation and field of working, to details of a possible exposure to ionising radiation like kind of radiation, time and duration of radiation, exposure of the whole body or of parts of the body and whole body or organ doses are collected. Additional information refers to medical aspects like diagnosis and date of diagnosis.

1. Introduction

In Germany some ten thousands of diseases are reported every year to the institutions for statutory accident insurance as occupationally caused diseases. A distribution of these reported diseases for the years 1985 to 2002, published by the Central Federation of the Industrial Institutions for statutory accident insurance, is shown in Figure 1.

FIG. 1. Reported occupational diseases in the years 1985 to 2002 [1]

The number of cases of occupational diseases in the former GDR is not included in Figure 1. The reported occupational diseases are sorted into groups according to the agents who are presumed to be responsible for the disease. These groups are named and numbered in the German regulation act of
occupational diseases. One of these agents is the exposure of ionising radiation, listed with the number 2402. So, the abbreviation of an occupational disease caused by an increased exposure of ionising radiation is “BK 2402” where “BK” stands for the German expression for occupational disease, “Berufskrankheit”. Like the distribution of all reported occupational diseases shown in Figure 1 the following figure (Figure 2) shows the distribution of the number of the reported BK 2402 [1]. In addition to the number of reported occupational diseases Figure 2 shows also the number of these reported diseases which are accepted as occupational diseases.

All reported BK2402 Accepted as BK2402

FIG. 2. Reported and accepted BK 2402 in the years 1985 to 2002.

The increased number of reported cases in the year 1986 is to explain with the accident of the nuclear power plant at Chernobyl.
The increasing number of reported case from the year 1992 with a maximum in the year 1995 is caused by the reunion of Germany in 1990 and the consequences for the Industrial Institutions for statutory accident insurance. It means referring to the BK 2402 that a number of some thousand persons who had worked as uranium miner in the former GDR have reported an occupational disease to the institution for statutory accident insurance for mining.

2. Documentation of the occupational diseases

2.1. General

As reported before every year the Central Federation of the Industrial Institutions for statutory accident insurance (HVBG) publishes among other data statistics to reported and accepted occupational diseases grouped to the different numbers like the BK 2402.

Because one of the major goals of the industrial institutions for statutory accident insurance is the prevention of occupational diseases and accidents additional evaluations of the data are carried out in special programs. Referring to the data of BK 2402 the industrial institution for statutory accident insurance in the precision engineering and electrical industry (BGFE) has the task for collection and evaluation of the data. With those special programs conclusions will be drawn to the work in the field of prevention. The circumstances which had led to the occupational diseases will be analysed, and in consequence, recommendations can be published.
2.2. Documentation of the BK 2402

In the case of the BK 2402 it is to differ between, first, an acute increased exposure to ionising radiation with all the possible health consequences which are generally diagnosed in a short time after exposure and, second, a chronic exposure to ionising radiation over a longer period. In the second case a disease which is presumed to be an effect of the exposure is generally diagnosed 15 to 30 years later (late effect). It is evident that the information about working, working place or exposure is not entirely available in all those cases.

An acute increased exposure occurs in Germany very rarely. So, the predominant numbers of BK 2402 are late effects and in the most of those cases the diagnosis is 'Carcinoma', a diagnosis of which about 30 % of the German population is affected.

At the BGFE a data bank was created to collect the information about BK 2402 reported to the institutions for statutory accident insurance. The data which are registered in the data bank are reported once from the BGFE itself and, on the other hand, from the other institutions for statutory accident insurance. In collaboration with these other institutions the BGFE has developed a form to report the cases of a BK 2402. That report informs about

— an exposure is suspected or certain
— the birthday and sex
— profession and job
— kind of effect (acute or late)
— kind of exposure source (X-ray generator, accelerator or radioactive material).

The BGFE for itself has developed an enlarged form which gives in addition to the above mentioned items information to

— category of occupational radiation exposed person
— data of the exposure to ionising radiation like time of exposure, kind of dose measuring, dose, kind of dose and nuclides in case of radioactive material
— medical data like diagnosis, date of diagnosis and, in case of death, date and cause of death
— result of the proceedings for acceptance the disease as an occupational disease.

So, the extent of the reported data depends on the reporting institution: the BGFE or another institution.

All cases of BK 2402 which are reported from other institutions to the BGFE and the cases of BK 2402 of the BGFE itself are registered in the data bank. There every case is linked with an identifier (case-specific key-number) as well as the coded name of the reporting institution.

It is remarkable that the input of the data of the BGFE into the data bank is carried out over the years from different persons. So, coding of the information of the paper file into the items of the data bank was in details not standardized over the years.

2.2.1. Completeness of the cases of BK 2402

To the end of the year 2003 there were registered in the data bank 1710 cases of BK 2402. The annual distribution since 1980 is shown in Figure 3.

For a comparison with the reported cases of BK 2402 by the HVBG the time period 1985 to 1991 is chosen. Figure 4 shows a comparison between the reported cases of BK 2402 to the HVBG and the reported cases to BGFE. Differences are caused among other things in a subsequently reporting of cases by institutions other than BGFE. These cases are not related to the year of first announcement but to the reporting year.
**FIG. 3. Annual distribution of the BK 2402 reported to the BGFE since 1980**

**FIG. 4. Comparison between the reported cases of BK 2402 to the BGFE and to the HVBG**

To the beginning of the year 1985 the BGFE has remembered the other institutions to report the cases of BK 2402. Subsequently a great number of cases of BK 2402 of the last years were reported. Those cases of which the date of first announcement was not given were related to the year of reporting. That is the reason for the great difference between the reported cases to BGFE and to HVBG in the year 1985.

2.2.2. Completeness of the registered data

Like mentioned above the extent of the information in every single data set is different. Therefore an analysis of the complete number of data sets is only reasonable for these items (global items) which are reported by the BGFE and the other institutions. In Figure 5 the completeness of these items is
shown. The statistics of figure 5 are related to all cases in the data bank which are finished before the end of the year 2003. These are 1639 cases.

**Fig. 5. Completeness of the global items.**

The items working field and job are put together. It means that the information of at least one of the two items is given. The percentage of the item radionuclide is related to all data sets where the kind of radiation is ‘radioactive material’.

The completeness of other items (special items) like kind of dose, dose, diagnosis and date of diagnosis, date of death and cause of death are shown in figure 6. The statistics of figure 6 are related to all cases of the BGFE which are finished before the end of the year 2003. The number of these cases is 513.

**Fig. 6. Completeness of special items referring to the cases of BK 2402 of the BGFE.**
The percentages of the two items ‘Date of death’ and ‘Cause of death’ are related to those cases where the information is given that the person is dead. The number of these cases is 75.

2.2.3. Quality correction of the registered data

It is noticeable that the completeness of the global items is better as that of the special items. One of the reasons of that effect may be the above mentioned fact that over the years the input of the data of the BGFE was carried out by more than one person. So, at the moment, all the registered data of the cases of BK 2402 at the BGFE are checked with the original documents. In the same way the forms with that other institutions report their cases of BK 2402 will be checked.

A first result on the basis of 106 checked cases of the BGFE is given in figure 7. For the most represented items the checking made a clear correction.

![Graph showing the effect of quality correction by checking the data sets.](image)

**FIG. 7. The effect of quality correction by checking the data sets.**

3. Analysis of the data

The special work for quality correction which is described in the last section will be finished in the next few weeks. Results can be given at the congress in Madrid.

In the following some examples for analyses are given which can be done at the moment. Related to the number of 1639 cases which are decided before December 31st 2003 there is a number of 366 cases (22%) which are accepted as occupational disease.

The information to working field is given in a number of 364 cases of the 366 cases. Only 11 cases (3%) are related to the field of nuclear engineering whereas a number of 72 cases (20%) are related to the field of health services. A number of 232 cases (64%) are related to the fields of mining and uranium mining. It is not possible to make a distinction between the two fields.

In a number of 359 cases of this group of 366 cases (98%) information to the work is available. Apart from a great group for whom the information “other” is given there are two areas of work with a little increasing frequency: research (24 cases) and material-proofing (17 cases). In 73% of the 41 ‘research’ and ‘material-proofing’ cases a damage of the skin is given for diagnosis.
In only 15 of the 366 cases (4%) the diagnosis was Leukaemia. With that result the thesis that Leukaemia is one of the most frequent diseases after an exposure with ionising radiation cannot be confirmed.

Further analyses on the basis of the above mentioned special work for quality correction will be presented at the congress.

4. References