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Final Documentation on Dose Assessments for Three Potential European ITER Candidate Sites with Updated Source Terms from ITER NSSR-2

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Abstract

The International Thermonuclear Experimental Reactor ITER is in its late engineering phase. One of the most important safety aspects - in particular for achieving public acceptance - is to assure that the releases of hazardous material are minimal during normal operation and for accidental events, even if very unlikely. To this purpose probabilistic dose assessments for accidental atmospheric releases of various ITER source terms which contain tritium and/or activation products were performed for the sites of Greifswald in Germany, Cadarache in France and an Italian site. In addition, routine releases into the atmosphere and hydrosphere have been evaluated. No country specific rules were applied and the input parameters were adapted as far as possible to those used within former studies to achieve a better comparability with site independent dose assessments performed in the frame of ITER. The calculations were based on source terms which contain a combination of tritium and activation products.

The results were compared to site independent dose limits defined in the frame of ITER. Annual doses from routine releases (CAT-I) are below 0.1 μSv for the aquatic scenarios and can reach several μSv dependent on the release characteristics. Source terms for two different categories of accidental releases, representing 'extremely unlikely events' (CAT-IV) and 'hypothetical sequences' (CAT-V), were investigated. In none of these cases, the release scenarios of category CAT-IV exceed the ITER limits. In addition, relevant characteristic quantities (e.g. 50%-fractiles) of the early dose distribution from the hypothetical scenarios of type CAT-V are still below 50 mSv or 100 mSv, values which are commonly used as lower reference values for evacuation in many potential home countries of ITER. These site specific assessments confirmed that the proposed release limits and thus the derived dose limits for a generic ITER site are unlikely to exceed the national criteria for evacuation. Other protective actions such as sheltering, relocation and food banning were investigated and only banning of agricultural products was found to be important.

Abschlußdokumentation der Dosisabschätzungen für drei potentielle europäische ITER Standorte mit neuen Quelltermen aus dem ITER NSSR-2 Bericht

Zusammenfassung

Der experimentelle Fusionsreaktor ITER befindet sich in einem fortgeschrittenen Planungsstadium. Eines der wichtigsten Ziele von Sicherheitsuntersuchungen, insbesondere um die Akzeptanz in breiten Bevölkerungsschichten zu sichern, ist nachzuweisen, daß sowohl Freisetzungen im Routinebetrieb als auch nach potentiellen Unfällen auf ein Minimum beschränkt bleiben. Deshalb wurden im Rahmen von Fusionsstudien Dosisabschätzungen für unfallbedingte Freisetzungen von Tritium und/oder Aktivierungsprodukten für die drei Standorte Greifswald in Deutschland, Cadarache in Frankreich und einen italienischen Standort durchgeführt. Weiterhin wurden Routinefreisetzungen in die Atmosphäre und Hydrosphäre untersucht. Dabei wurden keine länderspezifischen Vorschriften angewendet. Die Eingabeparameter wurden soweit wie möglich an diejenigen früherer ITER Studien angepaßt.

Die Ergebnisse wurden mit ITER internen Grenzwerten und Dosen, die im Rahmen von ITER für standortunabhängige Freisetzungen berechnet wurden, verglichen. Die Jahresdosen nach Routinefreisetzungen in die Hydrosphäre (CAT-I) liegen knapp unter 0.1μSv pro Jahr, die aus atmosphärischen Quellen können bis zu einigen μSv pro Jahr betragen. Für Unfälle wurden Freisetzungsszenarien der Kategorie IV (sehr unwahrscheinlich) und V (hypothetisch) untersucht. In keinem Fall überschreiten die Ergebnisse der Szenarien der Kategorie IV die Kriterien zur Evakuierung, wie sie im ITER Umfeld definiert sind. Auch liegen die akuten Dosen aus den Freisetzungen der Kategorie V im allgemeinen unterhalb 50 mSv bzw. 100 mSv, Werte, die in mehreren potentiellen ITER Gastländern als untere Eingreifrichtwerte für die Evakuierung gültig sind. Die standortbezogenen Untersuchungen haben gezeigt, daß die vorgeschlagenen Freisetzungslimits und die davon abgeleiteten Dosisgrenzwerte nationale Eingreifrichtwerte für die Initiierung von Evakuierungsmaßnahmen wahrscheinlich nicht überschreiten werden. Als einzige nennenswerte Schutz- und Gegenmaßnahme wurden alleine Einschränkungen bei der Verteilung von Nahrungsmitteln identifiziert.

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1. Introduction

The results presented in this report provide a complete documentation of the calculations performed in the years 1998 and 1999 to estimate the doses to the public from releases of radionuclides from potential ITER candidate sites in Europe. It supplements work documented in /RAS98/. For completeness and as some of the calculations were updated, all results were again put into one report to allow an easy comparison between all sites.

At the beginning of 1998, an update of the safety report describing the ongoing source term development for ITER /NSSR2/ was circulated as a draft and was used as basis for the new calculations described further down. To allow a comparison between the various dose assessment studies and also to look at the further development of the source terms, similar approaches, models and input parameters were applied within all studies. Despite not being candidates at present the three sites Cadarache, Greifswald and an Italian site were investigated in detail by assuming routine and accidental releases of tritium and activation products.

Greifswald is located in North Germany at the coast of the Baltic Sea. The area around the site is mostly flat, thus, the prevailing meteorological conditions are influenced from the zonal western winds. Cadarache, in contrast, is located in southern France some 50 kilometres from the coast of the Mediterranean Sea. The weather at this site is quite different from Greifswald and more influenced from high pressure areas centred at the Azores or the Mediterranean Sea itself. The climatic features of the Italian site are those of the Mediterranean regions characterised by temperate-hot humid climate with dry summers and mild and rainy winters. The annual rainfall is lower than 1000 mm. The prevailing meteorological conditions might be influenced by high pressure areas centred at the Azores or the Mediterranean Sea itself. However also land sea circulation may cause some heavy wind events.

Probabilistic dose assessments, based on hourly meteorological data, have been performed. Mostly potential individual doses and, if appropriate, also the need to initiate protective measures have been investigated for three types of accidents, all of them placed in the event sequence categories IV ('extremely unlikely events') and V ('hypothetical sequences'). In addition, routine releases into the atmosphere and hydrosphere have been evaluated. Aquatic releases however, have been only estimated for Cadarache and Greifswald.

The present calculations for activation products have been performed with the updated foodchain data base and dose conversion factors /GSF94/, implemented into the computer system COSYMA /COS90/. Therefore, these new calculations cannot be simply compared with those performed in previous studies in the early nineties (see e.g. /RAS92/). However, as demonstrated in /RAS96/, the difference between the 'old' and the 'new' version of the foodchain calculations in general does not exceed a factor of two, however, strongly depends on the nuclide considered. As the extended foodchain information in the new COSYMA version 95/1 is now based on a more sophisticated model, the new results should be considered as more reliable as the ones achieved in earlier studies, which were based on rather simple assumptions from the German Regulatory Guidelines /STO94/.

2. Model description

2.1 Atmospheric releases

Calculations for tritium and activation products have been performed with separate computer programs, also in those cases in which the source term contained both materials. The results of both calculations were added before the evaluation of the consequences results. This was possible as both codes have been used in their probabilistic versions using the identical meteorological data base as well as the same probabilistic sampling scheme. A description of the probabilistic sampling scheme can be found in Appendix A.

2.1.1 Tritium

The computer program UFOTRI /RAS90/ and /RAS93/ for assessing the consequences of accidental tritium releases has been used for the dose assessments. Processes such as the conversion in soil of tritium gas (HT) into tritiated water (HTO), reemission after deposition and the conversion of HTO into organically bound tritium (OBT) are considered. For atmospheric dispersion and deposition calculations (dry and wet) the trajectory model MUSEMET /STR81/ implemented in UFOTRI was used. During the time period of the first few days, all the relevant transfer processes between the compartments of the biosphere (atmosphere, soil, plants, animals) are described dynamically. A first order compartment model calculates the longer term pathways of tritium in the foodchains. In its newest version all the exchange processes (atmosphere-soil; atmosphere-plant) are based on resistance approaches and will be re-evaluated dependent on the prevailing environmental conditions. A simple photosynthetic submodule, which calculates the actual transfer rate of HTO in plant water into organically bound tritium, improved the results for the ingestion pathways.

2.1.2 Activation products

Calculations for accidentally released activation products were performed with the version NL/95 of the program system COSYMA /COS90/ (subsystem NL), including extended data sets for activation products /GSF94/. For atmospheric dispersion and deposition calculations (dry and wet) the trajectory model MUSEMET implemented in COSYMA and UFOTRI was used. It was assumed, that the nuclides which appear in aerosol form have a mean diameter of 1 mμ AMAD, and the corresponding dry deposition velocity is set to be 1.0 E-3 m/s (see also Table 2). The doses by ingestion of contaminated foodstuffs are calculated assuming the local production and consumption method; that means, all foodstuffs are consumed in the grid element where they are harvested / produced. The foodchain information from the German model ECOSYS has been used in the calculations /GSF94/.

2.2 Aquatic releases

As described in /RAS96/, two models were used to assess the releases of tritium and activation products from the two sites of Cadarache and Greifswald. A simplified box model was chosen to calculate the concentration in water and fish as well as the dose to man assuming a release into the Greifswaldener Bodden - located close to the Baltic see. As the hydrological information on the river Serre Poncon close to Cadarache did not meet the requirements of the 2-D

river model COASTOX, no specific dilution factor was calculated. Instead it was assumed, that the released activity was uniformly spread over the river, which seemed to be applicable in case of normal operation releases and average discharge regimes. The dose model H-DOSE uses then the activity concentrations in water to calculate the concentration in fish together with the doses by the ingestion pathways.

2.2.1 The simple box type model LAKE

The simplified 2-box model LAKE assumes equilibrium between the activity in lake water and the accumulated activity in fish flesh. This accumulation factor, often referred to as concentration factor is defined as the activity concentration in fish flesh compared to that in water assuming equilibrium conditions /TIL83/. In the model LAKE values from Table 1 are used for the calculations.

nuclide	fresh water	brackish water
HTO	1	1
Cr	200	400
Mn	400	550
Fe	200	1000
Co	300	300
Ni	100	300
Mo	10	10
Sr	2	4
Cs	800	50
Ta	100	100

Table 1: Concentration factor (Bq/kg / Bq/l) of tritium and activation products for fresh and brackish water

2.2.2 Dose model H-DOSE

Based on the concentration in water, in sediments and in fish, the computer code H-DOSE /RAS95/ calculates the dose from 4 different exposure pathways:

- Consumption of foodstuffs contaminated by irrigation (root vegetables, leafy vegetables, milk and milk products, meat and meat products)
- Consumption of contaminated drinking water
- Consumption of contaminated fish
- External irradiation from the borderline of the river or lake.

If the activity concentration in fish is not provided, H-DOSE has an integrated submodel to calculate this value by using the concentration factor approach. However, as this approach is only valid for equilibrium conditions, reduction factors were introduced, which take into account the non-equilibrium conditions /TIL83/. Rather simple approaches have been used mainly in accordance with the German Regulatory Guidelines [STO94]. Only the effective committed dose equivalent is assessed.

3. Release scenarios

3.1 Meteorological data for Cadarache, Greifswald and the Italian site

The Energiewerke Nord (EWN), maintaining the site of Greifswald, have provided meteorological data for one year covering the period from 20.03.1994 - 19.03.95. The following parameters were made available on an hourly basis:

- Wind speed (100 m height)
- Wind direction (100 m height)
- Rain intensity (10 m height)
- Stability class (Pasquill - Gifford)
- Irradiation balance
- Temperature (2 m and 100 m height)
- Relative humidity

Testing of the original data file showed that several hours of the meteorological data were missing:

• Wind speed (100 m height)	> 300 hrs
• Wind direction (100 m height)	> 300 hrs
• Rain intensity (10 m height)	complete
• Stability class	> 1200 hrs
• Irradiation balance	> 50 hrs
• Temperature (2 m and 100 m height)	> at least one T was available
• Relative humidity	> 40 hrs

There was no problem to complete the data for precipitation, irradiation, temperature and humidity. The small gaps were closed by simple interpolation between the last and the first hour with data. The missing data for wind speed and wind direction concentrated in the period from 10.09.94 - 21.09.94 where no data were present in the meteorological file. This gap was closed with 3 hourly records of the station Greifswald published in the European Weather Report /EUW95/. Further missing data were interpolated by using the first and the last hour with recorded values. If the gap was greater than 3 hours, the values were determined by using a random generator. Again, the interval for the random generator was set by the first and the last 'good' data. When evaluating the stability classes it was detected, that not only more than 1200 hours were missing, but that also the stability classes for night conditions were questionable. The wrong and missing stability classes were corrected by using the irradiation balance and the wind speed according to /KTA-1508/.

As the UFOTRI code requests the incoming solar irradiation, the irradiation balance was manipulated to obtain the necessary values. This was solved by using the temperature and the cloud cover /BLU86/. The cloud cover itself was not available at the site of Greifswald and was estimated by using the stability class, wind speed and time of the day. This procedure is in principle the inverse of the determination of the stability class according to /KLU69/, but now with the cloud cover as unknown variable.

The 'Centre d'etudes de Cadarache', part of the CEA, provided meteorological data for the three years 1991, 1992 and 1993. The meteorological values were recorded every 3 hours for most of the parameters, except the rain intensity (daily basis). In contrary to the request, the stability

class was not included and the solar irradiation was provided for the year 1994 only. Furthermore, the irradiation measurements were performed on a daily basis only. The following parameters were made available:

- Wind speed (10 m height, every 3 hours)
- Wind direction (10 m height, every 3 hours)
- Rain intensity (10 m height, every 24 hours)
- Stability class (not included)
- Irradiation balance (daily values from another year)
- Temperature (2 m height, every 3 hours)
- Relative humidity (10 m height, every 3 hours

As the UFOTRI code requests the meteorological data on an hourly basis, the data from Cadarache had to be converted into the appropriate form. But this caused a lot of problems what gives rise to doubts that the data are reliable for deterministic calculations. However, as in this study only probabilistic calculations were performed, the conversion was performed in the following way:

- The wind speed recorded every 3 hours was simply copied to the two hours following the time of the measurements. In case of missing values in the original data base, the wind speed was interpolated in the same manner as for the station Greifswald.
- The wind direction recorded every 3 hours was interpolated for the two hours following the time of the measurements. Again the procedure was the same as applied for Greifswald by using the first and the last hour with recorded values together with a random generator to account for the wind fluctuations over this period of missing data.
- The temperature was linearly interpolated between the three hourly records. There was no larger gap which required special attempt.
- The relative humidity was treated in the same manner as the temperature by linear interpolation between the three hourly records. Again, there was no larger gap which required special attempt.
- The precipitation was available only on a daily basis. This is especially a problem for the assessment of the releases of activation products, as the maximum weather sequence is normally linked to heavy rain during the release hour. This fact prevented to introduce a simple uniform distribution of the rain intensity over the 24 hour period. The relative humidity was chosen as a guide for dividing the rain intensity over the day. Whenever the relative humidity was high (>95 %) a fraction of the daily rain was related to this hour. And again this amount was not set to a uniform value but distributed randomly. This procedure was done by hand, as also the changing wind direction and the increasing wind speed (both indication of the passing rain band) was taken into account. As this attempt was made only for the three hourly values in the original data set, an interpolation scheme was necessary. This was performed by using simply a random generator to take the variability of the rain intensity into account. This procedure seemed to be appropriate for a passing front, but is rather questionable for a thunder storm during summer times. However, this fact was considered as far as possible by the interactive procedure of selecting the rain intensity.
- As the stability class was not included in the data it was generated artificially. Unfortunately, the data base was not complete enough to use the same scheme as for Greifswald. Therefore wind speed, cloud cover, hour of the day and month of the year were used to estimate the stability class. But the necessary cloud cover was not available

and substituted by the interpolated rain. Also this approach had to be corrected by manual procedures.

- The solar radiation represented a very special problem. The values were available on a daily basis for 1994 together with the remark that they do not significantly differ from year to year. This might be true for the mean value but is obviously not correct for an individual day. Nevertheless, the daily irradiation was distributed over all hours with the sun above the horizon, by using the angle of the sun above the horizon as measure. The higher the angle, the greater the fraction of the daily value sorted into this hour. To account for the rain events, the solar irradiation was halved whenever an hour contained any rain.

Again it has to be mentioned that interpolated meteorological data can not be used for deterministic assessments, but the main sources for mis-interpretations were removed. This includes combinations of rain and stable atmospheric conditions as well as rain and high solar irradiation. Nevertheless there seems to be a need to obtain a complete data set without the above reported shortcomings, to have a better feeling for the reliability of the assessments. The year 1991 was selected for all the assessments.

For the Italian site, a complete set of meteorological data for one year covering the period from 01.01.1995 - 31.12.95 was provided, on ENEA request, by the Italian Air Force, Centro Nazionale di Meteorologia e Climatologia Aeronautica (CNMCA) located at Pratica di Mare (Rome). The meteorological values were recorded every 3 hours for most of the parameters, except the rain intensity (12 hourly or daily basis). In contrary to the request, the stability class was not included. The irradiation measurements were performed on a daily basis only. The following parameters were used for the assessment:

- Wind speed (10 m height, every 3 hours)
- Wind direction (10 m height, every 3 hours)
- Rain intensity (10 m height, every 12 hours)
- Stability class (not included)
- Irradiation balance (daily values)
- Temperature (10 m height, every 3 hours)
- Relative humidity (10 m height, every 3 hours)
- Cloud cover (every 3 hours)

As the UFOTRI code requests the meteorological data on an hourly basis, the data from the Italian site had to be converted into the appropriate form. The conversion was performed in the following way:

- The wind direction recorded every 3 hours was interpolated for the two hours following the time of the measurements. In case of missing values or calm (direction 0) in the original data base, the data were interpolated by using the first and the last hour with recorded values. If the gap was greater than 3 hours, the values were determined by using a random generator. Again, the interval for the random generator was set by the first and the last correctly recorded data.
- The wind speed recorded every 3 hours was simply copied to the two hours following the time of the measurements. There was no larger gap which required special attempt.
- The temperature was linearly interpolated between the three hourly records. There was no larger gap which required special attempt.

- The relative humidity was treated in the same manner as the temperature by linear interpolation between the three hourly records. Again, there was no larger gap which required special attempt.
- The precipitation was available only on a twelve hourly basis. This is especially a problem for the assessment of the releases of activation products, as the maximum weather sequence is normally linked to heavy rain during the release hour. This fact prevented to introduce a simple uniform distribution of the rain intensity over the 12 hour period. The present weather code (3 hourly value) was selected as a guide for dividing the rain intensity over the day. Whenever the weather code stated precipitation a fraction of the twelve hourly rain was related to this 3 hour period. To interpolate to hourly values, again a random generator was used to take the variability of the rain intensity into account. This procedure seemed to be appropriate for a passing frontal zone, but is rather questionable for thunder storms during summer season.
- As the stability class was not included in the data it was created by using the scheme proposed by /KLU69/. Taking into account the wind speed, cloud cover, hour of the day, month of the year and specific guidelines for summer and winter periods, the stability classes could be defined.
- The solar radiation represented a very special problem. The values were available on a daily basis only. These daily irradiation values were distributed first over all hours with the sun above the horizon. The higher the angle, the greater was the fraction of the daily value sorted into this hour. As a last step, the solar irradiation was modified by consideration of the cloud cover.

3.2 Aquatic release characteristics (only Greifswald and Cadarache)

Greifswald is located at the border of the 'Bodden of Greifswald' opposite to the isle of Rügen at the coast of the Baltic Sea. The Bodden can be characterised as follows:

- area 514 km^2
- mean depth 5.6 m
- water volume 2.88 E+9 m^3
- water exchange rate 1700 m^3 /s
- salt content 10 per mill

Only one dilution factor will be calculated by the models as the water exchange rate with the Baltic Sea and the water volume do not change significantly over a year.

Cadarache is located close to the river Serre Poncon, which will be used for the liquid discharges from the projected power plant. There are three important discharge regimes, which can be characterised as :

- annual low 2.5 m^3/s
- annual high 2000 m^3/s
- annual mean 200 m^3/s

For normal operation conditions, the annual mean has been used for the calculations. As it was assumed that the activity is uniformly distributed over the whole river width, the following dilution factor was applied for the calculations:

- annual mean 2.0 E+5 l/s

3.3 Source terms and model input

Calculations were performed for various source terms of three categories out of 5 as defined in /NSSR2/. The first category includes operational events whereas the two categories CAT-IV and CAT-V represent the most unlikely and thus those events which might result in the highest consequences for the population (see Table 2).

EVENT SEQUENCE CATEGORY	I OPERATIONAL EVENTS	II LIKELY SEQUENCES	III UNLIKELY SEQUENCES	IV EXTREMELY UNLIKELY SEQUENCES	V HYPOTHE-TICAL SEQUENCES
Category Description	Events and plant conditions planned and required for ITER normal operation, including some faults and events which can occur as a result of the ITER experimental nature.	Event sequences not planned but likely to occur one or more times during the life of the plant but not including category I events.	Event sequences not likely to occur during the life of the plant.	Event sequences not likely to occur during the life of the plant with a very large margin; limiting events for "design basis"	Event sequences with extremely low frequency postulated with the goal of limiting the associated risk; outside the "design basis."
Typical Annual Expected Frequency	list of operational events to be defined explicitly	$f > \sim 10^{-2}/a$	$10^{-2}/a > f > 10^{-4}/a$	$10^{-4}/a > f > 10^{-6}/a$	$f < \sim 10^{-6}/a$
ITER Objectives	Meet appropriate national criteria for "design basis" events				No "edge" effects
	ALARA	Minimise releases to extent practical			
	Avoid any potential need for any public counter-measures			Avoid any potential need for public evacuation	
Type of dose	Annual chronic dose including ingestion	Chronic dose without ingestion		Early dose	

Table 2: Event categories and objectives (according to /PIE97/)

3.3.1 Model input

Probabilistic calculations for accidental release conditions were performed for two different release heights - 10 m with building wake effects and 100 m without any influence from the building. One year of hourly meteorological data from the sites of Greifswald and Cadarache was used as the basis of the dose assessments. However, calculations were performed only for the vegetation period, which is in fact the worst case for calculations with ingestion doses. This shortening of the potential range of weather sequences for the sampling scheme was also used for the calculations of the early dose without ingestion pathways as the early dose appears to differ not dramatically from summer to winter (see /RAS92/). The sampling scheme for obtaining the representative weather sequences of the desired period is shortly described in Appendix A. The same weather sequences have been used within UFOTRI and COSYMA. The main input parameters for the accidental release scenarios are shown in Table 2. The 'MOL' set of dispersion parameters was applied /BUL72/ for all calculations.

Two different sets of simulations were performed. The assessment of the potential dose of an individual located at the fence of the installation is based on the assumption that the person stays permanently outside the house on the meadow and the food is produced and consumed locally (if ingestion is considered). This results in the application of a shielding factor of 1 for all the exposure pathways. The second set investigated the potential need for protective measures based on potential dose calculations (i.e. the shielding factors do not differ from 1 (see Table 3)). Results of these calculations are the area and/or the number of people affected by an individual measure.

In case of normal operation releases, the meteorological data of the same year as for accidental assessments were used. Annual averages were calculated by COSYMA and NORMTRI applying the identical atmospheric dispersion model. The main input characteristics are also listed in Table 3. As for the accidental scenarios, the sigma parameter set MOL was applied. Potential doses were calculated with ingestion assuming local production and consumption.

parameter	value
source term	variable
individual dose for the	Most Exposed Individual
release height (accidental)	10 m or 100 m
release height (routine)	100 m, no building effects
building dimensions (h x w)	40m x 100m
release duration	1 hr, 1 y
washout coefficient (w)	w = A*I**B (1/s)
with rain intensity I	in mm/hr
coefficient A (nobel gas)	0.0 (hr s/mm)
coefficient B (nobel gas)	0.0
coefficient A (aerosol)	8.0 E-05 (hr s/mm)
coefficient B (aerosol)	0.8
coefficient A (HT)	0.0 (hr s/mm)
coefficient B (HT)	0.0
coefficient A (HTO)	9.0 E-05 (hr s/mm)
coefficient B (HTO)	0.6
deposition velocity (nobel gas)	0.0 m/s
deposition velocity (aerosol)	0.001 m/s
deposition velocity (HTO, routine)	0.005 m/s
deposition velocity (HTO, accidental)	variable
dose conversion factors act. prod.	nuclide dependent
dose conversion factor inhalation HT	6.8 E-16 Sv/Bq
dose conversion factor inhalation HTO	1.6 E-11 Sv/Bq
dose conversion factor ingestion HTO	1.6 E-11 Sv/Bq
dose conversion factor ingestion OBT	4.0 E-11 Sv/Bq
breathing rate	2.66 E-4 m**3/s
skin absorption rate (HTO)	1.60 E-4 m**3/s
ingestion rate veget. (root + grain)	180 kg/year
ingestion rate leafy vegetables	45 kg/year
ingestion rate meat	75 kg/year
ingestion rate milk	110 kg/year
shielding factor	1.0 (potential doses)
shielding factor	1.0 (protective measures)

Table 3: Input parameters for the accidental and routine release scenarios

The conditions for the aquatic discharges were adapted as far as possible to the ones for the atmospheric releases. Thus, the released quantities and main consumption rates remain unchanged. The differences and additional assumptions are summarised in the following:

- consumption rate of fish 30 kg/y (meat reduced by 30 kg)
- consumption of drinking water 1.5 l/d
- irrigation 20 events of 5 mm / m^2
- distance from the release point 1000 m

3.2.2 Source terms for atmospheric releases

Various source terms out of five ITER categories were selected for the calculations. As there is no final information available about the 'real' composition of the activated dust, it is assumed that the dust contains either 100% of tungsten, copper or steel. This allows to identify the worst case composition of the dust, even if the composition may change in real operation mode. The following source terms were investigated:

- **Type one**: 'normal operation releases', as proposed in /NSSR2/

scenario	composition dust	composition ACP	composition tritium	release height
CAT-I-W-el	W (5 g)	ACP (1.2 g)	HTO (112 TBq)	elevated
CAT-I-Cu-el	Cu (5 g)	ACP (1.2 g)	HTO (112 TBq)	elevated
CAT-I-St-el	Steel (5 g)	ACP (1.2 g)	HTO (112 TBq)	elevated
CAT-I-W-gr	W (5 g)	ACP (1.2 g)	HTO (112 TBq)	ground
CAT-I-Cu-gr	Cu (5 g)	ACP (1.2 g)	HTO (112 TBq)	ground
CAT-I-St-gr	Steel (5 g)	ACP (1.2 g)	HTO (112 TBq)	ground

Table 4: Source terms for the 'CAT-I, normal operation' (type one)

- **Type two**: 'New Release Limits for CAT IV', as proposed in /PIE97/

scenario	composition	amount	release height
CAT-IV-HTO-el	HTO	100 g	elevated
CAT-IV-HTO-gr	HTO	10 g	ground
CAT-IV-HT-el	HT	3000 g	elevated
CAT-IV-HT-gr	HT	300 g	ground
CAT-IV-W-el	Dust- W	2000 g	elevated
CAT-IV-W-gr	Dust- W	200 g	ground
CAT-IV-Cu-el	Dust- Cu	2000 g	elevated
CAT-IV-Cu-gr	Dust- Cu	200 g	ground
CAT-IV-St-el	Dust- Steel	2000 g	elevated
CAT-IV-St-gr	Dust- Steel	200 g	ground
CAT-IV-ACP-el	ACP	5000 g	elevated
CAT-IV-ACP-gr	ACP	500 g	ground

Table 5: Source terms for the 'New release limits for CAT-IV' (type one)

- **Type three**: One CAT IV accident sequence from the NSSR-2 report /NSSR2/. 'Wet Bypass'

scenario	composition dust	composition ACP	composition tritium	release height
CAT-IV-bypass-W-el	W (110 g)	ACP (15 g)	HTO (23 g)	elevated
CAT-IV-bypass-Cu-el	Cu (110 g)	ACP (15 g)	HTO (23 g)	elevated
CAT-IV-bypass-St-el	Steel (110 g)	ACP (15 g)	HTO (23 g)	elevated

Table 6: Source terms for CAT-IV 'Bypass and DV events' (type two)

- **Type four**: Highest source term from all CAT-V releases 'Wet bypass -1 hr isolation of GBR (ground)' /NSSR2/.

scenario	composition dust	composition ACP	composition tritium	release height
CAT-V-bypass-W-gr	W (4060 g)	ACP (18.2 g)	HTO (42 g)	ground
CAT-V-bypass-Cu-gr	Cu (4060 g)	ACP (18.2 g)	HTO (42 g)	ground
CAT-V-bypass-St-gr	Steel (4060 g)	ACP (18.2 g)	HTO (42 g)	ground

Table 7: Source terms for 'Wet bypass -1 hr isolation of GBR (ground)', CAT-V

As mentioned above, information about the final composition of the dust is not yet available. Therefore, three individual materials (steel, copper and tungsten) have been selected for the investigation. For ACPs (Activated Corrosion Products) only one location (PFW/IBB loop) was considered. The nuclide specific composition of the three types of dust and of the ACP are listed in the following four Tables (Table 8 to Table 11).

Copper (Cu outboard, BPP)					
isotope	half life [y]	activity [GBq/m3]	activity Bq/g	COSYMA	COSYMA Ing
Al-26	7.20E5	1.49E-01	1.73E+01	-	-
Co-60	5.27E0	4.23E+06	4.91E+08	31	25
Co-60m	1.99E-5	6.95E+07	8.06E+09	30	-
Ni-63	1.00E2	7.93E+05	9.20E+07	34	27
Cu-62	1.85E-5	1.47E+09	1.71E+11	36	-
Cu-64	1.45E-3	3.11E+09	3.61E+11	37	28
Cu-66	9.70E-6	9.67E+08	1.12E+11	38	-
Ta-182	3.15E-1	1.49E+06	1.73E+08	158	70
Bi-208	3.68E5	1.52E-01	1.76E+01	-	-

Table 8: Unit source term for copper (as dust), with the nuclide number of COSYMA

Steel, (SS316 outboard, EPP)					
isotope	**half life [y]**	**activity [GBq/m3]**	**activity [Bq/g]**	**COSYMA**	**COSYMA Ing**
Al-28	4.26E-06	1.57E+07	2.15E+09	-	-
V-52	7.13E-06	9.41E+07	1.29E+10	-	-
Cr-51	7.59E-02	1.42E+08	1.95E+10	16	14
Cr-55	6.66E-06	1.34E+07	1.84E+09	-	-
Mn-54	8.55E-01	2.72E+07	3.73E+09	20	17
Mn-56	2.94E-04	5.14E+08	7.04E+10	21	18
Fe-55	2.73E+00	1.67E+08	2.29E+10	23	19
Fe-59	1.22E-01	1.32E+06	1.81E+08	-	-
Co-57	7.44E-01	3.45E+07	4.73E+09	27	23
Co-58	1.94E-01	5.67E+07	7.77E+09	29	24
Co-58m	1.04E-03	9.40E+07	1.29E+10	28	-
Co-60	5.27E+00	5.71E+06	7.82E+08	31	25
Co-60m	1.99E-05	3.60E+07	4.93E+09	30	-
Ni-57	4.07E-03	5.03E+06	6.89E+08	-	-
Mo-99	7.52E-03	2.70E+07	3.70E+09	75	43
Tc-99m	6.86E-04	2.36E+07	3.23E+09	80	-

Table 9: Unit source term for steel (as dust), with the nuclide number of COSYMA

Tungsten (W inboard, EPP)					
isotope	**half life [y]**	**activity [GBq/m3]**	**activity Bq/g**	**COSYMA**	**COSYMA Ing**
Ag-110	7.79E-07	1.24E+06	6.46E+07		
Ta-179	1.82E+00	4.56E+06	2.38E+08		
Ta-180	9.30E-04	1.15E+06	5.99E+07		
Ta-182	3.15E-01	3.76E+06	1.96E+08	157	70
Ta-183	1.40E-02	3.27E+06	1.70E+08		
Ta-184	9.93E-04	9.08E+05	4.73E+07		
W-179	7.13E-05	3.51E+07	1.83E+09		
W-179m	1.27E-05	1.93E+06	1.01E+08		
W-181	3.32E-01	4.17E+08	2.17E+10	159	72
W-183m	1.65E-07	2.50E+09	1.30E+11	160	-
W-185	2.06E-01	8.81E+08	4.59E+10	161	73
W-185m	3.18E-06	4.90E+08	2.55E+10	-	-
W-187	2.73E-03	2.46E+09	1.28E+11	162	74
Re-186	1.03E-02	8.23E+07	4.29E+09	166	77
Re-188	1.94E-03	3.46E+07	1.80E+09	168	79
Re-188m	5.10E-02	2.35E+06	1.22E+08		

Table 10: Unit source term for tungsten (as dust), with the nuclide number of COSYMA

Activated Corrosion Products for a PFW/IBB loop					
isotope	**half life [y]**	**activity [GBq/deposit]**	**activity [Bq/g]**	**COSYMA**	**COSYMA Ing**
Cr-51	7.59E-02	2.55E+02	2.53E+08	16	14
Mn-54	8.55E-01	1.55E+02	1.54E+08	20	17
Mn-56	2.94E-04	4.34E+03	4.31E+09	21	-
Fe-55	2.73E+00	7.69E+02	7.64E+08	23	19
Co-57	7.44E-01	3.33E+02	3.31E+08	27	23
Co-58	1.94E-01	4.91E+02	4.88E+08	29	24
Co-60	5.27E+00	5.79E+01	5.75E+07	31	25
Ni-57	4.07E-03	1.40E+02	1.39E+08	-	-

Table 11: Unit source term for ACP (PFW/IBB), with the nuclide number of COSYMA

Based on the unit source terms as presented in the Table 8 to Table 11, the nuclide specific release rates for the individual source terms were derived. These values are presented in detail in the Appendices B to D for the four source term categories 1 - 4 and the three sites, respectively. Nuclides not considered in COSYMA do not play any significant role in the dose calculations. This has been assured by deriving fusion relevant dose conversion factors /GSF94/.

3.2.2 Source terms for aquatic releases

Only one aquatic source term is defined in the NSSR2 report. It contains activated corrosion products and tritium in form of HTO. The composition of the activated corrosion products was set identical to that used for the atmospheric scenarios (Table 10).

1. **Aquatic scenario**: 'normal operation releases', as proposed in /NSSR2/

scenario	**composition dust**	**composition ACP**	**composition tritium**
CAT-I-aq	-	ACP (1.9 g)	HTO (8 TBq)

Table 12: Source terms for 'CAT- I, normal operation aquatic'

4. Results of the potential dose calculations

Probabilistic individual potential dose values (no shielding, no protective actions) for the most exposed individual (MEI) were calculated at 12 distances (ranging from 145 m up to 10 km). However, only the results for 1000 m are evaluated in detail as this distance may represent the proposed site boundaries for ITER. All further results are presented in the various Appendices.

For routine releases, the dose represents the average burden of the MEI at a certain distance band. The dose values from the accidental scenarios, however, are presented together with their probability of occurrence expressed in percentiles. The probability of occurrence for the highest dose obtained in one individual distance band is given by the probability of the corresponding weather sequence. To explain this further, the example is considered the calculations result in a 95% percentile of 1mSv. This means that in 5 % of all calculations 1 mSv may be exceeded and in 95 % of all cases the dose values remain below this value. As described in /RAS96/ and also later on, various percentiles can be compared with dose values obtained in the ITER study for a generic site /ESECS/ and /NSSR/. These percentiles are the maximum dose or the 95% percentile for worst case conditions (CAT-IV) and the mean or 50 % percentile for average conditions (CAT-V).

From previous investigations about accidental releases it was concluded, that the selection of the vegetation period only does not alter the results when compared with that of one complete year. Therefore, to reduce the computational effort, only weather sequences from the vegetation period (4800 hours of the year) were selected for the accidental scenarios.

Two different types of doses have been obtained. The individual early dose results from the first week exposure and a 70 years integration time (50 years for tritium). The exposure pathways are the external exposure from the passing cloud (CL), the first week external exposure from the ground (GR), the internal exposure from inhalation (IH) + skin absorption (tritium only) from the passing cloud and the internal exposure from inhalation (IHR) + skin absorption (tritium only) from the reemitted tritium and activated products during the first week; the ingestion pathways (IG) are not considered. The individual effective dose equivalent (EDE) results from chronic exposure and a 70 years integration time (50 years for tritium). The exposure pathways are the external exposure from the passing cloud and the ground, the internal exposure from inhalation + skin absorption (tritium only) from the passing cloud, the internal exposure from inhalation + skin absorption (tritium only) from reemitted tritium and activated products and the internal exposure from the ingestion of contaminated foodstuffs.

4.1 Greifswald

4.1.1 Potential doses of the MEI from routine releases

Doses from atmospheric releases range below 1 μSv/a at the distance of 1 km from the source. They are highest for steel as single dust composition. However, more than 50% of the total dose is related to the release of tritium in form of HTO (see Table 13). In case of tungsten, more than 80% are attributed to the released HTO.

Distance (km)	CAT-I-W-el dose (Sv/a)	CAT-I-C-el dose (Sv/a)	CAT-I-S-el dose (Sv/a)	HTO-alone dose (Sv/a)
0.5	6.1E-07	6.2E-07	7.3E-07	5.7E-07
1.0	5.9E-07	6.2E-07	7.8E-07	5.2E-07
2.0	3.6E-07	3.8E-07	4.8E-07	3.3E-07

Table 13: Dose from atmospheric routine releases for elevated release scenarios, Greifswald, EDE of the MEI in Sv/a, near range

When comparing the ground level releases with those from the stack, it is obvious that the results are higher by about one order of magnitude for the near range. In one kilometre distance, the dose values amount to up to 5 μSv/a.

Distance (km)	CAT-I-W-gr dose (Sv/a)	CAT-I-C-gr dose (Sv/a)	CAT-I-S-gr dose (Sv/a)	HTO-alone dose (Sv/a)
0.5	1.2E-05	1.3E-05	1.6E-05	1.1E-05
1.0	4.0E-06	4.1E-06	5.1E-06	3.6E-05
2.0	1.3E-06	1.3E-06	1.6E-06	1.1E-06

Table 14: Dose from atmospheric routine releases for ground level scenarios, Greifswald, EDE of the MEI in Sv/a, near range

The doses from the discharge of activated corrosion products and tritium into the Greifswaldener Bodden are much lower than those obtained for atmospheric releases. They were lower than 10^{-3} μSv/a and dominated by the activated corrosion products. Tritium contributes by less than 20% only. This may be due to the fact that the accumulation factor is unity for tritium but can reach values of up to 1000 (Fe) for activated corrosion products.

Isotope	dose (Sv/a)	% of total
HTO	1.02E-10	17.8
Cr-51	6.36E-14	0.0
Mn-54	6.33E-11	11.0
Mn-56	0.00E+00	0.0
Fe-55	1.67E-10	29.2
Co-57	3.00E-11	5.2
Co-58	3.59E-11	6.2
Co-60	1.76E-10	30.6
Ni-57	1.40E-47	0.0
total	**5.74E-10**	

Table 15: Dose from aquatic routine releases into the Greifswaldener Bodden

4.1.2 Potential doses of the MEI at 1 km distance from accidental releases

Three different release scenarios, covering the proposed release limits of CAT-IV and actual scenarios of the two release categories CAT-IV and CAT-V, have been investigated. Release heights of 10 m and 100 m have been applied with and without building wake effects, respectively. Early doses from the release limit scenarios of CAT-IV exceed in no case the lower reference level for evacuation of 50 mSv at 1 km distance. The 95% percentile which is often used in various countries in licensing guidelines is far below the lower reference level for evacuation (CAT-IV). In case of the activation product source terms, 1 mSv is never exceeded. Releases of HTO show slightly higher early doses with values up to 3 mSv.

release limits scenario (Greifswald)	characteristic quantities of the dose distribution (Sv)							
	max. value		95%-fractile		50%-fractile		mean value	
	early	EDE	early	EDE	early	EDE	early	EDE
CAT-IV-HTO-el	6.9E-03	1.1E-01	1.4E-03	1.9E-02	6.2E-04	5.0E-03	7.2E-04	7.6E-03
CAT-IV-HTO-gr	5.3E-03	2.0E-02	2.9E-03	1.3E-02	3.5E-04	3.6E-03	7.2E-04	5.0E-03
CAT-IV-HT-el	5.8E-04	8.5E-02	1.0E-04	1.4E-02	3.8E-05	6.2E-03	4.5E-05	6.6E-03
CAT-IV-HT-gr	4.2E-04	6.1E-02	1.7E-04	3.7E-02	3.0E-05	2.9E-03	5.1E-05	7.3E-03
CAT-IV-W-el	8.4E-03	1.4E-01	4.8E-04	3.8E-03	6.2E-05	5.8E-04	1.2E-04	1.4E-03
CAT-IV-W-gr	1.1E-03	1.8E-02	3.2E-04	3.2E-03	3.0E-05	3.0E-04	7.5E-05	8.0E-04
CAT-IV-Cu-el	5.9E-03	1.8E-01	4.7E-04	5.1E-03	1.2E-04	7.9E-04	1.7E-04	1.9E-03
CAT-IV-Cu-gr	8.4E-04	2.3E-02	4.5E-04	4.4E-03	5.4E-05	4.0E-04	1.2E-04	1.1E-03
CAT-IV-St-el	9.8E-03	6.8E-01	6.5E-04	1.9E-02	1.5E-04	2.8E-03	2.3E-04	7.0E-03
CAT-IV-St-gr	1.4E-03	9.0E-02	6.8E-04	1.6E-02	7.4E-05	1.4E-03	1.7E-04	3.9E-03
CAT-IV-ACP-el	1.2E-03	9.3E-02	7.4E-05	2.5E-03	1.7E-05	3.8E-04	2.6E-05	9.6E-04
CAT-IV-ACP-gr	1.6E-04	1.2E-02	8.3E-05	2.2E-03	8.9E-06	1.9E-04	2.1E-05	5.4E-04

Table 16: Characteristic quantities of the individual dose distribution (Sv) for the MEI at the distance of 1000 m for various source terms ('New Release Limits for CAT-IV') under accidental release conditions, Greifswald, vegetation period

CAT-IV scenario (Greifswald)	characteristic quantities of the dose distribution (Sv)							
	max. value		95%-fractile		50%-fractile		mean value	
	early	EDE	early	EDE	early	EDE	early	EDE
CAT-IV-bypass -W-el	1.6E-03	3.3E-02	3.3E-04	4.6E-03	1.5E-04	1.2E-03	1.7E-04	1.8E-03
CAT-IV-bypass-Cu-el	1.6E-03	3.5E-02	3.3E-04	4.6E-03	1.5E-04	1.2E-03	1.8E-04	1.9E-03
CAT-IV-bypass -St-el	1.7E-03	6.3E-02	3.4E-04	4.9E-03	1.5E-04	1.3E-03	1.8E-04	2.2E-03

Table 17: Characteristic quantities of the individual dose distribution (Sv) for the MEI at the distance of 1000 m for various source terms (CAT-IV) under accidental release conditions, Greifswald, vegetation period

In addition to these limiting source terms, also source terms following certain accident sequences have been investigated. As the source terms of type three (CAT-IV-bypass - Table 17) and four (CAT-V-bypass - Table 18) are a combination of tritium and activation products, separate calculations have been performed also for the composition steel, to investigate the contribution of the two materials to the total dose (see Table 19). These calculations show that the early dose and most of the percentiles of the EDE from the CAT-IV release are dominated by the released tritium. The only exception is the maximum dose value of the EDE. This differs for the CAT-V scenario which shows the activation products as the dominating material with respect to the EDE and a nearly equal contribution in case of the percentiles of the early dose. One interesting feature can be demonstrated when looking at the maximum values of the EDE. Here, the contribution of activated materials is highest for all cases as this weather sequence might be dominated by heavy rain which affects activation products much more than tritium (higher deposition causes higher doses from external radiation from ground surface and from ingestion).

CAT-V scenario (Greifswald)	characteristic quantities of the dose distribution (Sv)							
	max. value		95%-fractile		50%-fractile		mean value	
	early	EDE	early	EDE	early	EDE	early	EDE
CAT-V-bypass-W-gr	3.4E-02	4.1E-01	1.8E-02	1.3E-01	2.1E-03	2.0E-02	4.6E-03	3.7E-02
CAT-V-bypass-Cu-gr	3.8E-02	5.1E-01	2.1E-02	1.5E-01	2.6E-03	2.3E-02	5.5E-03	4.3E-02
CAT-V-bypass-St-gr	4.8E-02	1.9E+00	2.6E-02	4.0E-01	3.0E-03	4.4E-02	6.6E-03	1.1E-01

Table 18: Characteristic quantities of the individual dose distribution (Sv) for the MEI at the distance of 1000 m for various source terms (CAT-V) under accidental release conditions, Greifswald, vegetation period

scenario (Greifswald)	contribution of tritium and activation products to the dose in % of total							
	max. value		95%-fractile		50%-fractile		mean value	
	HTO	ACT	HTO	ACT	HTO	ACT	HTO	ACT
CAT-IV-St-el (early)	68.2	31.8	89.7	10.3	94.3	5.7	92.8	7.2
CAT-IV-St-el (EDE)	39.7	60.3	85.5	24.5	90.8	9.2	92.8	17.7
CAT-V-St-gr (early)	41.7	58.3	46.2	53.8	50.0	50.0	47.0	53.0
CAT-V-St-gr (EDE)	5.3	94.7	20.0	80.0	37.8	68.2	19.0	81.0

Table 19: Contribution of tritium and activated material (steel) to the individual dose distribution (%) for the MEI at the distance of 1000 m for various source terms (CAT-IV and CAT-V) under accidental release conditions, Greifswald, vegetation period

The early doses from the CAT-IV scenarios (see Table 17) are far below the lower reference level for evacuation as it is the case for the predefined limiting source terms. However, as CAT-IV source terms may be used in case of licensing procedures, also the EDE with ingestion has to be evaluated. In certain countries, in particular in Germany, the dose from ingestion is considered when licensing a nuclear power plant. Looking at the percentiles, the EDE at 1 km distance is

below 10 mSv for all compositions of the dust. As demonstrated in Table 19, HTO contributes mostly to final dose. Nevertheless it cannot be excluded, that there may exist weather conditions, defined by deterministic calculating prescriptions, which result in doses higher than the 50 mSv target used in Germany.

According to the ITER guidelines, CAT-V releases, which are of hypothetical nature, should be evaluated by using average weather conditions. These average weather conditions fit best to the mean values and the 50% percentiles of the probabilistic calculations. Using these percentile criteria, the early doses never reach 10 mSv, a value which is definite below the lower reference level for evacuation. The EDE, however, is in general much higher than the early dose. In particular for the higher percentiles but also for the mean value, EDEs from CAT-V releases exceed 50 mSv. As CAT-V sequences are of 'hypothetical' nature, they never may be part of the licensing procedure, i.e. they may not play any role with respect to governmental decisions.

4.2 Cadarache

4.2.1 Potential doses to the MEI from routine releases

Doses from elevated atmospheric releases are highest for the steel as unit composition of the dust. The EDE for the MEI exceeds one μSv/a at 1 km distance for all release scenarios. The contribution of the two materials tritium and activation products to the total dose does not differ much from that observed for the other sites. Again more than 50% of the total dose is related to the release of tritium in form of HTO (see Table20).

Distance (km)	CAT-I-W-el dose (Sv/a)	CAT-I-C-el dose (Sv/a)	CAT-I-S-el dose (Sv/a)	HTO-alone dose (Sv/a)
0.5	1.2E-06	1.2E-06	1.3E-06	1.2E-06
1.0	1.0E-06	1.1E-06	1.4E-06	8.9E-07
2.0	7.6E-07	8.1E-07	1.1E-06	6.3E-07

Table 20: Dose from atmospheric routine releases for the elevated release scenarios, Cadarache, EDE of the MEI in Sv/a, near range

The doses from ground level releases under normal operation conditions are higher by about one order of magnitude compared to those from stack releases. At one kilometre distance, dose values of up to 11 μSv/a were obtained for the composition steel.

Distance (km)	CAT-I-W-gr dose (Sv/a)	CAT-I-C-gr dose (Sv/a)	CAT-I-S-gr dose (Sv/a)	HTO-alone dose (Sv/a)
0.5	1.9E-05	2.1E-05	3.4E-05	1.4E-04
1.0	5.9E-06	6.5E-06	1.1E-05	4.4E-06
2.0	1.9E-06	2.0E-06	3.3E-06	1.4E-06

Table 21: Dose from atmospheric routine releases for the ground level scenarios, Cadarache, EDE of the MEI in Sv/a, near range

The doses from the discharge of activated corrosion products and tritium into the river Serre Poncon result in a total dose of about 0.01 μSv/a at 1 km distance. The EDE is dominated by tritium with the highest contribution from the drinking water pathways. The corrosion products only contribute by less than 20%, which is different from the result obtained from the release in the Greifswaldener Bodden. One possible explanation can be found in different exposure pathways considered here. Irrigation and in particular drinking water was not included in the calculations for Greifswald, but shows here the highest contribution to the total dose. Without these two exposure pathways, the activation products would dominate the dose.

nuclide:	IGI in %	IGD in %	IGF in %	dose (Sv/a)	% of tot
CR- 51	5.97	32.98	61.05	0.32E-11	0.03
MN- 54	1.32	6.47	92.20	0.19E-09	1.63
MN- 56	26.76	5.73	67.50	0.14E-11	0.01
FE- 55	2.85	6.26	90.89	0.21E-09	1.86
FE- 59	6.39	23.75	69.86	0.43E-28	0.00
CO- 57	1.92	6.76	91.33	0.17E-09	1.44
CO- 58	3.04	14.45	82.51	0.35E-09	2.99
CO- 60	1.71	4.82	93.47	0.92E-09	7.95
NI- 57	13.84	79.96	6.20	0.11E-10	0.09
HTO	12.24	81.26	6.50	0.97E-08	83.99
Total	10.63	69.47	19.90	0.12E-07	

Table 22: EDE in Sv/a from aquatic routine releases into the river Serre Poncon (IGI = irrigated crops, IGD = drinking water, IGF = fish consumption)

4.2.2 Potential doses of the MEI at 1 km distance from accidental releases

Three different release scenarios, covering the proposed release limits of CAT-IV and actual scenarios of the two release categories CAT-IV and CAT-V, have been investigated. Release heights of 10 m and 100 m have been applied with and without building wake effects, respectively.

When evaluating the results from the release limit scenarios (CAT-IV -Table 23) the lower reference level for evacuation of 50 mSv as defined within the generic ITER safety study /GESECS/ is not reached by any of the released materials. The 95% percentile, however, is slightly higher than that obtained for Greifswald and exceeds 1 mSv for dust and 5 mSv for tritium. However, doses from ACPs are still below 1 mSv.

Maximum and 95% percentiles of dose distribution of the early dose for the CAT-IV source terms based on accident scenarios are close to 1 mSv at 1 km distance (see Table 24). The EDE with ingestion exceeds 50 mSv for the maximum case but remains below 10 mSv for the 95% percentile. In case of the early dose the contribution of tritium and activation products is rather similar (see Table 26). But in case of the EDE, the contribution of tritium is dominating. Only in case of the maximum value, contribution of dust is higher which might be attributed to high deposition due to heavy rain events, as rain affects aerosols more than tritiated water vapor.

The hypothetical CAT-V releases have been evaluated by calculating the mean and the 50% percentile of the dose distribution. None of the releases show doses higher than the 50 mSv lower

reference level for evacuation for these lower percentiles. However, the higher percentiles (maximum and 95 %) nearly reach and, in the case of steel, exceed the 50 mSv at 1 km distance (see Table 25). Differing from the CAT-IV releases, the contribution of tritium and activation products is similar for the early dose but dominated by the activation products in case of the EDE (see Table 26). This dominance may be explained either by the higher amount of dust released or by the contribution from external exposure from the ground and from ingestion. This differs in case of the early dose as the exposure from ground is only considered up to 7 days and the ingestion pathways are completely neglected. However, the release height also may have an influence on these observations.

release limits scenario (Cadarache)	characteristic quantities of the dose distribution (Sv)							
	max. value		95%-fractile		50%-fractile		mean value	
	early	EDE	early	EDE	early	EDE	early	EDE
CAT-IV-HTO-el	3.8E-03	9.6E-02	3.5E-03	6.5E-02	1.0E-03	1.2E-02	1.4E-03	2.1E-02
CAT-IV-HTO-gr	5.6E-03	2.9E-02	5.0E-03	2.2E-02	5.4E-04	5..2E-03	1.2E-03	9.2E-03
CAT-IV-HT-el	5.3E-06	5.7E-02	4.8E-06	5.1E-02	1.3E-06	1.1E-02	1.9E-06	1.7E-02
CAT-IV-HT-gr	7.9E-06	7.0E-02	6.9E-06	6.1E-02	6.8E-07	4.8E-03	1.8E-06	1.5E-02
CAT-IV-W-el	1.1E-02	1.8E-01	3.4E-04	3.2E-03	9.1E-05	8.3E-04	1.7E-04	1.9E-03
CAT-IV-W-gr	1.4E-03	2.2E-02	5.0E-04	5.1E-03	3.0E-05	2.8E-04	1.6E-04	1.7E-03
CAT-IV-Cu-el	7.8E-03	2.4E-01	5.5E-04	4.3E-03	1.8E-04	1.1E-03	2.5E-04	2.5E-03
CAT-IV-Cu-gr	9.6E-04	2.8E-02	8.1E-04	6.9E-03	5.2E-05	3.9E-04	2.5E-04	2.2E-03
CAT-IV-St-el	1.3E-02	9.1E-01	8.3E-04	1.5E-02	2.2E-04	4.1E-03	3.5E-04	9.3E-03
CAT-IV-St-gr	1.6E-03	1.1E-01	1.2E-03	2.5E-02	7.2E-05	1.4E-03	3.8E-04	8.2E-03
CAT-IV-ACP-el	1.5E-03	1.2E-01	9.5E-05	2.1E-03	2.5E-05	5.5E-04	3.8E-05	1.3E-03
CAT-IV-ACP-gr	1.9E-04	1.5E-02	1.5E-04	3.5E-03	8.5E-06	1.9E-04	4.7E-05	1.1E-03

Table 23: Characteristic quantities of the individual dose distribution (Sv) for the MEI at the distance of 1000 m for various source terms ('New release limits for CAT-IV') under accidental release conditions, Cadarache, vegetation period

CAT-IV scenario (Cadarache)	characteristic quantities of the dose distribution (Sv)							
	max. value		95%-fractile		50%-fractile		mean value	
	early	EDE	early	EDE	early	EDE	early	EDE
CAT-IV-bypass-W-el	1.4E-03	3.3E-02	6.3E-04	7.2E-03	2.4E-04	1.8E-03	2.8E-04	2.6E-03
CAT-IV-bypass-Cu-el	1.2E-03	3.6E-02	6.3E-04	7.4E-03	2.4E-04	1.9E-03	2.8E-04	2.7E-03
CAT-IV-bypass-St-el	1.5E-03	7.3E-02	6.5E-04	7.9E-03	2.5E-04	2.0E-03	2.9E-04	3.1E-03

Table 24: Characteristic quantities of the individual dose distribution (Sv) for the MEI at the distance of 1000 m for various source terms (CAT-IV) under accidental release conditions, Cadarache, vegetation period

CAT-V scenario (Cadarache)	characteristic quantities of the dose distribution (Sv)							
	max. value		95%-fractile		50%-fractile		mean value	
	early	EDE	early	EDE	early	EDE	early	EDE
CAT-V-bypass-W-gr	3.5E-02	5.2E-01	3.2E-02	1.9E-01	2.1E-03	2.0E-02	1.0E-02	6.7E-02
CAT-V-bypass-Cu-gr	4.2E-02	6.4E-01	3.9E-02	2.3E-01	2.6E-03	2.2E-02	1.2E-02	7.2E-02
CAT-V-bypass-St-gr	5.1E-02	2.3E+00	4.8E-02	6.0E-01	3.1E-03	4.4E-02	1.5E-02	2.0E-01

Table 25: Characteristic quantities of the individual dose distribution (Sv) for the MEI at the distance of 1000 m for various source terms (CAT-V) under accidental release conditions, Cadarache, vegetation period

scenario (Cadarache)	contribution of tritium and activation products to the dose in % of total							
	max. value		95%-fractile		50%-fractile		mean value	
	HTO	ACT	HTO	ACT	HTO	ACT	HTO	ACT
CAT-IV-St-el (early)	52.0	48.0	29.2	70.8	48.0	52.0	31.6	68.4
CAT-IV-St-el (EDE)	30.0	70.0	89.2	10.8	88.5	11.5	83.2	16.8
CAT-V-St-gr (early)	35.3	64.7	47.9	52.1	45.2	54.8	48.0	52.0
CAT-V-St-gr (EDE)	4.4	95.6	15.0	85.0	27.3	72.7	15.0	85.0

Table 26: Contribution of tritium and activated material (steel) to the individual dose distribution (%) for the MEI at the distance of 1000 m for various source terms (CAT-IV and CAT-V) under accidental release conditions, Cadarache, vegetation period

4.3 Italian Site

4.3.1 Potential doses of the MEI from routine releases

For the Italian site, no aquatic releases under normal operation conditions were investigated.

Doses from elevated atmospheric releases reach about 1 μSv/a at the distance of 1 km from the source. They are highest for steel as single dust composition. However, more than 50% of the total dose is related to the release of tritium in form of HTO (see Table 27). In case of tungsten, even more than 80% are attributed to the released HTO.

Distance (km)	CAT-I-W-el dose (Sv/a)	CAT-I-C-el dose (Sv/a)	CAT-I-S-el dose (Sv/a)	HTO-alone dose (Sv/a)
0.5	9.8E-07	9.9E-07	1.1E-06	9.5E-07
1.0	7.8E-07	8.0E-07	9.4E-07	7.3E-07
2.0	5.0E-07	5.2E-07	6.0E-07	4.7E-07

Table 27: Dose from atmospheric routine stack releases, Italian site, EDE of the MEI in Sv/a, near range

Doses for the ground level releases were about a factor of ten higher very close to the source (500 m) and up to five times higher at 1000 m distance from the source point. Their characteristics with the tungsten as the material resulting in the lowest and steel in the highest doses is the same as for the elevated release.

Distance (km)	CAT-I-W-gr dose (Sv/a)	CAT-I-C-gr dose (Sv/a)	CAT-I-S-gr dose (Sv/a)	HTO-alone dose (Sv/a)
0.5	1.3E-05	1.4E-05	1.7E-05	1.2E-05
1.0	4.2E-06	4.4E-06	5.4E-06	3.8E-06
2.0	1.3E-06	1.4E-06	1.7E-06	1.2E-06

Table 28: Dose from atmospheric routine ground level releases, Italian site, EDE of the MEI in Sv/a, near range

4.3.2 Potential doses of the MEI at 1 km distance from accidental releases

Three different release scenarios, covering the proposed release limits of CAT-IV and actual scenarios of the two release categories CAT-IV and CAT-V, have been investigated. Release heights of 10 m and 100 m have been applied with and without building wake effects, respectively.

release limits scenario (Italian site)	characteristic quantities of the dose distribution (Sv)							
	max. value		95%-fractile		50%-fractile		mean value	
	early	EDE	early	EDE	early	EDE	early	EDE
CAT-IV-HTO-el	4.6E-03	8.6E-02	2.4E-03	4.1E-02	5.6E-04	5.6E-03	9.2E-04	1.1E-02
CAT-IV-HTO-gr	5.6E-03	3.2E-02	5.1E-03	2.4E-02	2.9E-04	6.2E-03	1.4E-03	8.1E-03
CAT-IV-HT-el	5.1E-04	6.3E-02	1.8E-04	2.6E-02	5.2E-05	6.0E-03	6.5E-05	9.8E-03
CAT-IV-HT-gr	4.0E-04	9.0E-02	3.2E-04	6.4E-02	3.5E-05	3.3E-03	8.7E-05	1.6E-02
CAT-IV-W-el	6.9E-03	1.1E-01	3.8E-04	4.7E-03	5.8E-05	5.2E-04	1.8E-04	2.3E-03
CAT-IV-W-gr	1.2E-03	1.9E-02	4.9E-04	5.0E-03	3.9E-05	4.4E-04	1.5E-04	1.6E-03
CAT-IV-Cu-el	5.0E-03	1.4E-01	5.6E-04	6.0E-03	1.1E-04	7.2E-04	2.3E-04	3.0E-03
CAT-IV-Cu-gr	8.9E-04	2.4E-02	7.8E-04	6.8E-03	5.4E-05	5.6E-04	2.2E-04	2.1E-03
CAT-IV-St-el	8.2E-03	5.6E-01	8.3E-04	2.3E-02	1.4E-04	2.6E-03	3.3E-04	1.1E-02
CAT-IV-St-gr	1.5E-03	9.3E-02	1.2E-03	2.5E-02	7.8E-05	2.1E-03	3.4E-04	7.7E-03
CAT-IV-ACP-el	9.7E-04	7.7E-02	9.5E-05	3.2E-03	1.6E-05	3.5E-04	3.6E-05	1.5E-03
CAT-IV-ACP-gr	1.8E-04	1.3E-02	1.5E-04	3.4E-03	9.1E-06	3.0E-04	4.2E-05	1.1E-03

Table 29: Characteristic quantities of the individual dose distribution (Sv) for the MEI at the distance of 1000 m for various source terms ('New Release Limits for CAT-IV') under accidental release conditions, Italian site, vegetation period

The lower reference level for evacuation (50 mSv) as defined within the generic ITER safety study /GESECS/ is never reached by the early doses for any of the materials. Early doses from the release limit scenarios of CAT-IV exceed in no case the lower reference level of 50 mSv at 1 km distance. The 95% percentile which is often used in various countries in licensing guidelines is far below the lower reference level for evacuation (CAT-IV). In case of the activation product source terms, 1 mSv is only exceeded by the release of activated steel. Releases of HTO show slightly higher early doses with values up to 5 mSv.

CAT-IV scenario (Italian site)	Characteristic quantities of the dose distribution (Sv)							
	max. value		95%-fractile		50%-fractile		mean value	
	early	EDE	Early	EDE	early	EDE	early	EDE
CAT-IV-bypass -W-el	1.4E-03	2.6E-02	5.9E-04	9.5E-03	1.3E-04	1.3E-03	2.2E-04	2.7E-03
CAT-IV-bypass-Cu-el	1.3E-03	2.8E-02	5.9E-04	9.5E-03	1.3E-04	1.3E-03	2.2E-04	2.8E-03
CAT-IV-bypass -St-el	1.4E-03	5.1E-02	6.0E-04	1.1E-02	1.3E-04	1.6E-03	2.3E-04	3.2E-03

Table 30: Characteristic quantities of the individual dose distribution (Sv) for the MEI at the distance of 1000 m for various source terms (CAT-IV) under accidental release conditions, Italian site, vegetation period

In addition to these proposed release limits, also source terms following certain accident sequences have been investigated. As the source terms of type three (CAT-IV-bypass - Table 30) and four (CAT-V-bypass - Table 31) are a combination of tritium and activation products, separate calculations have been performed also for the composition steel, to investigate the contribution of the two materials to the total dose (see Table 32). CAT-IV releases are dominated by the released tritium. The only exception is the maximum dose value of the EDE. This differs for the CAT-V scenario where in particular the EDE is dominated by the released activation products.

CAT-V scenario (Italian site)	characteristic quantities of the dose distribution (Sv)							
	max. value		95%-fractile		50%-fractile		mean value	
	early	EDE	early	EDE	early	EDE	early	EDE
CAT-V-bypass-W-gr	3.5E-02	4.6E-01	3.2E-02	2.2E-01	1.9E-03	3.5E-02	8.8E-03	6.6E-02
CAT-V-bypass-Cu-gr	4.1E-02	5.6E-01	2.5E-02	2.5E-01	2.2E-03	3.6E-02	1.0E-02	7.6E-02
CAT-V-bypass-St-gr	5.1E-02	2.0E+00	4.6E-02	5.9E-01	2.6E-03	7.1E-02	1.3E-02	1.9E-01

Table 31: Characteristic quantities of the individual dose distribution (Sv) for the MEI at the distance of 1000 m for various source terms (CAT-V) under accidental release conditions, Italian site, vegetation period

scenario (Italian site)	contribution of tritium and activation products to the dose in % of total							
	max. value		95%-fractile		50%-fractile		mean value	
	HTO	ACT	HTO	ACT	HTO	ACT	HTO	ACT
CAT-IV-St-el (early)	75	25	93	7	98	2	91	9
CAT-IV-St-el (EDE)	39	61	84	16	81	19	81	19
CAT-V-St-gr (early)	47	53	46	54	46	54	45	55
CAT-V-St-gr (EDE)	7	93	18	82	36	64	18	82

Table 32: Contribution of tritium and activated material (steel) to the individual dose distribution (%) for the MEI at the distance of 1000 m for various source terms (CAT-IV and CAT-V) under accidental release conditions, Italian site, vegetation period

The early doses from the CAT-IV scenarios (see Table 30) are far below the lower reference level for evacuation as it is the case for all the other sites which have been investigated. The dose for the EDE, however, exceeds 50 mSv for the maximum and 10 mSv for the 95% percentile. As CAT-IV source terms may be used in case of licensing procedures, in particular in Germany, the EDE and thus the dose from ingestion should not be neglected in the evaluation procedure.

According to the ITER guidelines, CAT-V releases, which are of hypothetical nature, should be evaluated by using average weather conditions. These average weather conditions fit best to the mean values and the 50% percentiles of the probabilistic calculations. Using these percentile criteria, the early dose exceeds 10 mSv only for the composition of steel.

5. Assessment of protective measures

To have an idea about the need and the extent of protective actions, calculations have been performed with selected source term out of the three types of accidental scenarios. The source terms considered are HTO from the new release limits of CAT-IV and steel and tungsten as dominating material for the CAT-IV and CAT-V events.

The following countermeasures were considered (only areas outside the fence):

1) Short term
   - Evacuation: early dose (cloudshine, 7 days integration time for groundshine, 70 years committed dose from inhalation) > 50 mSv
   - Sheltering: early dose (cloudshine, 7 days integration time for groundshine, 70 years committed dose from inhalation) > 5 mSv and < 50 mSv
2) Long term
   - Relocation: effective dose equivalent (groundshine, 1 year integration time) > 50 mSv
   - Foodban: concentration levels in the foodstuff, exceeding EU criteria (total area where food bans are initiated)

scenario (Greifswald)	areas (km^2) and persons affected by evacuation and sheltering for various characteristic quantities of the dose distribution							
	max. value		95%-fractile		50%-fractile		mean value	
	evac	shelt	evac	shelt	evac	shelt	evac	shelt
CAT-IV-HTO-gr	-	-	-	-	-	-	-	-
CAT-IV-bypass -St-el	-	-	-	-	-	-	-	-
CAT-IV-bypass -W-el	-	-	-	-	-	-	-	-
CAT-V-bypass -St-gr	-	0.7 / 70	-	0.2 / 20	-	-	-	0.03 / 3
CAT-V-bypass -W-gr	-	0.7 / 70	-	-	-	-	-	-

Table 33: Off site areas / persons affected by evacuation and sheltering for characteristic quantities of the dose distribution, Greifswald, accidental releases, vegetation period, ('evac' = evacuation, 'shelt' = sheltering, '-' means: areas < 0.01 km^2)

scenario (Cadarache)	areas (km^2) and persons affected by evacuation and sheltering for various characteristic quantities of the dose distribution							
	max. value		95%-fractile		50%-fractile		mean value	
	evac	shelt	evac	shelt	evac	shelt	evac	shelt
CAT-IV-HTO-gr	-	-	-	-	-	-	-	-
CAT-IV-bypass -St-el	-	-	-	-	-	-	-	-
CAT-IV-bypass -W-el	-	-	-	-	-	-	-	-
CAT-V-bypass -St-gr	-	1.4 / 140	-	0.6 / 60	-	-	-	0.1 / 10
CAT-V-bypass -W-gr	-	0.7 / 70	-	0.06 / 6	-	-	-	0.02 / 2

Table 34: Off site areas / persons affected by evacuation and sheltering for characteristic quantities of the dose distribution, Cadarache, accidental releases, vegetation period, ('evac' = evacuation, 'shelt' = sheltering, '-' means: areas < 0.01 km^2)

scenario (Italian site)	areas (km^2) and persons affected by evacuation and sheltering for various characteristic quantities of the dose distribution							
	max. value		95%-fractile		50%-fractile		mean value	
	evac	shelt	evac	shelt	evac	shelt	evac	shelt
CAT-IV-HTO-gr	-	-	-	-	-	-	-	-
CAT-IV-bypass -St-el								
CAT-IV-bypass -W-el	-	-	-	-	-	-	-	-
CAT-V-bypass -St-gr	-	1.7 / 170	-	0.7 / 70	-	-	-	0.1 / 11
CAT-V-bypass -W-gr	-	1.0 / 103	-	0.1 / 12	-	-	-	0.02 / 2

Table 35: Off site areas / persons affected by evacuation and sheltering for characteristic quantities of the dose distribution, Italian site, accidental releases, vegetation period, Italian site, ('evac' = evacuation, 'shelt' = sheltering, '-' means: areas < 0.01 km^2)

The assessments for the short term countermeasures show that evacuation according to the 50 mSv criteria was not initiated for any of the investigated source terms (see Tables 33 to 35). Sheltering, however, occurred, but only areas of less than 2 km^2 were affected (see Tables 33 to 35). Relocation as a long-term countermeasure was only observed in a considerable quantity for worst case weather conditions and the CAT-V scenario (see Tables 36 to 38). Banning of food products however, was calculated for all scenarios and considerably large areas were found for all the percentiles (see Tables 36 to 38). Tritium is the main contributor to the area which has to be banned for at least one week. For the longer term, the harvest of winter wheat has to be interdicted for the first year on an area which covers about one third of total initial ban area. However, one problem is the application of the present EU criteria for foodbans to tritium as they were initially derived for cesium (see chapter 6).

scenario (Greifswald)	areas (km^2) affected by relocation and food bans for characteristic quantities of the dose/concentration distribution							
	max. value		95%-fractile		50%-fractile		mean value	
	reloc	food	reloc	food	reloc	food	reloc	food
CAT-IV-HTO-gr	-	9160	-	5670	-	2410	-	2889
CAT-IV-St-el	-	3470	-	678	-	208	-	274
CAT-IV-bypass-St-el (without HTO)	-	11900 (355)	-	7570 (129)	-	2680 (3)	-	3083 (23)
CAT-IV-bypass-W-el (without HTO)	-	11900 (349)	-	7570 (105)	-	2680 (2)	-	3083 (18)
CAT-V-bypass -St-gr (without HTO)	2.04	19000 (3120)	-	12100 (585)	-	5920 (240)	0.03	6451 (279)
CAT-V-bypass -W-gr (without HTO)	0.2	19000 (2740)	-	12100 (589)	-	5920 (209)	-	6451 (255)

Table 36: Off site areas affected by relocation and food bans for characteristic quantities of the dose/concentration distribution, Greifswald, accidental release conditions, vegetation period, total area where food bans are initiated ('reloc' = relocation, 'food' = food ban, '-' means: areas < 0.01 km^2)

scenario (Cadarache)	areas (km^2) affected by relocation and food bans for characteristic quantities of the dose/concentration distribution							
	max. value		95%-fractile		50%-fractile		mean value	
	reloc	food	reloc	food	reloc	food	reloc	food
CAT-IV-HTO-gr	-	11200	-	7180	-	3560	-	3540
CAT-IV-St-el	-	3200	-	2000	-	202	-	669
CAT-IV-bypass -St-el (without HTO)	-	16700 (710)	-	11200 (437)	-	3960 (8)	-	4485 (70)
CAT-IV-bypass -W-el (without HTO)	-	16700 (535)	-	11200 (302)	-	3960 (5)	-	4485 (56)
CAT-V-bypass -St-gr (without HTO)	3.8	22000 (3670)	-	17800 (1860)	-	7520 (324)	0.1	8387 (722)
CAT-V-bypass -W-gr (without HTO)	0.2	22000 (3200)	-	17800 (1740)	-	7520 (263)	-	8387 (642)

Table 37: Off site areas affected by relocation and food bans for characteristic quantities of the dose/concentration distribution, Cadarache, accidental release conditions, vegetation period, total area where food bans are initiated ('reloc' = relocation, 'food' = food ban, '-' means: areas < 0.01 km^2)

scenario (Italian site)	areas (km^2) affected by relocation and food bans for characteristic quantities of the dose/concentration distribution							
	max. value		95%-fractile		50%-fractile		mean value	
	reloc	food	reloc	food	reloc	food	reloc	food
CAT-IV-HTO-gr	-	11100	-	5080	-	2270	-	2423
CAT-IV-St-el	0.6	2250	-	661	-	129	-	214
CAT-IV-bypass-St-el (without HTO)	-	11600 (602)	-	7260 (240)	-	2260 (4)	-	3165 (45)
CAT-IV-bypass-W-el (without HTO)	-	11600 (460)	-	7260 (219)	-	2260 (2)	-	3165 (37)
CAT-V-bypass -St-gr (without HTO)	2.3	18300 (3280)	-	12700 (741)	-	4920 (219)	0.03	5738 (319)
CAT-V-bypass-W-gr (without HTO)	0.1	18300 (3100)	-	12700 (741)	-	4920 (209)	-	5738 (293)

Table 38: Off site areas affected by relocation and food bans for characteristic quantities of the dose/concentration distribution, accidental release conditions, Italian site, vegetation period, total area where food bans are initiated ('reloc' = relocation, 'food' = initial food ban, '-' means: areas < 0.01 km^2)

6. Discussion of the site specific calculations

As the public safety is one of the important tasks in licensing ITER, derived dose limits have been published for a generic site recently /ESECS/. Dependent on the event sequence category, ranging from CAT-I ('routine emissions') to CAT-V ('hypothetical sequences'), different calculation criteria, dose limits and types of doses were applied:

- CAT-I: Routine releases: effective dose equivalent, annual dose based on annual averaged weather conditions,
- CAT-IV: Design basis accident: early dose, worst weather conditions and
- CAT-V: Beyond design basis accident: early dose, average weather conditions.

Doses from the routine emissions of the CAT-I scenarios should result in doses which are far below the natural background, e.g. far below 2 mSv/a. Accidental scenarios of the types CAT-IV should in no case exceed an early dose of 50 mSv at the fence of the installation. The 50 mSv value has been selected as it is in accordance with many lower reference levels for evacuation realised in ITER partner countries. CAT-V events are of hypothetical nature and therefore might never be considered in any licensing procedure. However, whenever it is possible to demonstrate that independent of the severity of the accident no major action has to be initiated, the public acceptance might be reached more easily. To this purpose also the initiation of protective measures based on national or international criteria were evaluated for selected scenarios.

Doses from routine releases into the atmosphere and the hydrosphere resulted in rather low doses of less than 1 percent of the natural background of several mSv. For Cadarache and Greifswald, the discharges into aquatic media showed lower doses than the release into the atmosphere. This seems to be partly due to the reduced number of exposure pathways (mostly ingestion) and in particular due to the lower source term.

The accidental site specific assessments showed that early doses from all CAT-IV release scenarios do not exceed the lower reference level of 50 mSv for evacuation at 1 km distance, when compared with the 95 % percentile of the probabilistic calculations. Independent from the selection of a site, the new release limits fit with the proposed dose limits. The dose values for Cadarache and the Italian site are similar; both are in most cases slightly higher than for Greifswald. As observed in earlier investigations /RAS96/ and /RAS97b/, this fact indicates that weather conditions in Southern Europe may contain more worst cases - with respect to radiation dose calculations - than weather in Northern Germany. Weather conditions which may appear only once a year can result in even higher early doses, however these conditions may not be considered in licensing procedures.

The evaluation of the CAT-IV source term which is based on potential accident sequences seems also to be important in terms of the total dose including ingestion. As such a CAT-IV scenario might be used as a design basis accident, none of the potential dose limits of any of the ITER partner countries should be exceeded. However, these dose calculations have to be performed with country specific input parameters, therefore one cannot decide at present whether this analysis is sufficient. As listed in Tables 18, 24 and 30, the total dose including ingestion sums up to about 10 mSv when looking at the 95% percentile which is often used within licensing procedures. However, the maximum values at both sites exceed 50 mSv. Important is to recognise the high contribution of tritium to the EDE when looking at the 95% percentile. This means that the chronic dose without ingestion is lower at least by a factor of four. For the maximum however, the activation products are dominating, thus the chronic dose without ingestion may be lower by only a factor of two to three.

CAT-V releases, which are stated to be hypothetical, showed early dose values of several mSv at 1 km distance when looking at the lower percentiles. Even if recommended to use average weather conditions, a look at the upper percentiles is also interesting. In particular the 50 mSv concept for evacuation is closely reached at the Italian site and at Cadarache whereas only up to the half of this value is found for Greifswald when comparing with the 95% percentiles. This clearly indicates that none of the hypothetical accident sequences should be considered within licensing procedures.

At present, release limits to avoid evacuation are key criteria for ITER. However, other protective actions such as sheltering, relocation and food banning may become important in future. Therefore, source terms which showed highest doses in the potential calculations were evaluated with respect to these protective measures. Only banning of agricultural products was found to be important. Dependent on the scenario, banning affects initially areas of several hundreds of square kilometres and can be as large as 10000 km^2 and more for CAT-IV and CAT-V releases - when evaluating the 95 % percentile of the concentration distribution. Most of these large areas are attributed to tritium and the fact that there exists no special intervention level for food banning for tritium. Therefore, the value of 1250 Bq/kg fresh weight was selected as this value is appropriate for Cs and other long living radionuclides. However, the radiological significance of tritium is much lower than Cs, thus an overestimation of the ban areas cannot be precluded. Nevertheless, also when estimating the CAT-IV limits on dust (steel), initial ban areas of more than 1000 km^2 have been estimated.

As there are no tritium specific rules, the question can be raised whether the present regulations are appropriate for the special radionuclide tritium. The regulation for banning of contaminated food is based on maximum permissible activity concentrations in specific feed and foodstuffs introduced by the European Commission in the year 1987 /EUR87 and EUR89/. All radionuclides are subdivided into the following four groups:

1. Strontium isotopes, in particular Sr-90,
2. Iodine, in particular I-131,
3. Alpha emitters such as plutonium isotopes and transuranium isotopes, in particular Pu-239 and Am-241
4. Longer living nuclides (half-time > 10 days), in particular Cs-134 and Cs-137.

Tritium has to be treated as cesium as it belongs to group four with a half life of more than 10 days. However, due to the lower dose conversion factor and the different time-dependent behaviour of tritium in the environment, this classification might be not appropriate. When comparing with cesium, the dose conversion factor of tritium in HTO form is about 750 times lower. The dose conversion factor for OBT however, is lower by a factor of about 280. Converting this difference in the dose conversion factor into activity concentrations in plants, a permissible concentration level of 750000 Bq/kg wet weight might be assumed. Applying this ban criteria for the present source terms, the areas become very small and do not exceed 100 km^2. Then, only those interdictions caused by the activation products dominate the foodban areas. At present however, activity concentrations in feed- and foodstuffs of day seven after the release were used to be compared with the maximum permissible levels from the EU regulation to estimate the area affected by food banning together with its duration.

This simple example demonstrates that the question of a separate group for tritium has to be discussed in future and further methodological investigations have to be initiated to get a more complete view on the potential risks of tritium contaminated feed- and foodstuffs and how to prevent harm to the public without being too conservative.

As was pointed out in earlier reports /RAS97a and RAS98/, there are factors which may modify the results and which are still not yet finally defined at present. This includes :

- Material composition of the release
- Duration of the release
- Choice of dispersion parameters
- Variability in the weather over a longer period (about 10 years required for German licensing) and the adequacy of the sampling scheme for 144 weather sequences
- Choice of input parameters and targets (child or adult)
- Uncertainties of the mathematical models (parameters and approaches)
- Applicability of the present EU's permissible levels for radionuclide concentrations in feed- and foodstuffs

Most of these parameters can cause an increase as well as a decrease of the expected dose values. Prolonging the release for so called 'worst case weather sequences' reduces the doses for the MEI considerably but shortening of the release will increase it /RAS95/. For probabilistic releases however, investigations about the influence of the release time are still missing. Therefore, to have a first impression, additional calculations have been performed for one release scenario 'CAT-V-bypass -St-gr' and the Italian site. The release duration has been set to 24 hours with the source term distributed uniformly over this time. Within other studies such as SEAFP, release durations vary between 60 and 600 hours, however, these studies were limited to one weather sequence. Due to constraints in computing times and as these calculations are for demonstration purposes only, no further calculations were performed.

The values of the upper percentiles (maximum and 95%) of the early individual doses and the EDE are strongly reduced compared to the one hour release scenario. The other percentiles of the dose distribution (mean and 50%) however are only lower by about a factor of two to three. Evacuation, sheltering and relocation areas beyond the fence of the site of 1 km have been not identified. Thus for the extended release duration banning of food remains the only countermeasure which might be initiated. Applying the present EU-criteria, the initial food ban areas caused by tritium are reduced by a factor of about 2. Those from the release of activation products however increase in particular for the mean, 50% and 95% percentiles by more than a factor of 2. The area from the maximum weather sequence is increased by about 30%.

One + 24 hour release	**characteristic quantities of the dose distribution (Sv)**							
scenario (Italian site)	**max. value**		**95%-fractile**		**50%-fractile**		**mean value**	
	early	**EDE**	**early**	**EDE**	**early**	**EDE**	**early**	**EDE**
CAT-V-bypass-St-gr-24	1.0E-02	2.2E-01	7.4E-03	1.1E-01	2.9E-03	4.3E-02	3.0E-03	5.0E-02
CAT-V-bypass-St-gr-01	*5.1E-02*	*2.0E+00*	*4.6E-02*	*5.9E-01*	*2.6E-03*	*7.1E-02*	*1.3E-02*	*1.9E-01*

Table 39: Comparison of 1 hour and 24 hour release: Characteristic quantities of the individual dose distribution (Sv) for the MEI at the distance of 1000 m for one source term (CAT-V) under accidental release conditions, Italian site, vegetation period

One + 24 hour release	areas (km^2) affected by relocation and food bans for characteristic quantities of the dose/concentration distribution							
scenario (Italian site)	max. value		95%-fractile		50%-fractile		mean value	
	reloc	food	reloc	food	reloc	food	reloc	food
CAT-V-bypass -St-gr-24 (without HTO)	-	10200 (4390)	-	5930 (2450)	-	2590 (603)	-	3136 (941)
CAT-V-bypass -St-gr-01 (without HTO)	*2.3*	*18300 (3280)*	-	*12700 (741)*	-	*4920 (219)*	*0.03*	*5738 (319)*

Table 40: Comparison of 1 hour and 24 hour release: Off site areas affected by relocation and food bans for characteristic quantities of the dose/concentration distribution, Italian site, accidental releases, vegetation period, total area where food bans are initiated ('reloc' = relocation, 'food' = initial food ban, '-' means: areas < 0.01 km^2)

Many of the above mentioned influencing parameters are still open for discussion and, in particular, the final composition of the release material and the duration of the release have to be defined before 'final' dose assessments can be performed.

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APPENDIX A

Probabilistic sampling scheme

The consequences of a postulated release of radioactive material will vary considerably with the conditions pertaining at the time of the accidental release, in particular with the prevailing meteorological conditions, the season, the location and habits of population. For any given release, therefore, there will be a spectrum of possible consequences, each having different probabilities of occurrence determined by the environmental characteristics of the release location and its surroundings. To estimate the full spectrum of consequences of an accidental release a computer code should calculate all possible sequences of weather (a weather sequence is defined by its starting time in the weather record) which may occur during this period. Thus several thousands of different weather sequences had to be considered. In practice, time and computer effort prevent such an action. Therefore, a reduced number of weather sequences representing the full spectrum of atmospheric conditions at the site under consideration had to be selected.

The meteorological record includes (among others) wind speed, wind direction, rainfall and atmospheric stability category in hourly values for a given period (in our example for the whole vegetation period, 4800 hours). For each of the 4800 possible weather sequences the trajectory of the plume will be calculated and evaluated according to the following criteria:

- initial wind direction (12 classes)
    - 12 30° sectors
- travel time T up to the 20 km radius from the release point (3 classes)
    - 0 < T <= 2h
    - 2 h < T <= 5 h
    - T > 5 h
- precipitation I, found during the travel time to reach 20 km (4 classes)
    - I = 0 mm
    - 0 mm < I <=. 1 mm
    - 1 mm < I <=. 3 mm
    - I > 3 mm

In this way 144 different classes of weather conditions are obtained together with their probability of occurrence which will be determined from the number of weather sequences sorted in each class divided by the total number of weather sequences. For the calculations one weather sequence of each class will be chosen randomly. Thus 144 weather sequences with their probability of occurrence may represent the vegetation period, however uncertain due to the chosen sampling scheme.

APPENDIX B - Greifswald

Doses from routine releases (CAT-I)

CAT-I-Cu-elevated, EDE with ingestion (Greifswald)

NO.	NUCLIDE	SUM
	HTO	1.120E+14
8	AR- 41	2.000E+12
16	CR- 51	3.040E+08
20	MN- 54	1.850E+08
21	MN- 56	5.170E+09
23	FE- 55	9.160E+08
27	CO- 57	3.970E+08
29	CO- 58	5.850E+08
30	CO- 60M	4.030E+10
31	CO- 60	2.520E+09
34	NI- 63	4.600E+08
36	CU- 62	8.530E+11
37	CU- 64	1.800E+12
38	CU- 66	5.610E+11
157	TA-182	8.640E+08

RADIUS (KM)	.145	.210	.320	.500	.680	1.000
EDE	9.4E-07	7.3E-07	6.0E-07	6.2E-07	6.6E-07	6.2E-07

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
EDE	4.9E-07	3.8E-07	2.2E-07	1.3E-07	8.2E-08	4.8E-08

RADIUS (KM)	15.000	21.000	32.000	46.000	68.000	100.000
EDE	2.9E-08	2.0E-08	1.3E-08	9.3E-09	6.4E-09	4.3E-09

CAT-I-St-elevated, EDE with ingestion (Greifswald)

NO.	NUCLIDE	SUM
	HTO	1.120E+14
8	AR- 41	2.000E+12
16	CR- 51	9.760E+10
20	MN- 54	1.880E+10
21	MN- 56	3.570E+11
23	FE- 55	1.150E+11
27	CO- 57	2.400E+10
28	CO- 58M	6.440E+10
29	CO- 58	3.940E+10
30	CO- 60M	2.470E+10
31	CO- 60	3.980E+09
75	MO- 99	1.850E+10
80	TC- 99M	1.620E+10

RESULTS ARE CALCULATED FOR THE WHOLE DISTANCE BAND

RADIUS (KM)	.145	.210	.320	.500	.680	1.000
EDE	9.4E-07	7.3E-07	6.2E-07	7.3E-07	8.1E-07	7.8E-07

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
EDE	6.2E-07	4.8E-07	2.7E-07	1.5E-07	9.8E-08	5.7E-08

RADIUS (KM)	15.000	21.000	32.000	46.000	68.000	100.000
EDE	3.3E-08	2.3E-08	1.5E-08	1.1E-08	7.2E-09	4.9E-09

CAT-I-W-elevated, EDE with ingestion (Greifswald)

NO.	NUCLIDE	SUM
	HTO	1.120E+14
8	AR- 41	2.000E+12
16	CR- 51	3.040E+08
20	MN- 54	1.850E+08
21	MN- 56	5.170E+09
23	FE- 55	9.160E+08
27	CO- 57	3.970E+08
29	CO- 58	5.850E+08
31	CO- 60	6.900E+07
90	AG-110	3.230E+08
155	TA-179	1.190E+09
157	TA-182	9.790E+08
159	W -181	1.090E+11
160	W -183M	6.510E+11
161	W -185	2.290E+11
162	W -187	6.410E+11
166	RE-186	2.140E+10
167	RE-188M	6.120E+08
168	RE-188	9.010E+09

RESULTS ARE CALCULATED FOR THE WHOLE DISTANCE BAND

RADIUS (KM)	.145	.210	.320	.500	.680	1.000
MEAN DOSES	9.4E-07	7.3E-07	5.9E-07	6.1E-07	6.3E-07	5.9E-07

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MEAN DOSES	4.7E-07	3.6E-07	2.2E-07	1.2E-07	8.0E-08	4.7E-08

RADIUS (KM)	15.000	21.000	32.000	46.000	68.000	100.000
MEAN DOSES	2.8E-08	1.9E-08	1.3E-08	9.1E-09	6.3E-09	4.2E-09

CAT-I-Cu- ground, EDE in Sv with ingestion (Greifswald)

NO.	NUCLIDE	SUM (Bq)
	HTO	1.120E+14
8	AR- 41	2.000E+12
16	CR- 51	3.040E+08
20	MN- 54	1.850E+08
21	MN- 56	5.170E+09
23	FE- 55	9.160E+08
27	CO- 57	3.970E+08
29	CO- 58	5.850E+08
30	CO- 60M	4.030E+10
31	CO- 60	2.520E+09
34	NI- 63	4.600E+08
36	CU- 62	8.530E+11
37	CU- 64	1.800E+12
38	CU- 66	5.610E+11
157	TA-182	8.640E+08

RESULTS ARE CALCULATED FOR THE WHOLE DISTANCE BAND

RADIUS (KM)	.145	.210	.320	.500	.680	1.000
MEAN DOSES	9.6E-05	5.4E-05	2.7E-05	1.3E-05	7.8E-06	4.1E-06

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MEAN DOSES	2.1E-06	1.3E-06	6.3E-07	3.1E-07	1.9E-07	1.1E-07

RADIUS (KM)	15.000	21.000	32.000	46.000	68.000	100.000
MEAN DOSES	6.2E-08	4.1E-08	2.7E-08	1.9E-08	1.3E-08	8.4E-09

CAT-I-St-ground, EDE in Sv with ingestion (Greifswald)

NO.	NUCLIDE	SUM (Bq)
	HTO	1.120E+14
8	AR- 41	2.000E+12
16	CR- 51	9.760E+10
20	MN- 54	1.880E+10
21	MN- 56	3.570E+11
23	FE- 55	1.150E+11
27	CO- 57	2.400E+10
28	CO- 58M	6.440E+10
29	CO- 58	3.940E+10
30	CO- 60M	2.470E+10
31	CO- 60	3.980E+09
75	MO- 99	1.850E+10
80	TC- 99M	1.620E+10

RESULTS ARE CALCULATED FOR THE WHOLE DISTANCE BAND

RADIUS (KM)	.145	.210	.320	.500	.680	1.000
MEAN DOSES	1.2E-04	6.8E-05	3.4E-05	1.6E-05	9.7E-06	5.1E-06

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MEAN DOSES	2.6E-06	1.6E-06	7.6E-07	3.7E-07	2.3E-07	1.3E-07

RADIUS (KM)	15.000	21.000	32.000	46.000	68.000	100.000
MEAN DOSES	7.2E-08	4.7E-08	3.1E-08	2.1E-08	1.4E-08	9.6E-09

CAT-I-W-ground, EDE in Sv with ingestion (Greifswald)

NO.	NUCLIDE	SUM (Bq)
	HTO	1.120E+14
8	AR- 41	2.000E+12
16	CR- 51	3.040E+08
20	MN- 54	1.850E+08
21	MN- 56	5.170E+09
23	FE- 55	9.160E+08
27	CO- 57	3.970E+08
29	CO- 58	5.850E+08
31	CO- 60	6.900E+07
90	AG-110	3.230E+08
155	TA-179	1.190E+09
157	TA-182	9.790E+08
159	W -181	1.090E+11
160	W -183M	6.510E+11
161	W -185	2.290E+11
162	W -187	6.410E+11
166	RE-186	2.140E+10
167	RE-188M	6.120E+08
168	RE-188	9.010E+09

RESULTS ARE CALCULATED FOR THE WHOLE DISTANCE BAND

RADIUS (KM)	.145	.210	.320	.500	.680	1.000
MEAN DOSES	9.2E-05	5.2E-05	2.6E-05	1.2E-05	7.5E-06	4.0E-06

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MEAN DOSES	2.1E-06	1.3E-06	6.1E-07	3.0E-07	1.9E-07	1.1E-07

RADIUS (KM)	15.000	21.000	32.000	46.000	68.000	100.000
MEAN DOSES	6.1E-08	4.1E-08	2.6E-08	1.8E-08	1.2E-08	8.2E-09

Probabilistic potential doses from source terms of case 2 (release limits)

CAT-IV-HTO-elevated, early dose (Greifswald)

NO.	NUCLIDE	SUM
1	HTO	3.70000E+16

RADIUS (KM)	0.145	0.210	0.320	0.500	0.680	1.000
MAX. DOSES	1.1E-02	1.1E-02	1.1E-02	7.7E-03	8.3E-03	6.9E-03
FRACTILE 99.0	9.8E-04	7.9E-04	2.1E-03	2.3E-03	2.1E-03	4.1E-03
FRACTILE 95.0	6.3E-05	1.0E-04	5.5E-04	1.0E-03	1.2E-03	1.4E-03
FRACTILE 90.0	2.0E-05	6.6E-05	4.2E-04	8.7E-04	1.0E-03	9.8E-04
FRACTILE 50.0	2.3E-07	4.6E-07	5.9E-05	3.0E-04	5.0E-04	6.2E-04
MEAN DOSES	3.2E-05	5.3E-05	1.7E-04	3.8E-04	5.5E-04	7.2E-04

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	7.5E-03	8.1E-03	5.2E-03	3.3E-03	2.2E-03	1.2E-03
FRACTILE 99	7.5E-03	7.6E-03	4.0E-03	1.9E-03	1.5E-03	8.7E-04
FRACTILE 95	1.6E-03	1.7E-03	1.4E-03	9.5E-04	6.0E-04	3.4E-04
FRACTILE 90	1.4E-03	1.5E-03	1.2E-03	7.2E-04	4.6E-04	2.6E-04
FRACTILE 50	5.4E-04	4.3E-04	2.5E-04	1.6E-04	9.5E-05	5.5E-05
MEAN DOSES	7.9E-04	6.9E-04	4.3E-04	2.7E-04	1.7E-04	1.0E-04

CAT-IV-HTO-elevated, EDE, with ingestion (Greifswald)

RADIUS (KM)	0.145	0.210	0.320	0.500	0.680	1.000
MAX. DOSES	5.9E-01	4.9E-01	3.2E-01	2.2E-01	1.7E-01	1.1E-01
FRACTILE 99	5.6E-02	4.9E-02	5.5E-02	4.1E-02	3.3E-02	2.8E-02
FRACTILE 95	1.3E-02	1.1E-02	1.4E-02	2.1E-02	2.3E-02	1.9E-02
FRACTILE 90	3.9E-03	5.4E-03	8.7E-03	1.5E-02	1.7E-02	1.6E-02
FRACTILE 50	2.3E-06	6.3E-06	4.8E-04	2.6E-03	4.3E-03	5.0E-03
MEAN DOSES	3.2E-03	3.0E-03	3.8E-03	5.9E-03	7.2E-03	7.6E-03

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	6.5E-02	4.3E-02	3.6E-02	1.0E-02	7.0E-03	5.2E-03
FRACTILE 99	2.1E-02	1.6E-02	1.0E-02	6.6E-03	4.6E-03	3.6E-03
FRACTILE 95	1.5E-02	1.2E-02	8.5E-03	5.4E-03	3.1E-03	2.1E-03
FRACTILE 90	1.3E-02	1.1E-02	6.5E-03	4.4E-03	2.7E-03	1.7E-03
FRACTILE 50	6.3E-03	4.9E-03	3.0E-03	1.9E-03	1.1E-03	6.0E-04
MEAN DOSES	6.7E-03	5.5E-03	3.4E-03	2.2E-03	1.3E-03	7.8E-04

CAT-IV-HTO-ground, early dose (Greifswald)

NO.	NUCLIDE	SUM
1	HTO	3.70000E+15

RADIUS (KM)	0.145	0.210	0.320	0.500	0.680	1.000
MAX. DOSES	2.5E-02	2.4E-02	1.7E-02	1.2E-02	8.5E-03	5.3E-03
FRACTILE 99.0	2.5E-02	2.4E-02	1.7E-02	1.2E-02	8.5E-03	5.3E-03
FRACTILE 95.0	1.4E-02	1.3E-02	9.5E-03	6.5E-03	4.7E-03	2.9E-03
FRACTILE 90.0	1.3E-02	1.2E-02	8.5E-03	5.8E-03	4.2E-03	2.6E-03
FRACTILE 50.0	2.8E-03	2.5E-03	1.5E-03	8.9E-04	5.9E-04	3.5E-04
MEAN DOSES	4.5E-03	4.0E-03	2.6E-03	1.7E-03	1.2E-03	7.2E-04

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	3.1E-03	2.0E-03	9.1E-04	5.2E-04	3.5E-04	2.1E-04
FRACTILE 99.0	3.1E-03	1.9E-03	6.9E-04	5.2E-04	2.6E-04	7.4E-05
FRACTILE 95.0	1.7E-03	1.1E-03	5.0E-04	2.4E-04	1.0E-04	4.7E-05
FRACTILE 90.0	1.5E-03	9.1E-04	4.0E-04	1.4E-04	6.5E-05	2.6E-05
FRACTILE 50.0	1.9E-04	1.2E-04	5.9E-05	3.2E-05	1.7E-05	9.3E-06
MEAN DOSES	4.1E-04	2.5E-04	1.2E-04	6.1E-05	3.1E-05	1.5E-05

CAT-IV-HTO-ground, EDE, with ingestion (Greifswald)

RADIUS (KM)	0.145	0.210	0.320	0.500	0.680	1.000
MAX. DOSES	1.3E-01	1.1E-01	6.8E-02	4.5E-02	3.2E-02	2.0E-02
FRACTILE 99.0	9.8E-02	8.3E-02	5.9E-02	4.1E-02	3.0E-02	1.8E-02
FRACTILE 95.0	7.4E-02	6.6E-02	4.6E-02	3.1E-02	2.2E-02	1.3E-02
FRACTILE 90.0	6.8E-02	6.2E-02	4.1E-02	2.8E-02	1.9E-02	1.2E-02
FRACTILE 50.0	3.5E-02	3.0E-02	1.7E-02	9.3E-03	6.3E-03	3.6E-03
MEAN DOSES	3.5E-02	3.1E-02	1.9E-02	1.2E-02	8.3E-03	5.0E-03

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	1.5E-02	7.4E-03	4.3E-03	2.2E-03	2.1E-03	6.2E-04
FRACTILE 99.0	1.0E-02	6.8E-03	3.5E-03	2.2E-03	9.3E-04	4.1E-04
FRACTILE 95.0	7.6E-03	4.9E-03	2.3E-03	1.1E-03	5.6E-04	3.3E-04
FRACTILE 90.0	6.8E-03	4.2E-03	1.9E-03	9.5E-04	5.2E-04	2.9E-04
FRACTILE 50.0	2.0E-03	1.3E-03	6.5E-04	3.7E-04	1.9E-04	1.0E-04
MEAN DOSES	2.8E-03	1.8E-03	8.6E-04	4.7E-04	2.5E-04	1.3E-04

CAT-IV-HT-elevated, early dose (Greifswald)

NO.	NUCLIDE	SUM
1	HT	1.11000E+18

RADIUS (KM)	0.145	0.210	0.320	0.500	0.680	1.000
MAX. DOSES	8.0E-04	9.1E-04	9.6E-04	9.4E-04	7.2E-04	5.8E-04
FRACTILE 99.0	8.1E-05	8.7E-05	1.4E-04	2.1E-04	2.3E-04	2.2E-04
FRACTILE 95.0	1.2E-05	1.3E-05	2.6E-05	6.2E-05	1.0E-04	1.0E-04
FRACTILE 90.0	8.5E-06	9.8E-06	2.0E-05	5.8E-05	8.1E-05	7.8E-05
FRACTILE 50.0	5.0E-07	6.0E-07	2.0E-06	1.1E-05	2.5E-05	3.8E-05
MEAN DOSES	4.1E-06	4.8E-06	1.0E-05	2.4E-05	3.9E-05	4.5E-05

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	5.2E-04	4.5E-04	3.7E-04	2.4E-04	2.4E-04	1.5E-04
FRACTILE 99.0	3.7E-04	3.9E-04	2.4E-04	1.4E-04	1.1E-04	6.8E-05
FRACTILE 95.0	1.3E-04	1.1E-04	7.6E-05	6.9E-05	3.9E-05	2.4E-05
FRACTILE 90.0	8.5E-05	8.7E-05	5.0E-05	4.3E-05	2.3E-05	1.4E-05
FRACTILE 50.0	4.5E-05	4.3E-05	2.6E-05	1.9E-05	1.1E-05	6.0E-06
MEAN DOSES	5.3E-05	5.3E-05	3.2E-05	2.4E-05	1.5E-05	8.6E-06

CAT-IV-HT-elevated, EDE, with ingestion (Greifswald)

RADIUS (KM)	0.145	0.210	0.320	0.500	0.680	1.000
MAX. DOSES	6.5E-02	8.7E-02	9.5E-02	9.4E-02	1.0E-01	8.5E-02
FRACTILE 99.0	2.7E-03	6.8E-03	2.0E-02	2.4E-02	1.9E-02	3.9E-02
FRACTILE 95.0	2.1E-04	4.2E-04	4.7E-03	9.5E-03	1.1E-02	1.4E-02
FRACTILE 90.0	1.6E-04	3.0E-04	3.7E-03	7.4E-03	7.9E-03	9.5E-03
FRACTILE 50.0	4.6E-06	6.3E-06	5.5E-04	2.5E-03	4.0E-03	6.2E-03
MEAN DOSES	2.2E-04	3.8E-04	1.5E-03	3.4E-03	5.0E-03	6.6E-03

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	8.4E-02	7.7E-02	5.4E-02	3.0E-02	2.2E-02	1.2E-02
FRACTILE 99.0	7.1E-02	7.1E-02	4.0E-02	1.6E-02	1.8E-02	1.1E-02
FRACTILE 95.0	1.8E-02	2.0E-02	1.5E-02	9.3E-03	6.2E-03	3.7E-03
FRACTILE 90.0	1.3E-02	1.4E-02	1.1E-02	7.8E-03	4.9E-03	2.7E-03
FRACTILE 50.0	4.7E-03	3.5E-03	2.3E-03	1.5E-03	8.7E-04	5.0E-04
MEAN DOSES	7.4E-03	6.5E-03	4.1E-03	2.6E-03	1.6E-03	9.8E-04

CAT-IV-HT-ground, early dose (Greifswald)

1 HT 1.11000E+17

RADIUS (KM)	0.145	0.210	0.320	0.500	0.680	1.000
MAX. DOSES	1.5E-03	1.2E-03	9.7E-04	8.0E-04	6.6E-04	4.2E-04
FRACTILE 99.0	5.6E-04	1.0E-03	7.8E-04	6.3E-04	5.5E-04	3.4E-04
FRACTILE 95.0	2.5E-04	4.2E-04	3.8E-04	3.7E-04	2.8E-04	1.7E-04
FRACTILE 90.0	1.6E-04	2.5E-04	2.3E-04	2.1E-04	1.7E-04	1.1E-04
FRACTILE 50.0	4.8E-05	1.2E-04	8.5E-05	6.5E-05	5.0E-05	3.0E-05
MEAN DOSES	7.6E-05	1.4E-04	1.3E-04	1.0E-04	8.2E-05	5.1E-05

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	2.7E-04	1.6E-04	8.8E-05	5.0E-05	3.5E-05	2.2E-05
FRACTILE 99.0	2.2E-04	1.4E-04	6.0E-05	3.6E-05	2.6E-05	1.1E-05
FRACTILE 95.0	1.3E-04	9.3E-05	3.7E-05	2.8E-05	1.4E-05	6.6E-06
FRACTILE 90.0	6.8E-05	4.9E-05	2.6E-05	1.3E-05	6.9E-06	3.6E-06
FRACTILE 50.0	1.9E-05	1.4E-05	7.1E-06	4.8E-06	2.8E-06	1.4E-06
MEAN DOSES	3.3E-05	2.3E-05	1.1E-05	6.9E-06	3.9E-06	2.0E-06

CAT-IV-HT-ground, EDE, with ingestion (Greifswald)

RADIUS (KM)	0.145	0.210	0.320	0.500	0.680	1.000
MAX. DOSES	2.8E-01	2.6E-01	1.9E-01	1.3E-01	9.8E-02	6.1E-02
FRACTILE 99.0	2.6E-01	2.4E-01	1.8E-01	1.2E-01	8.9E-02	5.6E-02
FRACTILE 95.0	1.7E-01	1.5E-01	1.1E-01	7.9E-02	5.9E-02	3.7E-02
FRACTILE 90.0	1.2E-01	1.1E-01	7.9E-02	5.5E-02	4.0E-02	2.6E-02
FRACTILE 50.0	2.6E-02	2.1E-02	1.2E-02	7.2E-03	4.9E-03	2.9E-03
MEAN DOSES	4.2E-02	3.8E-02	2.5E-02	1.7E-02	1.2E-02	7.3E-03

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	3.6E-02	2.0E-02	1.0E-02	7.6E-03	4.2E-03	2.5E-03
FRACTILE 99.0	3.3E-02	1.7E-02	9.3E-03	7.6E-03	2.6E-03	1.0E-03
FRACTILE 95.0	2.2E-02	1.3E-02	5.8E-03	3.2E-03	1.3E-03	5.5E-04
FRACTILE 90.0	1.5E-02	1.0E-02	4.1E-03	1.5E-03	9.5E-04	4.9E-04
FRACTILE 50.0	1.7E-03	1.1E-03	5.5E-04	3.2E-04	1.8E-04	9.3E-05
MEAN DOSES	4.2E-03	2.6E-03	1.2E-03	6.7E-04	3.4E-04	1.7E-04

CAT-IV-Cu-elevated, early dose (Greifswald)

NO.	NUCLIDE	SUM
30	CO- 60M	1.610E+13
31	CO- 60	9.810E+11
34	NI- 63	1.840E+11
36	CU- 62	3.410E+14
37	CU- 64	7.220E+14
38	CU- 66	2.240E+14
157	TA-182	3.460E+11

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	4.1E-02	3.4E-02	2.0E-02	1.4E-02	9.4E-03	5.9E-03
FRACTILE 99.0	2.6E-03	2.2E-03	2.1E-03	1.7E-03	1.3E-03	9.5E-04
FRACTILE 95.0	4.8E-04	4.6E-04	5.2E-04	4.5E-04	3.8E-04	4.7E-04
FRACTILE 90.0	1.9E-04	1.7E-04	3.0E-04	2.7E-04	2.8E-04	2.2E-04
FRACTILE 50.0	3.5E-05	3.4E-05	5.6E-05	7.6E-05	1.1E-04	1.2E-04
MEAN DOSES	1.6E-04	1.5E-04	1.7E-04	1.6E-04	1.7E-04	1.7E-04

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	3.2E-03	2.0E-03	1.6E-03	7.1E-04	9.2E-04	3.1E-04
FRACTILE 99.0	1.2E-03	1.1E-03	5.5E-04	2.9E-04	3.4E-04	1.9E-04
FRACTILE 95.0	4.9E-04	3.3E-04	2.3E-04	1.5E-04	1.2E-04	8.1E-05
FRACTILE 90.0	2.8E-04	2.8E-04	2.0E-04	1.4E-04	9.3E-05	5.2E-05
FRACTILE 50.0	9.8E-05	7.2E-05	4.3E-05	2.6E-05	1.4E-05	7.9E-06
MEAN DOSES	1.6E-04	1.3E-04	7.8E-05	4.9E-05	3.4E-05	1.9E-05

CAT-IV-Cu-elevated, EDE with ingestion (Greifswald)

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	1.2E+00	1.0E+00	6.1E-01	4.3E-01	2.8E-01	1.8E-01
FRACTILE 99.0	7.8E-02	6.5E-02	6.5E-02	4.9E-02	3.5E-02	2.6E-02
FRACTILE 95.0	1.3E-02	1.1E-02	1.1E-02	9.1E-03	6.8E-03	5.1E-03
FRACTILE 90.0	2.8E-03	3.7E-03	2.9E-03	2.7E-03	2.2E-03	3.1E-03
FRACTILE 50.0	3.5E-05	3.5E-05	1.2E-04	3.4E-04	6.5E-04	7.9E-04
MEAN DOSES	4.0E-03	3.4E-03	2.9E-03	2.4E-03	2.1E-03	1.9E-03

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	9.8E-02	6.0E-02	4.9E-02	2.1E-02	1.7E-02	9.9E-03
FRACTILE 99.0	1.9E-02	1.5E-02	7.2E-03	5.1E-03	6.9E-03	2.3E-03
FRACTILE 95.0	7.2E-03	5.6E-03	3.7E-03	2.2E-03	1.9E-03	1.2E-03
FRACTILE 90.0	2.6E-03	2.1E-03	1.7E-03	1.2E-03	7.9E-04	5.4E-04
FRACTILE 50.0	6.6E-04	5.1E-04	3.0E-04	1.9E-04	1.1E-04	6.2E-05
MEAN DOSES	1.6E-03	1.3E-03	8.1E-04	5.3E-04	4.1E-04	2.3E-04

CAT-IV-Cu-ground, early dose (Greifswald)

NO.	NUCLIDE	SUM
30	CO- 60M	1.610E+12
31	CO- 60	9.810E+10
34	NI- 63	1.840E+10
36	CU- 62	3.410E+13
37	CU- 64	7.220E+13
38	CU- 66	2.240E+13
157	TA-182	3.460E+10

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	6.6E-03	5.5E-03	3.2E-03	2.1E-03	1.3E-03	8.4E-04
FRACTILE 99.0	3.7E-03	3.5E-03	2.5E-03	1.9E-03	1.2E-03	7.6E-04
FRACTILE 95.0	2.2E-03	2.0E-03	1.4E-03	1.1E-03	7.2E-04	4.5E-04
FRACTILE 90.0	1.9E-03	1.8E-03	1.3E-03	9.8E-04	6.6E-04	4.2E-04
FRACTILE 50.0	4.3E-04	3.6E-04	2.2E-04	1.4E-04	9.1E-05	5.4E-05
MEAN DOSES	7.0E-04	6.2E-04	4.1E-04	2.9E-04	1.9E-04	1.2E-04

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	7.3E-04	3.5E-04	2.3E-04	8.7E-05	9.3E-05	6.2E-05
FRACTILE 99.0	4.5E-04	2.8E-04	1.7E-04	8.7E-05	3.8E-05	3.4E-05
FRACTILE 95.0	2.6E-04	1.7E-04	8.3E-05	5.1E-05	2.4E-05	1.1E-05
FRACTILE 90.0	2.4E-04	1.5E-04	6.3E-05	2.6E-05	1.4E-05	7.9E-06
FRACTILE 50.0	3.0E-05	2.0E-05	9.8E-06	5.5E-06	3.0E-06	1.7E-06
MEAN DOSES	6.8E-05	4.2E-05	2.1E-05	1.1E-05	5.6E-06	3.4E-06

CAT-IV-Cu-ground, EDE with ingestion (Greifswald)

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	1.6E-01	1.4E-01	8.5E-02	5.8E-02	3.5E-02	2.3E-02
FRACTILE 99.0	3.2E-02	2.9E-02	2.1E-02	1.5E-02	1.0E-02	6.5E-03
FRACTILE 95.0	1.9E-02	1.7E-02	1.3E-02	9.3E-03	6.8E-03	4.4E-03
FRACTILE 90.0	1.6E-02	1.5E-02	1.1E-02	8.1E-03	5.4E-03	3.6E-03
FRACTILE 50.0	3.4E-03	3.0E-03	1.7E-03	1.1E-03	6.8E-04	4.0E-04
MEAN DOSES	6.2E-03	5.5E-03	3.6E-03	2.6E-03	1.7E-03	1.1E-03

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	2.0E-02	1.0E-02	5.0E-03	2.5E-03	2.8E-03	9.6E-04
FRACTILE 99.0	4.1E-03	2.8E-03	2.5E-03	1.0E-03	7.8E-04	6.6E-04
FRACTILE 95.0	2.5E-03	1.7E-03	8.9E-04	6.6E-04	2.8E-04	2.6E-04
FRACTILE 90.0	2.1E-03	1.4E-03	6.6E-04	3.6E-04	1.4E-04	1.0E-04
FRACTILE 50.0	2.2E-04	1.4E-04	7.2E-05	4.2E-05	2.3E-05	1.3E-05
MEAN DOSES	6.4E-04	4.0E-04	2.2E-04	1.3E-04	6.8E-05	4.8E-05

CAT-IV-St-elevated, early dose (Greifswald)

NO.	NUCLIDE	SUM
16	CR- 51	3.890E+13
20	MN- 54	7.450E+12
21	MN- 56	1.410E+14
23	FE- 55	4.580E+13
27	CO- 57	9.450E+12
28	CO- 58M	2.580E+13
29	CO- 58	1.550E+13
30	CO- 60M	9.860E+12
31	CO- 60	1.560E+12
75	MO- 99	7.400E+12
80	TC- 99M	6.470E+12

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	6.7E-02	5.5E-02	3.3E-02	2.3E-02	1.6E-02	9.8E-03
FRACTILE 99.0	4.2E-03	3.5E-03	3.5E-03	2.6E-03	2.0E-03	1.5E-03
FRACTILE 95.0	7.2E-04	6.9E-04	7.8E-04	6.3E-04	5.1E-04	6.5E-04
FRACTILE 90.0	3.0E-04	2.5E-04	3.6E-04	3.4E-04	3.9E-04	3.2E-04
FRACTILE 50.0	2.0E-05	2.0E-05	4.0E-05	7.4E-05	1.3E-04	1.5E-04
MEAN DOSES	2.4E-04	2.1E-04	2.1E-04	2.1E-04	2.2E-04	2.3E-04

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	5.4E-03	3.3E-03	2.7E-03	1.2E-03	1.5E-03	5.3E-04
FRACTILE 99.0	1.9E-03	1.7E-03	8.5E-04	4.6E-04	5.5E-04	2.9E-04
FRACTILE 95.0	7.6E-04	4.9E-04	3.5E-04	2.4E-04	1.8E-04	1.3E-04
FRACTILE 90.0	3.7E-04	4.0E-04	3.0E-04	2.1E-04	1.4E-04	8.3E-05
FRACTILE 50.0	1.3E-04	9.8E-05	6.0E-05	3.8E-05	2.2E-05	1.2E-05
MEAN DOSES	2.2E-04	1.9E-04	1.1E-04	7.2E-05	5.2E-05	3.0E-05

CAT-IV-St-elevated, EDE with ingestion (Greifswald)

RESULTS ARE CALCULATED FOR THE WHOLE DISTANCE BAND

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	4.8E+00	4.0E+00	2.4E+00	1.7E+00	1.1E+00	6.8E-01
FRACTILE 99.0	1.0E-01	1.0E-01	1.0E-01	1.0E-01	1.0E-01	1.0E-01
FRACTILE 95.0	5.1E-02	4.3E-02	4.2E-02	3.3E-02	2.6E-02	1.9E-02
FRACTILE 90.0	9.5E-03	1.3E-02	1.1E-02	9.5E-03	7.8E-03	1.1E-02
FRACTILE 50.0	2.1E-05	2.1E-05	3.0E-04	1.1E-03	2.2E-03	2.8E-03
MEAN DOSES	1.6E-02	1.3E-02	1.1E-02	9.1E-03	7.8E-03	7.0E-03

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	3.8E-01	2.3E-01	1.9E-01	8.3E-02	6.5E-02	3.8E-02
FRACTILE 99.0	7.2E-02	5.6E-02	2.8E-02	1.9E-02	2.6E-02	9.1E-03
FRACTILE 95.0	2.8E-02	2.2E-02	1.4E-02	8.3E-03	7.1E-03	4.8E-03
FRACTILE 90.0	1.0E-02	7.9E-03	6.2E-03	4.5E-03	2.9E-03	1.9E-03
FRACTILE 50.0	2.3E-03	1.9E-03	1.1E-03	6.8E-04	4.0E-04	2.2E-04
MEAN DOSES	6.1E-03	4.9E-03	3.0E-03	2.0E-03	1.6E-03	8.7E-04

CAT-IV-St-ground, early dose (Greifswald)

NO.	NUCLIDE	SUM
16	CR- 51	3.890E+12
20	MN- 54	7.450E+11
21	MN- 56	1.410E+13
23	FE- 55	4.580E+12
27	CO- 57	9.450E+11
28	CO- 58M	2.580E+12
29	CO- 58	1.550E+12
30	CO- 60M	9.860E+11
31	CO- 60	1.560E+11
75	MO- 99	7.400E+11
80	TC- 99M	6.470E+11

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	1.1E-02	8.9E-03	5.2E-03	3.4E-03	2.1E-03	1.4E-03
FRACTILE 99.0	5.5E-03	5.1E-03	3.7E-03	2.8E-03	1.9E-03	1.2E-03
FRACTILE 95.0	3.3E-03	3.0E-03	2.1E-03	1.6E-03	1.1E-03	6.8E-04
FRACTILE 90.0	2.8E-03	2.6E-03	1.9E-03	1.4E-03	9.8E-04	6.2E-04
FRACTILE 50.0	6.0E-04	5.2E-04	3.1E-04	2.0E-04	1.2E-04	7.4E-05
MEAN DOSES	1.0E-03	9.0E-04	5.9E-04	4.2E-04	2.8E-04	1.7E-04

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	1.2E-03	5.8E-04	3.6E-04	1.4E-04	1.6E-04	1.0E-04
FRACTILE 99.0	6.9E-04	4.3E-04	2.8E-04	1.4E-04	6.0E-05	5.8E-05
FRACTILE 95.0	4.0E-04	2.7E-04	1.3E-04	7.9E-05	3.7E-05	1.9E-05
FRACTILE 90.0	3.6E-04	2.4E-04	1.0E-04	4.0E-05	2.2E-05	1.2E-05
FRACTILE 50.0	4.2E-05	2.8E-05	1.4E-05	8.3E-06	4.6E-06	2.6E-06
MEAN DOSES	1.0E-04	6.4E-05	3.3E-05	1.7E-05	8.9E-06	5.4E-06

CAT-IV-St-ground, EDE with ingestion (Greifswald)

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	6.3E-01	5.4E-01	3.3E-01	2.2E-01	1.4E-01	9.0E-02
FRACTILE 99.0	1.0E-01	1.0E-01	7.8E-02	5.8E-02	3.8E-02	2.4E-02
FRACTILE 95.0	7.2E-02	6.6E-02	4.7E-02	3.5E-02	2.5E-02	1.6E-02
FRACTILE 90.0	5.9E-02	5.5E-02	4.0E-02	3.0E-02	2.0E-02	1.3E-02
FRACTILE 50.0	1.3E-02	1.1E-02	6.2E-03	4.1E-03	2.5E-03	1.4E-03
MEAN DOSES	2.3E-02	2.0E-02	1.3E-02	9.5E-03	6.3E-03	3.9E-03

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	7.9E-02	4.0E-02	1.9E-02	9.7E-03	1.1E-02	3.6E-03
FRACTILE 99.0	1.5E-02	1.1E-02	9.3E-03	3.9E-03	3.0E-03	2.6E-03
FRACTILE 95.0	9.1E-03	6.0E-03	3.3E-03	2.4E-03	1.1E-03	1.0E-03
FRACTILE 90.0	7.8E-03	5.1E-03	2.5E-03	1.3E-03	5.6E-04	4.0E-04
FRACTILE 50.0	7.9E-04	5.2E-04	2.6E-04	1.5E-04	8.5E-05	4.9E-05
MEAN DOSES	2.4E-03	1.5E-03	8.3E-04	4.7E-04	2.5E-04	1.8E-04

CAT-IV-W-elevated, early dose (Greifswald)

NO.	NUCLIDE	SUM
90	AG-110	1.290E+11
155	TA-179	4.750E+11
157	TA-182	3.920E+11
159	W -181	4.340E+13
160	W -183M	2.600E+14
161	W -185	9.180E+13
162	W -187	2.560E+14
166	RE-186	8.570E+12
167	RE-188M	2.450E+11
168	RE-188	3.600E+12

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	5.9E-02	4.9E-02	2.9E-02	2.0E-02	1.3E-02	8.4E-03
FRACTILE 99.0	3.7E-03	3.1E-03	3.1E-03	2.3E-03	1.7E-03	1.3E-03
FRACTILE 95.0	6.3E-04	5.4E-04	5.4E-04	4.7E-04	3.8E-04	4.8E-04
FRACTILE 90.0	2.3E-04	2.2E-04	2.0E-04	2.1E-04	1.9E-04	1.9E-04
FRACTILE 50.0	8.7E-06	8.7E-06	1.7E-05	3.0E-05	5.1E-05	6.2E-05
MEAN DOSES	2.0E-04	1.7E-04	1.6E-04	1.3E-04	1.3E-04	1.2E-04

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	4.7E-03	2.8E-03	2.3E-03	1.0E-03	9.5E-04	4.6E-04
FRACTILE 99.0	8.9E-04	7.9E-04	4.6E-04	3.2E-04	3.7E-04	1.4E-04
FRACTILE 95.0	4.0E-04	3.2E-04	1.9E-04	1.3E-04	1.1E-04	6.3E-05
FRACTILE 90.0	1.6E-04	1.6E-04	1.3E-04	9.3E-05	6.5E-05	3.9E-05
FRACTILE 50.0	5.1E-05	4.1E-05	2.5E-05	1.5E-05	9.1E-06	5.2E-06
MEAN DOSES	1.1E-04	8.8E-05	5.5E-05	3.5E-05	2.7E-05	1.5E-05

CAT-IV-W-elevated, EDE with ingestion (Greifswald)

RESULTS ARE CALCULATED FOR THE WHOLE DISTANCE BAND

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	9.8E-01	8.1E-01	4.8E-01	3.3E-01	2.2E-01	1.4E-01
FRACTILE 99.0	6.0E-02	5.1E-02	5.1E-02	3.8E-02	2.8E-02	2.0E-02
FRACTILE 95.0	1.0E-02	8.7E-03	8.5E-03	6.8E-03	5.2E-03	3.8E-03
FRACTILE 90.0	1.9E-03	2.7E-03	2.2E-03	1.9E-03	1.6E-03	2.3E-03
FRACTILE 50.0	8.7E-06	8.7E-06	6.6E-05	2.3E-04	4.6E-04	5.8E-04
MEAN DOSES	3.1E-03	2.7E-03	2.3E-03	1.9E-03	1.6E-03	1.4E-03

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	7.7E-02	4.7E-02	3.8E-02	1.7E-02	1.3E-02	7.8E-03
FRACTILE 99.0	1.5E-02	1.1E-02	5.8E-03	4.0E-03	5.4E-03	1.8E-03
FRACTILE 95.0	5.6E-03	4.4E-03	2.8E-03	1.7E-03	1.5E-03	9.5E-04
FRACTILE 90.0	2.0E-03	1.6E-03	1.3E-03	9.1E-04	5.9E-04	4.0E-04
FRACTILE 50.0	4.8E-04	3.8E-04	2.2E-04	1.4E-04	8.1E-05	4.7E-05
MEAN DOSES	1.2E-03	9.9E-04	6.1E-04	4.0E-04	3.2E-04	1.8E-04

CAT-IV-W-ground, early dose (Greifswald)

NO.	NUCLIDE	SUM
90	AG-110	1.290E+10
155	TA-179	4.750E+10
157	TA-182	3.920E+10
159	W -181	4.340E+12
160	W -183M	2.600E+13
161	W -185	9.180E+12
162	W -187	2.560E+13
166	RE-186	8.570E+11
167	RE-188M	2.450E+10
168	RE-188	3.600E+11

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	8.1E-03	6.9E-03	4.1E-03	2.8E-03	1.7E-03	1.1E-03
FRACTILE 99.0	2.2E-03	2.1E-03	1.5E-03	1.1E-03	7.6E-04	4.8E-04
FRACTILE 95.0	1.3E-03	1.2E-03	8.9E-04	6.8E-04	4.7E-04	3.2E-04
FRACTILE 90.0	1.1E-03	1.0E-03	7.8E-04	5.8E-04	3.9E-04	2.5E-04
FRACTILE 50.0	2.5E-04	2.1E-04	1.2E-04	8.1E-05	5.0E-05	3.0E-05
MEAN DOSES	4.2E-04	3.8E-04	2.5E-04	1.8E-04	1.2E-04	7.5E-05

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	9.8E-04	4.9E-04	2.4E-04	1.2E-04	1.3E-04	5.7E-05
FRACTILE 99.0	2.8E-04	1.9E-04	1.5E-04	5.8E-05	3.6E-05	3.5E-05
FRACTILE 95.0	1.9E-04	1.2E-04	6.9E-05	4.3E-05	1.8E-05	1.3E-05
FRACTILE 90.0	1.5E-04	1.0E-04	4.7E-05	2.1E-05	1.0E-05	5.6E-06
FRACTILE 50.0	1.7E-05	1.1E-05	5.8E-06	3.4E-06	1.9E-06	1.1E-06
MEAN DOSES	4.5E-05	2.8E-05	1.5E-05	8.4E-06	4.5E-06	2.9E-06

CAT-IV-W-ground, EDE with ingestion (Greifswald)

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	1.3E-01	1.1E-01	6.6E-02	4.5E-02	2.8E-02	1.8E-02
FRACTILE 99.0	2.3E-02	2.2E-02	1.6E-02	1.2E-02	7.8E-03	4.9E-03
FRACTILE 95.0	1.5E-02	1.3E-02	9.3E-03	7.2E-03	5.0E-03	3.2E-03
FRACTILE 90.0	1.2E-02	1.1E-02	8.1E-03	6.0E-03	4.1E-03	2.7E-03
FRACTILE 50.0	2.5E-03	2.2E-03	1.3E-03	8.3E-04	5.0E-04	3.0E-04
MEAN DOSES	4.6E-03	4.1E-03	2.7E-03	1.9E-03	1.3E-03	8.0E-04

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	1.6E-02	8.0E-03	3.9E-03	2.0E-03	2.2E-03	7.4E-04
FRACTILE 99.0	3.2E-03	2.1E-03	1.9E-03	7.8E-04	6.0E-04	5.1E-04
FRACTILE 95.0	1.9E-03	1.2E-03	6.8E-04	4.9E-04	2.2E-04	2.1E-04
FRACTILE 90.0	1.6E-03	1.0E-03	5.0E-04	2.8E-04	1.1E-04	8.1E-05
FRACTILE 50.0	1.6E-04	1.1E-04	5.4E-05	3.1E-05	1.7E-05	1.0E-05
MEAN DOSES	4.8E-04	3.0E-04	1.7E-04	9.6E-05	5.2E-05	3.7E-05

CAT-IV-ACP-elevated, early dose (Greifswald)

NO.	NUCLIDE	SUM
16	CR- 51	1.270E+12
20	MN- 54	7.700E+11
23	FE- 55	3.820E+12
27	CO- 57	1.650E+12
29	CO- 58	2.440E+12
31	CO- 60	2.870E+11

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	7.8E-03	6.5E-03	3.9E-03	2.8E-03	1.8E-03	1.2E-03
FRACTILE 99.0	4.9E-04	4.1E-04	4.1E-04	3.1E-04	2.3E-04	1.8E-04
FRACTILE 95.0	8.3E-05	7.8E-05	9.1E-05	7.2E-05	5.9E-05	7.4E-05
FRACTILE 90.0	3.3E-05	2.8E-05	4.1E-05	3.9E-05	3.8E-05	3.5E-05
FRACTILE 50.0	3.0E-07	3.0E-07	2.0E-06	7.1E-06	1.4E-05	1.7E-05
MEAN DOSES	2.6E-05	2.2E-05	2.2E-05	2.2E-05	2.4E-05	2.6E-05

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	6.5E-04	4.0E-04	3.3E-04	1.4E-04	1.8E-04	6.4E-05
FRACTILE 99.0	2.1E-04	2.1E-04	1.1E-04	5.5E-05	6.9E-05	3.5E-05
FRACTILE 95.0	8.7E-05	5.8E-05	4.1E-05	2.8E-05	2.2E-05	1.4E-05
FRACTILE 90.0	4.2E-05	4.6E-05	3.5E-05	2.5E-05	1.6E-05	9.3E-06
FRACTILE 50.0	1.4E-05	1.1E-05	6.8E-06	4.3E-06	2.5E-06	1.4E-06
MEAN DOSES	2.5E-05	2.1E-05	1.3E-05	8.4E-06	6.0E-06	3.5E-06

CAT-IV-ACP-elevated, EDE with ingestion (Greifswald)

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	6.6E-01	5.5E-01	3.2E-01	2.3E-01	1.5E-01	9.3E-02
FRACTILE 99.0	4.1E-02	3.5E-02	3.5E-02	2.6E-02	1.9E-02	1.4E-02
FRACTILE 95.0	7.1E-03	5.9E-03	5.8E-03	4.6E-03	3.5E-03	2.5E-03
FRACTILE 90.0	1.3E-03	1.8E-03	1.5E-03	1.3E-03	1.0E-03	1.5E-03
FRACTILE 50.0	3.0E-07	4.1E-07	3.4E-05	1.5E-04	3.0E-04	3.8E-04
MEAN DOSES	2.1E-03	1.8E-03	1.5E-03	1.2E-03	1.1E-03	9.6E-04

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	5.2E-02	3.2E-02	2.6E-02	1.1E-02	8.9E-03	5.3E-03
FRACTILE 99.0	1.0E-02	7.8E-03	3.9E-03	2.7E-03	3.6E-03	1.2E-03
FRACTILE 95.0	3.8E-03	3.0E-03	1.9E-03	1.1E-03	9.5E-04	6.5E-04
FRACTILE 90.0	1.4E-03	1.1E-03	8.5E-04	6.0E-04	3.9E-04	2.7E-04
FRACTILE 50.0	3.2E-04	2.5E-04	1.5E-04	9.3E-05	5.4E-05	3.1E-05
MEAN DOSES	8.3E-04	6.6E-04	4.1E-04	2.7E-04	2.1E-04	1.2E-04

CAT-IV-ACP-ground, early dose (Greifswald)

NO.	NUCLIDE	SUM
16	CR- 51	1.270E+11
20	MN- 54	7.700E+10
23	FE- 55	3.820E+11
27	CO- 57	1.650E+11
29	CO- 58	2.440E+11
31	CO- 60	2.870E+10

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	1.3E-03	1.1E-03	6.2E-04	4.1E-04	2.6E-04	1.6E-04
FRACTILE 99.0	7.1E-04	6.6E-04	4.8E-04	3.5E-04	2.3E-04	1.5E-04
FRACTILE 95.0	4.1E-04	3.7E-04	2.6E-04	2.0E-04	1.3E-04	8.3E-05
FRACTILE 90.0	3.6E-04	3.3E-04	2.4E-04	1.8E-04	1.2E-04	7.6E-05
FRACTILE 50.0	7.6E-05	6.5E-05	3.8E-05	2.5E-05	1.5E-05	8.9E-06
MEAN DOSES	1.3E-04	1.1E-04	7.4E-05	5.3E-05	3.4E-05	2.1E-05

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	1.5E-04	6.9E-05	4.5E-05	1.7E-05	1.9E-05	1.3E-05
FRACTILE 99.0	8.5E-05	5.4E-05	3.3E-05	1.7E-05	7.9E-06	7.9E-06
FRACTILE 95.0	4.9E-05	3.2E-05	1.6E-05	9.8E-06	4.7E-06	2.5E-06
FRACTILE 90.0	4.5E-05	3.0E-05	1.2E-05	4.9E-06	2.6E-06	1.5E-06
FRACTILE 50.0	4.9E-06	3.2E-06	1.6E-06	9.3E-07	5.2E-07	3.0E-07
MEAN DOSES	1.2E-05	7.6E-06	3.9E-06	2.1E-06	1.1E-06	6.7E-07

CAT-IV-ACP-ground, EDE with ingestion (Greifswald)

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	8.6E-02	7.4E-02	4.5E-02	3.0E-02	1.9E-02	1.2E-02
FRACTILE 99.0	1.6E-02	1.4E-02	1.0E-02	7.8E-03	5.2E-03	3.2E-03
FRACTILE 95.0	1.0E-02	8.9E-03	6.3E-03	4.9E-03	3.4E-03	2.2E-03
FRACTILE 90.0	8.1E-03	7.4E-03	5.4E-03	4.0E-03	2.8E-03	1.8E-03
FRACTILE 50.0	1.7E-03	1.4E-03	8.5E-04	5.5E-04	3.3E-04	1.9E-04
MEAN DOSES	3.1E-03	2.8E-03	1.8E-03	1.3E-03	8.5E-04	5.4E-04

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	1.1E-02	5.4E-03	2.7E-03	1.3E-03	1.5E-03	5.0E-04
FRACTILE 99.0	2.1E-03	1.4E-03	1.3E-03	5.4E-04	4.1E-04	3.5E-04
FRACTILE 95.0	1.3E-03	8.3E-04	4.6E-04	3.3E-04	1.5E-04	1.4E-04
FRACTILE 90.0	1.0E-03	7.1E-04	3.3E-04	1.9E-04	7.6E-05	5.5E-05
FRACTILE 50.0	1.1E-04	7.1E-05	3.5E-05	2.1E-05	1.1E-05	6.6E-06
MEAN DOSES	3.2E-04	2.0E-04	1.1E-04	6.4E-05	3.5E-05	2.5E-05

Probabilistic potential doses from source terms of case 3 (CAT-IV-bypass)

CAT-IV-bypass-Cu-elevated, early dose (Greifswald)

NO.	NUCLIDE	SUM
	HTO	0.85100E+16
16	CR- 51	0.38000E+10
20	MN- 54	0.23100E+10
21	MN- 56	0.64600E+11
23	FE- 55	0.11500E+11
27	CO- 57	0.49600E+10
29	CO- 58	0.53600E+11
30	CO- 60M	0.88900E+12
31	CO- 60	0.54800E+11
34	NI- 63	0.10100E+11
36	CU- 62	0.18800E+14
37	CU- 64	0.39700E+14
38	CU- 66	0.12300E+14
157	TA-182	0.19000E+11

RADIUS (KM)	0.145	0.180	0.320	0.500	0.680	1.000
MAX. DOSES	4.1E-03	4.0E-03	3.3E-03	2.3E-03	1.9E-03	1.6E-03
FRACTILE 99.0	4.1E-04	3.7E-04	6.3E-04	6.2E-04	5.0E-04	9.5E-04
FRACTILE 95.0	6.8E-05	8.3E-05	1.4E-04	2.6E-04	2.8E-04	3.3E-04
FRACTILE 90.0	1.6E-05	2.4E-05	1.2E-04	2.2E-04	2.4E-04	2.3E-04
FRACTILE 50.0	5.5E-07	5.9E-07	1.4E-05	7.1E-05	1.2E-04	1.5E-04
MEAN DOSES	1.7E-05	2.0E-05	4.8E-05	9.6E-05	1.3E-04	1.7E-04

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MAX. DOSES	1.8E-03	1.9E-03	1.2E-03	7.8E-04	5.1E-04	2.8E-04
FRACTILE 99.0	1.8E-03	1.8E-03	9.3E-04	4.4E-04	3.6E-04	2.1E-04
FRACTILE 95.0	3.9E-04	4.0E-04	3.2E-04	2.2E-04	1.4E-04	7.9E-05
FRACTILE 90.0	3.3E-04	3.7E-04	2.9E-04	1.7E-04	1.1E-04	6.2E-05
FRACTILE 50.0	1.3E-04	1.0E-04	5.9E-05	3.8E-05	2.2E-05	1.3E-05
MEAN DOSES	1.9E-04	1.6E-04	1.0E-04	6.4E-05	4.0E-05	2.4E-05

CAT-IV-bypass-Cu-elevated, EDE, with ingestion (Greifswald)

RADIUS (KM)	0.145	0.180	0.320	0.500	0.680	1.000
MAX. DOSES	3.9E+00	3.3E+00	2.0E+00	1.2E+00	8.2E-01	5.1E-01
FRACTILE 99.0	9.3E-01	8.5E-01	6.2E-01	4.3E-01	3.1E-01	1.9E-01
FRACTILE 95.0	7.2E-01	6.8E-01	4.9E-01	3.4E-01	2.5E-01	1.5E-01
FRACTILE 90.0	5.9E-01	5.4E-01	3.8E-01	2.6E-01	1.9E-01	1.2E-01
FRACTILE 50.0	2.3E-01	1.9E-01	1.0E-01	6.0E-02	4.0E-02	2.3E-02
MEAN DOSES	2.8E-01	2.4E-01	1.6E-01	1.0E-01	7.0E-02	4.3E-02

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MAX. DOSES	4.8E-01	2.2E-01	1.1E-01	4.7E-02	6.6E-02	2.8E-02
FRACTILE 99.0	1.2E-01	6.8E-02	4.0E-02	2.1E-02	1.8E-02	1.2E-02
FRACTILE 95.0	8.9E-02	5.2E-02	2.5E-02	1.4E-02	9.3E-03	5.0E-03
FRACTILE 90.0	6.8E-02	4.5E-02	2.2E-02	8.9E-03	5.2E-03	2.7E-03
FRACTILE 50.0	1.3E-02	8.7E-03	4.4E-03	2.3E-03	1.4E-03	6.8E-04
MEAN DOSES	2.5E-02	1.6E-02	7.9E-03	4.0E-03	2.5E-03	1.5E-03

CAT-IV-bypass-St-elevated, early dose (Greifswald)

NO.	NUCLIDE	SUM
	HTO	0.85100E+16
16	CR- 51	0.21400E+13
20	MN- 54	0.41200E+12
21	MN- 56	0.78100E+13
23	FE- 55	0.25300E+13
27	CO- 57	0.52500E+12
28	CO- 58M	0.14200E+13
29	CO- 58	0.86200E+12
30	CO- 60M	0.54200E+12
31	CO- 60	0.86900E+11
75	MO- 99	0.40700E+12
80	TC- 99M	0.35600E+12

RADIUS (KM)	0.145	0.180	0.320	0.500	0.680	1.000
MAX. DOSES	4.3E-03	4.3E-03	3.5E-03	2.4E-03	2.0E-03	1.7E-03
FRACTILE 99.0	4.4E-04	4.2E-04	6.8E-04	6.9E-04	5.1E-04	1.0E-03
FRACTILE 95.0	7.6E-05	9.1E-05	1.5E-04	2.7E-04	3.0E-04	3.4E-04
FRACTILE 90.0	1.8E-05	2.6E-05	1.2E-04	2.3E-04	2.5E-04	2.3E-04
FRACTILE 50.0	1.1E-06	1.3E-06	1.6E-05	7.4E-05	1.3E-04	1.5E-04
MEAN DOSES	2.0E-05	2.2E-05	5.1E-05	1.0E-04	1.4E-04	1.8E-04

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MAX. DOSES	1.8E-03	2.0E-03	1.3E-03	8.0E-04	5.3E-04	2.9E-04
FRACTILE 99.0	1.8E-03	1.9E-03	9.5E-04	4.5E-04	3.8E-04	2.2E-04
FRACTILE 95.0	4.0E-04	4.1E-04	3.3E-04	2.3E-04	1.5E-04	8.3E-05
FRACTILE 90.0	3.5E-04	3.8E-04	3.0E-04	1.7E-04	1.1E-04	6.5E-05
FRACTILE 50.0	1.3E-04	1.0E-04	6.2E-05	3.9E-05	2.3E-05	1.3E-05
MEAN DOSES	1.9E-04	1.7E-04	1.1E-04	6.5E-05	4.1E-05	2.5E-05

CAT-IV-bypass-St-elevated, EDE with ingestion (Greifswald)

RADIUS (KM)	0.145	0.180	0.320	0.500	0.680	1.000
MAX. DOSES	4.0E-01	3.3E-01	2.0E-01	1.4E-01	9.9E-02	6.3E-02
FRACTILE 99.0	2.8E-02	2.3E-02	2.1E-02	1.5E-02	1.3E-02	1.0E-02
FRACTILE 95.0	6.2E-03	5.2E-03	7.1E-03	7.8E-03	6.6E-03	4.9E-03
FRACTILE 90.0	1.9E-03	1.7E-03	2.6E-03	4.0E-03	4.3E-03	3.9E-03
FRACTILE 50.0	1.5E-06	2.0E-06	1.4E-04	7.1E-04	1.1E-03	1.3E-03
MEAN DOSES	1.4E-03	1.3E-03	1.5E-03	1.9E-03	2.1E-03	2.2E-03

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MAX. DOSES	3.6E-02	2.2E-02	1.9E-02	5.9E-03	3.7E-03	3.1E-03
FRACTILE 99.0	7.2E-03	6.0E-03	3.5E-03	2.4E-03	1.7E-03	1.0E-03
FRACTILE 95.0	4.7E-03	4.1E-03	2.3E-03	1.6E-03	1.1E-03	7.2E-04
FRACTILE 90.0	3.3E-03	2.8E-03	1.8E-03	1.2E-03	7.4E-04	5.4E-04
FRACTILE 50.0	1.7E-03	1.3E-03	8.1E-04	5.1E-04	3.0E-04	1.7E-04
MEAN DOSES	1.9E-03	1.5E-03	9.6E-04	6.1E-04	3.8E-04	2.3E-04

CAT-IV-bypass-W-elevated, early dose (Greifswald)

NO.	NUCLIDE	SUM
	HTO	0.85100E+16
16	CR- 51	0.38000E+10
20	MN- 54	0.23100E+10
21	MN- 56	0.64600E+11
23	FE- 55	0.11500E+11
27	CO- 57	0.49600E+10
29	CO- 58	0.73100E+10
31	CO- 60	0.86200E+09
90	AG-110	0.71000E+10
155	TA-179	0.26100E+11
157	TA-182	0.21500E+11
159	W -181	0.23900E+13
160	W -183M	0.14300E+14
161	W -185	0.50500E+13
162	W -187	0.14100E+14
166	RE-186	0.47200E+12
167	RE-188M	0.13500E+11
168	RE-188	0.19800E+12

RADIUS (KM)	0.145	0.180	0.320	0.500	0.680	1.000
MAX. DOSES	4.1E-03	4.0E-03	3.3E-03	2.3E-03	1.9E-03	1.6E-03
FRACTILE 99.0	4.1E-04	3.7E-04	6.3E-04	6.2E-04	5.0E-04	9.5E-04
FRACTILE 95.0	6.8E-05	8.3E-05	1.4E-04	2.6E-04	2.8E-04	3.3E-04
FRACTILE 90.0	1.6E-05	2.4E-05	1.2E-04	2.2E-04	2.4E-04	2.3E-04
FRACTILE 50.0	5.5E-07	5.9E-07	1.4E-05	7.1E-05	1.2E-04	1.5E-04
MEAN DOSES	1.7E-05	2.0E-05	4.8E-05	9.6E-05	1.3E-04	1.7E-04

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MAX. DOSES	1.8E-03	1.9E-03	1.2E-03	7.8E-04	5.1E-04	2.8E-04
FRACTILE 99.0	1.8E-03	1.8E-03	9.3E-04	4.4E-04	3.6E-04	2.1E-04
FRACTILE 95.0	3.9E-04	4.0E-04	3.2E-04	2.2E-04	1.4E-04	7.9E-05
FRACTILE 90.0	3.3E-04	3.7E-04	2.9E-04	1.7E-04	1.1E-04	6.2E-05
FRACTILE 50.0	1.3E-04	1.0E-04	5.9E-05	3.8E-05	2.2E-05	1.3E-05
MEAN DOSES	1.9E-04	1.6E-04	1.0E-04	6.4E-05	4.0E-05	2.4E-05

CAT-IV-bypass-W-elevated, EDE with ingestion (Greifswald)

RADIUS (KM)	0.145	0.180	0.320	0.500	0.680	1.000
MAX. DOSES	1.9E-01	1.6E-01	1.0E-01	6.8E-02	5.1E-02	3.3E-02
FRACTILE 99.0	1.3E-02	1.1E-02	1.3E-02	9.5E-03	8.5E-03	6.8E-03
FRACTILE 95.0	3.6E-03	3.2E-03	4.3E-03	5.1E-03	5.6E-03	4.6E-03
FRACTILE 90.0	1.1E-03	8.9E-04	2.3E-03	3.6E-03	4.1E-03	3.6E-03
FRACTILE 50.0	7.1E-07	1.3E-06	1.3E-04	6.2E-04	1.0E-03	1.2E-03
MEAN DOSES	7.4E-04	7.0E-04	1.0E-03	1.5E-03	1.8E-03	1.8E-03

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MAX. DOSES	1.9E-02	1.2E-02	1.0E-02	2.8E-03	2.0E-03	1.4E-03
FRACTILE 99.0	5.4E-03	4.2E-03	2.5E-03	1.7E-03	1.1E-03	8.7E-04
FRACTILE 95.0	3.7E-03	3.0E-03	2.0E-03	1.3E-03	8.1E-04	5.2E-04
FRACTILE 90.0	3.2E-03	2.5E-03	1.6E-03	1.0E-03	6.5E-04	4.4E-04
FRACTILE 50.0	1.5E-03	1.3E-03	7.8E-04	4.8E-04	2.8E-04	1.4E-04
MEAN DOSES	1.6E-03	1.3E-03	8.3E-04	5.3E-04	3.2E-04	1.9E-04

Probabilistic potential doses from source terms of case 4 (CAT-V-bypass)

CAT-V-Cu- bypass-ground, early dose (Greifswald)

NO.	NUCLIDE	SUM
	HTO	0.15540E+17
16	CR- 51	0.46100E+10
20	MN- 54	0.28000E+10
21	MN- 56	0.78400E+11
23	FE- 55	0.13900E+11
27	CO- 57	0.60200E+10
29	CO- 58	0.88700E+10
30	CO- 60M	0.32700E+14
31	CO- 60	0.19900E+13
34	NI- 63	0.37400E+12
36	CU- 62	0.69200E+15
37	CU- 64	0.14600E+16
38	CU- 66	0.45500E+15
157	TA-182	0.70200E+12

RADIUS (KM)	0.145	0.180	0.320	0.500	0.680	1.000
MAX. DOSES	3.1E-01	1.7E-01	1.2E-01	8.5E-02	6.1E-02	3.8E-02
FRACTILE 99.0	1.0E-01	1.0E-01	1.0E-01	8.5E-02	6.1E-02	3.8E-02
FRACTILE 95.0	1.0E-01	9.5E-02	6.9E-02	4.8E-02	3.4E-02	2.1E-02
FRACTILE 90.0	9.3E-02	8.7E-02	6.3E-02	4.3E-02	3.1E-02	1.9E-02
FRACTILE 50.0	2.0E-02	1.8E-02	1.1E-02	6.5E-03	4.5E-03	2.6E-03
MEAN DOSES	3.3E-02	3.0E-02	2.0E-02	1.3E-02	8.9E-03	5.5E-03

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MAX. DOSES	2.2E-02	1.4E-02	7.4E-03	3.6E-03	2.3E-03	2.2E-03
FRACTILE 99.0	2.2E-02	1.4E-02	5.2E-03	3.5E-03	1.9E-03	1.1E-03
FRACTILE 95.0	1.2E-02	7.9E-03	3.8E-03	1.7E-03	7.9E-04	3.5E-04
FRACTILE 90.0	1.1E-02	7.2E-03	3.0E-03	9.3E-04	5.6E-04	3.0E-04
FRACTILE 50.0	1.5E-03	9.8E-04	4.8E-04	2.6E-04	1.5E-04	8.1E-05
MEAN DOSES	3.1E-03	1.9E-03	9.0E-04	4.3E-04	2.4E-04	1.2E-04

CAT-V-Cu- bypass-ground, EDE, with ingestion(Greifswald)

RADIUS (KM)	0.145	0.180	0.320	0.500	0.680	1.000
MAX. DOSES	3.9E+00	3.3E+00	2.0E+00	1.2E+00	8.2E-01	5.1E-01
FRACTILE 99.0	9.3E-01	8.5E-01	6.2E-01	4.3E-01	3.1E-01	1.9E-01
FRACTILE 95.0	7.2E-01	6.8E-01	4.9E-01	3.4E-01	2.5E-01	1.5E-01
FRACTILE 90.0	5.9E-01	5.4E-01	3.8E-01	2.6E-01	1.9E-01	1.2E-01
FRACTILE 50.0	2.3E-01	1.9E-01	1.0E-01	6.0E-02	4.0E-02	2.3E-02
MEAN DOSES	2.8E-01	2.4E-01	1.6E-01	1.0E-01	7.0E-02	4.3E-02

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MAX. DOSES	4.8E-01	2.2E-01	1.1E-01	4.7E-02	6.6E-02	2.8E-02
FRACTILE 99.0	1.2E-01	6.8E-02	4.0E-02	2.1E-02	1.8E-02	1.2E-02
FRACTILE 95.0	8.9E-02	5.2E-02	2.5E-02	1.4E-02	9.3E-03	5.0E-03
FRACTILE 90.0	6.8E-02	4.5E-02	2.2E-02	8.9E-03	5.2E-03	2.7E-03
FRACTILE 50.0	1.3E-02	8.7E-03	4.4E-03	2.3E-03	1.4E-03	6.8E-04
MEAN DOSES	2.5E-02	1.6E-02	7.9E-03	4.0E-03	2.5E-03	1.5E-03

CAT-V-St- bypass-ground, early dose (Greifswald)

NO.	NUCLIDE	SUM
	HTO	0.15540E+17
16	CR- 51	0.79000E+14
20	MN- 54	0.15100E+14
21	MN- 56	0.28600E+15
23	FE- 55	0.92900E+14
27	CO- 57	0.19200E+14
28	CO- 58M	0.52300E+14
29	CO- 58	0.31500E+14
30	CO- 60M	0.20000E+14
31	CO- 60	0.31800E+13
75	MO- 99	0.15000E+14
80	TC- 99M	0.13100E+14

RADIUS (KM)	0.145	0.180	0.320	0.500	0.680	1.000
MAX. DOSES	3.4E-01	2.2E-01	1.5E-01	1.0E-01	7.6E-02	4.8E-02
FRACTILE 99.0	1.0E-01	1.0E-01	1.0E-01	1.0E-01	7.4E-02	4.7E-02
FRACTILE 95.0	1.0E-01	1.0E-01	8.3E-02	5.8E-02	4.2E-02	2.6E-02
FRACTILE 90.0	1.0E-01	1.0E-01	7.6E-02	5.2E-02	3.8E-02	2.4E-02
FRACTILE 50.0	2.4E-02	2.1E-02	1.3E-02	7.4E-03	5.1E-03	3.0E-03
MEAN DOSES	4.0E-02	3.5E-02	2.3E-02	1.5E-02	1.1E-02	6.6E-03

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MAX. DOSES	2.8E-02	1.8E-02	9.8E-03	4.4E-03	3.4E-03	3.1E-03
FRACTILE 99.0	2.7E-02	1.7E-02	6.5E-03	4.2E-03	2.4E-03	1.4E-03
FRACTILE 95.0	1.5E-02	1.0E-02	4.7E-03	2.1E-03	1.3E-03	4.8E-04
FRACTILE 90.0	1.4E-02	8.9E-03	3.6E-03	1.1E-03	7.9E-04	4.3E-04
FRACTILE 50.0	1.7E-03	1.1E-03	5.6E-04	3.1E-04	1.8E-04	1.0E-04
MEAN DOSES	3.8E-03	2.4E-03	1.1E-03	5.4E-04	3.1E-04	1.6E-04

CAT-V-St- bypass-ground, EDE with ingestion (Greifswald)

RADIUS (KM)	0.145	0.180	0.320	0.500	0.680	1.000
MAX. DOSES	1.3E+01	1.1E+01	6.9E+00	4.3E+00	2.9E+00	1.9E+00
FRACTILE 99.0	2.6E+00	2.5E+00	1.8E+00	1.2E+00	8.7E-01	5.5E-01
FRACTILE 95.0	1.7E+00	1.6E+00	1.1E+00	7.9E-01	5.8E-01	4.0E-01
FRACTILE 90.0	1.5E+00	1.4E+00	1.0E+00	6.9E-01	5.0E-01	3.1E-01
FRACTILE 50.0	4.0E-01	3.2E-01	1.8E-01	1.1E-01	7.4E-02	4.4E-02
MEAN DOSES	6.1E-01	5.4E-01	3.6E-01	2.3E-01	1.6E-01	1.0E-01

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MAX. DOSES	1.7E+00	8.2E-01	4.0E-01	1.7E-01	2.3E-01	1.1E-01
FRACTILE 99.0	3.5E-01	2.2E-01	1.4E-01	7.2E-02	6.3E-02	4.2E-02
FRACTILE 95.0	2.2E-01	1.4E-01	7.2E-02	4.4E-02	2.8E-02	1.7E-02
FRACTILE 90.0	1.8E-01	1.2E-01	6.0E-02	2.6E-02	1.4E-02	8.1E-03
FRACTILE 50.0	2.4E-02	1.6E-02	7.8E-03	4.4E-03	2.5E-03	1.4E-03
MEAN DOSES	6.0E-02	3.8E-02	2.0E-02	9.6E-03	6.8E-03	4.1E-03

CAT-V-W- bypass-ground, early dose (Greifswald)

NO.	NUCLIDE	SUM
	HTO	0.15540E+17
16	CR- 51	0.46100E+10
20	MN- 54	0.28000E+10
21	MN- 56	0.78400E+11
23	FE- 55	0.13900E+11
27	CO- 57	0.60200E+10
29	CO- 58	0.88700E+10
31	CO- 60	0.10500E+10
90	AG-110	0.26200E+12
155	TA-179	0.96400E+12
157	TA-182	0.79500E+12
159	W -181	0.88200E+14
160	W -183M	0.52900E+15
161	W -185	0.18600E+15
162	W -187	0.52000E+15
166	RE-186	0.17400E+14
167	RE-188M	0.49700E+12
168	RE-188	0.73200E+13

RADIUS (KM)	0.145	0.180	0.320	0.500	0.680	1.000
MAX. DOSES	3.1E-01	1.8E-01	1.1E-01	7.4E-02	5.4E-02	3.4E-02
FRACTILE 99.0	1.0E-01	1.0E-01	1.0E-01	7.1E-02	5.1E-02	3.2E-02
FRACTILE 95.0	8.5E-02	7.9E-02	5.8E-02	3.9E-02	2.8E-02	1.8E-02
FRACTILE 90.0	7.8E-02	7.2E-02	5.2E-02	3.6E-02	2.6E-02	1.7E-02
FRACTILE 50.0	1.7E-02	1.5E-02	8.7E-03	5.2E-03	3.6E-03	2.1E-03
MEAN DOSES	2.8E-02	2.5E-02	1.6E-02	1.1E-02	7.5E-03	4.6E-03

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MAX. DOSES	2.3E-02	1.2E-02	7.4E-03	3.1E-03	2.9E-03	2.1E-03
FRACTILE 99.0	1.9E-02	1.2E-02	4.5E-03	3.1E-03	1.7E-03	9.1E-04
FRACTILE 95.0	1.0E-02	6.8E-03	3.2E-03	1.5E-03	8.3E-04	3.5E-04
FRACTILE 90.0	9.5E-03	6.0E-03	2.5E-03	8.1E-04	5.4E-04	2.9E-04
FRACTILE 50.0	1.2E-03	7.9E-04	3.9E-04	2.2E-04	1.3E-04	6.9E-05
MEAN DOSES	2.6E-03	1.6E-03	7.8E-04	3.9E-04	2.2E-04	1.2E-04

CAT-V-W- bypass-ground, EDE with ingestion (Greifswald)

RADIUS (KM)	0.145	0.180	0.320	0.500	0.680	1.000
MAX. DOSES	3.1E+00	2.7E+00	1.6E+00	9.9E-01	6.7E-01	4.1E-01
FRACTILE 99.0	7.6E-01	7.1E-01	5.1E-01	3.5E-01	2.5E-01	1.6E-01
FRACTILE 95.0	6.3E-01	5.9E-01	4.3E-01	3.0E-01	2.1E-01	1.3E-01
FRACTILE 90.0	5.1E-01	4.7E-01	3.2E-01	2.2E-01	1.6E-01	9.8E-02
FRACTILE 50.0	2.1E-01	1.7E-01	9.1E-02	5.2E-02	3.5E-02	2.0E-02
MEAN DOSES	2.4E-01	2.2E-01	1.4E-01	8.7E-02	6.1E-02	3.7E-02

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MAX. DOSES	3.9E-01	1.8E-01	8.9E-02	3.8E-02	5.4E-02	2.1E-02
FRACTILE 99.0	9.8E-02	5.8E-02	3.3E-02	1.7E-02	1.4E-02	9.8E-03
FRACTILE 95.0	7.6E-02	4.5E-02	2.1E-02	1.2E-02	7.6E-03	4.1E-03
FRACTILE 90.0	5.8E-02	3.8E-02	1.9E-02	7.4E-03	4.7E-03	2.3E-03
FRACTILE 50.0	1.1E-02	7.6E-03	3.8E-03	2.1E-03	1.2E-03	6.2E-04
MEAN DOSES	2.2E-02	1.4E-02	6.9E-03	3.5E-03	2.2E-03	1.2E-03

APPENDIX C -Cadarache

Doses from routine releases (CAT-I)

CAT-I-Cu- elevated, EDE in Sv with ingestion (Cadarache)

NO.	NUCLIDE	SUM (Bq)
	HTO	1.120E+14
8	AR- 41	2.000E+12
16	CR- 51	3.040E+08
20	MN- 54	1.850E+08
21	MN- 56	5.170E+09
23	FE- 55	9.160E+08
27	CO- 57	3.970E+08
29	CO- 58	5.850E+08
30	CO- 60M	4.030E+10
31	CO- 60	2.520E+09
34	NI- 63	4.600E+08
36	CU- 62	8.530E+11
37	CU- 64	1.800E+12
38	CU- 66	5.610E+11
157	TA-182	8.640E+08

RESULTS ARE CALCULATED FOR THE WHOLE DISTANCE BAND

RADIUS (KM)	.145	.210	.320	.500	.680	1.000
MEAN DOSES	2.6E-06	2.0E-06	1.6E-06	1.2E-06	1.1E-06	1.1E-06

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MEAN DOSES	9.6E-07	8.1E-07	5.0E-07	2.8E-07	1.8E-07	1.0E-07

RADIUS (KM)	15.000	21.000	32.000	46.000	68.000	100.000
MEAN DOSES	6.0E-08	4.2E-08	2.8E-08	1.9E-08	1.3E-08	9.1E-09

CAT-I-St- elevated, EDE in Sv with ingestion (Cadarache)

NO.	NUCLIDE	SUM (Bq)
	HTO	1.120E+14
8	AR- 41	2.000E+12
16	CR- 51	9.760E+10
20	MN- 54	1.880E+10
21	MN- 56	3.570E+11
23	FE- 55	1.150E+11
27	CO- 57	2.400E+10
28	CO- 58M	6.440E+10
29	CO- 58	3.940E+10
30	CO- 60M	2.470E+10
31	CO- 60	3.980E+09
75	MO- 99	1.850E+10
80	TC- 99M	1.620E+10

RESULTS ARE CALCULATED FOR THE WHOLE DISTANCE BAND

RADIUS (KM)	.145	.210	.320	.500	.680	1.000
MEAN DOSES	2.6E-06	2.0E-06	1.6E-06	1.3E-06	1.3E-06	1.4E-06

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MEAN DOSES	1.3E-06	1.1E-06	7.2E-07	4.0E-07	2.5E-07	1.4E-07

RADIUS (KM)	15.000	21.000	32.000	46.000	68.000	100.000
MEAN DOSES	8.5E-08	5.9E-08	3.9E-08	2.7E-08	1.9E-08	1.3E-08

CAT-I-W- elevated, EDE in Sv with ingestion (Cadarache)

NO.	NUCLIDE	SUM (Bq)
	HTO	1.120E+14
8	AR- 41	2.000E+12
16	CR- 51	3.040E+08
20	MN- 54	1.850E+08
21	MN- 56	5.170E+09
23	FE- 55	9.160E+08
27	CO- 57	3.970E+08
29	CO- 58	5.850E+08
31	CO- 60	6.900E+07
90	AG-110	3.230E+08
155	TA-179	1.190E+09
157	TA-182	9.790E+08
159	W -181	1.090E+11
160	W -183M	6.510E+11
161	W -185	2.290E+11
162	W -187	6.410E+11
166	RE-186	2.140E+10
167	RE-188M	6.120E+08
168	RE-188	9.010E+09

RESULTS ARE CALCULATED FOR THE WHOLE DISTANCE BAND

RADIUS (KM)	.145	.210	.320	.500	.680	1.000
MEAN DOSES	2.6E-06	2.0E-06	1.6E-06	1.2E-06	1.1E-06	1.0E-06

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MEAN DOSES	9.0E-07	7.6E-07	4.7E-07	2.6E-07	1.7E-07	9.4E-08

RADIUS (KM)	15.000	21.000	32.000	46.000	68.000	100.000
MEAN DOSES	5.7E-08	3.9E-08	2.6E-08	1.8E-08	1.3E-08	8.6E-09

CAT-I-Cu- ground, EDE in Sv with ingestion (Cadarache)

NO.	NUCLIDE	SUM (Bq)
	HTO	1.120E+14
8	AR- 41	2.000E+12
16	CR- 51	3.040E+08
20	MN- 54	1.850E+08
21	MN- 56	5.170E+09
23	FE- 55	9.160E+08
27	CO- 57	3.970E+08
29	CO- 58	5.850E+08
30	CO- 60M	4.030E+10
31	CO- 60	2.520E+09
34	NI- 63	4.600E+08
36	CU- 62	8.530E+11
37	CU- 64	1.800E+12
38	CU- 66	5.610E+11
157	TA-182	8.640E+08

RESULTS ARE CALCULATED FOR THE WHOLE DISTANCE BAND

RADIUS (KM)	.145	.210	.320	.500	.680	1.000
MEAN DOSES	1.6E-04	8.8E-05	4.4E-05	2.1E-05	1.2E-05	6.5E-06

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MEAN DOSES	3.3E-06	2.0E-06	9.1E-07	4.3E-07	2.6E-07	1.4E-07

RADIUS (KM)	15.000	21.000	32.000	46.000	68.000	100.000
MEAN DOSES	7.9E-08	5.4E-08	3.5E-08	2.5E-08	1.7E-08	1.1E-08

CAT-I-St- ground, EDE in Sv with ingestion (Cadarache)

NO.	NUCLIDE	SUM (Bq)
	HTO	1.120E+14
8	AR- 41	2.000E+12
16	CR- 51	9.760E+10
20	MN- 54	1.880E+10
21	MN- 56	3.570E+11
23	FE- 55	1.150E+11
27	CO- 57	2.400E+10
28	CO- 58M	6.440E+10
29	CO- 58	3.940E+10
30	CO- 60M	2.470E+10
31	CO- 60	3.980E+09
75	MO- 99	1.850E+10
80	TC- 99M	1.620E+10

RESULTS ARE CALCULATED FOR THE WHOLE DISTANCE BAND

RADIUS (KM)	.145	.210	.320	.500	.680	1.000
MEAN DOSES	2.6E-04	1.4E-04	7.2E-05	3.4E-05	2.0E-05	1.1E-05

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MEAN DOSES	5.3E-06	3.3E-06	1.5E-06	6.8E-07	4.0E-07	2.1E-07

RADIUS (KM)	15.000	21.000	32.000	46.000	68.000	100.000
MEAN DOSES	1.2E-07	8.5E-08	5.5E-08	3.9E-08	2.6E-08	1.8E-08

CAT-I-W- ground, EDE in Sv with ingestion (Cadarache)

NO.	NUCLIDE	SUM (Bq)
	HTO	1.120E+14
8	AR- 41	2.000E+12
16	CR- 51	3.040E+08
20	MN- 54	1.850E+08
21	MN- 56	5.170E+09
23	FE- 55	9.160E+08
27	CO- 57	3.970E+08
29	CO- 58	5.850E+08
31	CO- 60	6.900E+07
90	AG-110	3.230E+08
155	TA-179	1.190E+09
157	TA-182	9.790E+08
159	W -181	1.090E+11
160	W -183M	6.510E+11
161	W -185	2.290E+11
162	W -187	6.410E+11
166	RE-186	2.140E+10
167	RE-188M	6.120E+08
168	RE-188	9.010E+09

RESULTS ARE CALCULATED FOR THE WHOLE DISTANCE BAND

RADIUS (KM)	.145	.210	.320	.500	.680	1.000
MEAN DOSES	1.4E-04	7.9E-05	4.0E-05	1.9E-05	1.1E-05	5.9E-06

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MEAN DOSES	3.0E-06	1.9E-06	8.4E-07	4.0E-07	2.4E-07	1.3E-07

RADIUS (KM)	15.000	21.000	32.000	46.000	68.000	100.000
MEAN DOSES	7.3E-08	5.0E-08	3.3E-08	2.3E-08	1.6E-08	1.1E-08

Probabilistic potential doses from source terms of case 2 (release limits)

CAT-IV-HTO-elevated, early dose (Cadarache)

NO.	NUCLIDE	SUM
1	HTO	3.70000E+16

RADIUS (KM)	0.145	0.210	0.320	0.500	0.680	1.000
MAX. DOSES	3.2E-03	3.9E-03	5.8E-03	6.1E-03	5.8E-03	4.5E-03
FRACTILE 99.0	2.9E-03	3.8E-03	5.8E-03	6.0E-03	5.1E-03	3.6E-03
FRACTILE 95.0	1.9E-03	2.5E-03	3.4E-03	3.1E-03	2.6E-03	2.5E-03
FRACTILE 90.0	8.1E-04	2.0E-03	2.5E-03	2.2E-03	2.0E-03	1.8E-03
FRACTILE 50.0	4.2E-06	1.3E-05	1.7E-04	3.6E-04	6.5E-04	1.0E-03
MEAN DOSES	2.5E-04	4.1E-04	8.1E-04	9.2E-04	9.8E-04	1.2E-03

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	3.3E-03	3.7E-03	3.1E-03	3.1E-03	1.6E-03	8.3E-04
FRACTILE 99.0	3.2E-03	3.7E-03	2.9E-03	2.7E-03	1.6E-03	8.3E-04
FRACTILE 95.0	3.1E-03	3.4E-03	2.5E-03	2.6E-03	9.3E-04	4.4E-04
FRACTILE 90.0	2.9E-03	3.0E-03	2.5E-03	1.9E-03	6.5E-04	3.0E-04
FRACTILE 50.0	7.1E-04	5.1E-04	2.9E-04	1.6E-04	9.1E-05	4.0E-05
MEAN DOSES	1.3E-03	1.2E-03	8.7E-04	6.5E-04	2.6E-04	1.2E-04

CAT-IV-HTO-elevated, EDE, with ingestion (Cadarache)

RADIUS (KM)	0.145	0.210	0.320	0.500	0.680	1.000
MAX. DOSES	4.6E-01	3.9E-01	2.4E-01	1.7E-01	1.3E-01	9.6E-02
FRACTILE 99.0	8.1E-02	8.3E-02	9.5E-02	7.1E-02	5.4E-02	4.6E-02
FRACTILE 95.0	2.5E-02	3.5E-02	4.5E-02	4.7E-02	4.4E-02	3.0E-02
FRACTILE 90.0	1.6E-02	1.9E-02	3.2E-02	3.2E-02	2.7E-02	1.9E-02
FRACTILE 50.0	4.9E-05	1.9E-04	2.6E-03	3.4E-03	5.5E-03	7.4E-03
MEAN DOSES	6.0E-03	7.6E-03	1.2E-02	1.3E-02	1.2E-02	1.1E-02

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	6.1E-02	4.0E-02	2.2E-02	2.6E-02	1.2E-02	5.2E-03
FRACTILE 99.0	3.7E-02	2.8E-02	1.7E-02	1.1E-02	6.8E-03	5.2E-03
FRACTILE 95.0	2.0E-02	1.5E-02	1.1E-02	9.5E-03	4.9E-03	2.7E-03
FRACTILE 90.0	1.7E-02	1.3E-02	1.1E-02	8.3E-03	3.7E-03	2.1E-03
FRACTILE 50.0	9.1E-03	8.1E-03	4.3E-03	2.5E-03	1.4E-03	5.6E-04
MEAN DOSES	9.5E-03	7.9E-03	5.1E-03	3.6E-03	1.8E-03	8.7E-04

CAT-IV-HTO-ground, early dose (Cadarache)

NO.	NUCLIDE	SUM
1	HTO	3.70000E+15

RADIUS (KM)	0.145	0.210	0.320	0.500	0.680	1.000
MAX. DOSES	2.6E-02	2.4E-02	1.7E-02	1.2E-02	8.7E-03	5.7E-03
FRACTILE 99.0	2.6E-02	2.4E-02	1.7E-02	1.2E-02	8.7E-03	5.4E-03
FRACTILE 95.0	2.6E-02	2.3E-02	1.7E-02	1.2E-02	8.5E-03	5.4E-03
FRACTILE 90.0	2.5E-02	2.3E-02	1.7E-02	1.1E-02	8.3E-03	5.1E-03
FRACTILE 50.0	3.2E-03	2.6E-03	1.5E-03	8.3E-04	5.2E-04	2.9E-04
MEAN DOSES	9.3E-03	8.3E-03	5.6E-03	3.7E-03	2.6E-03	1.6E-03

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	4.4E-03	2.7E-03	9.9E-04	3.7E-04	2.0E-04	7.7E-05
FRACTILE 99.0	3.4E-03	1.9E-03	6.6E-04	3.7E-04	1.8E-04	5.1E-05
FRACTILE 95.0	3.4E-03	1.8E-03	4.7E-04	3.0E-04	1.2E-04	4.1E-05
FRACTILE 90.0	3.0E-03	1.0E-03	4.3E-04	2.1E-04	7.6E-05	3.2E-05
FRACTILE 50.0	1.5E-04	1.0E-04	3.4E-05	1.7E-05	9.1E-06	4.6E-06
MEAN DOSES	9.3E-04	3.8E-04	1.3E-04	6.7E-05	2.7E-05	8.7E-06

CAT-IV-HTO-ground, EDE, with ingestion (Cadarache)

RADIUS (KM)	0.145	0.210	0.320	0.500	0.680	1.000
MAX. DOSES	1.7E-01	1.5E-01	9.2E-02	6.3E-02	4.6E-02	2.9E-02
FRACTILE 99.0	1.3E-01	1.2E-01	7.9E-02	5.1E-02	3.7E-02	2.2E-02
FRACTILE 95.0	1.1E-01	1.0E-01	7.1E-02	4.7E-02	3.3E-02	2.1E-02
FRACTILE 90.0	9.8E-02	8.9E-02	6.5E-02	4.3E-02	3.1E-02	1.9E-02
FRACTILE 50.0	4.4E-02	3.5E-02	1.7E-02	9.1E-03	5.9E-03	3.3E-03
MEAN DOSES	5.3E-02	4.7E-02	3.0E-02	1.9E-02	1.3E-02	7.8E-03

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	2.6E-02	1.1E-02	4.5E-03	2.4E-03	1.4E-03	1.7E-03
FRACTILE 99.0	1.3E-02	9.8E-03	3.7E-03	1.8E-03	1.3E-03	3.9E-04
FRACTILE 95.0	1.3E-02	6.9E-03	3.0E-03	1.3E-03	6.8E-04	2.6E-04
FRACTILE 90.0	1.1E-02	5.9E-03	2.2E-03	1.2E-03	5.6E-04	1.8E-04
FRACTILE 50.0	1.8E-03	1.2E-03	5.8E-04	3.2E-04	1.7E-04	7.2E-05
MEAN DOSES	4.6E-03	2.4E-03	9.4E-04	4.8E-04	2.4E-04	9.5E-05

CAT-IV-HT-elevated, early dose (Cadarache)

NO.	NUCLIDE	SUM
1	HT	1.11000E+18

RADIUS (KM)	0.145	0.210	0.320	0.500	0.680	1.000
MAX. DOSES	2.3E-04	2.6E-04	4.8E-04	6.7E-04	7.4E-04	5.2E-04
FRACTILE 99.0	2.3E-04	2.5E-04	4.6E-04	6.7E-04	6.9E-04	5.0E-04
FRACTILE 95.0	1.3E-04	2.3E-04	2.8E-04	3.2E-04	3.3E-04	2.9E-04
FRACTILE 90.0	9.3E-05	1.7E-04	2.1E-04	2.4E-04	2.3E-04	1.7E-04
FRACTILE 50.0	7.9E-06	8.3E-06	1.3E-05	2.5E-05	4.4E-05	7.4E-05
MEAN DOSES	2.5E-05	3.6E-05	6.0E-05	9.0E-05	1.0E-04	9.4E-05

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	4.6E-04	3.7E-04	2.4E-04	2.4E-04	1.2E-04	5.0E-05
FRACTILE 99.0	3.7E-04	3.5E-04	2.4E-04	2.1E-04	1.1E-04	4.9E-05
FRACTILE 95.0	3.4E-04	2.8E-04	2.0E-04	2.0E-04	1.1E-04	4.8E-05
FRACTILE 90.0	3.0E-04	2.5E-04	1.4E-04	1.3E-04	8.3E-05	4.0E-05
FRACTILE 50.0	7.6E-05	6.2E-05	3.6E-05	2.5E-05	1.4E-05	7.2E-06
MEAN DOSES	1.0E-04	9.4E-05	5.7E-05	4.8E-05	2.7E-05	1.3E-05

CAT-IV-HT-elevated, EDE, with ingestion (Cadarache)

RADIUS (KM)	0.145	0.210	0.320	0.500	0.680	1.000
MAX. DOSES	3.9E-02	5.3E-02	6.1E-02	6.7E-02	6.1E-02	5.7E-02
FRACTILE 99.0	2.7E-02	3.6E-02	6.0E-02	6.3E-02	5.2E-02	3.7E-02
FRACTILE 95.0	1.7E-02	2.3E-02	3.2E-02	3.2E-02	2.9E-02	2.7E-02
FRACTILE 90.0	7.8E-03	1.8E-02	2.0E-02	2.0E-02	1.9E-02	2.0E-02
FRACTILE 50.0	7.8E-05	1.4E-04	1.4E-03	3.7E-03	6.0E-03	9.5E-03
MEAN DOSES	2.4E-03	3.8E-03	7.7E-03	9.0E-03	9.7E-03	1.1E-02

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	4.9E-02	3.9E-02	3.7E-02	3.3E-02	1.5E-02	9.7E-03
FRACTILE 99.0	3.4E-02	3.9E-02	2.8E-02	2.8E-02	1.5E-02	9.7E-03
FRACTILE 95.0	3.0E-02	3.4E-02	2.8E-02	2.6E-02	1.1E-02	4.0E-03
FRACTILE 90.0	3.0E-02	3.3E-02	2.7E-02	2.0E-02	7.4E-03	3.5E-03
FRACTILE 50.0	6.9E-03	4.7E-03	2.8E-03	1.7E-03	9.3E-04	4.4E-04
MEAN DOSES	1.3E-02	1.2E-02	8.6E-03	6.5E-03	2.7E-03	1.2E-03

CAT-IV-HT-ground, early dose (Cadarache)

NO.	NUCLIDE	SUM
1	HT	1.11000E+17

RADIUS (KM)	0.145	0.210	0.320	0.500	0.680	1.000
MAX. DOSES	1.1E-03	1.1E-03	9.4E-04	7.9E-04	6.8E-04	4.7E-04
FRACTILE 99.0	6.5E-04	1.1E-03	7.9E-04	7.1E-04	6.2E-04	4.2E-04
FRACTILE 95.0	6.2E-04	9.1E-04	7.8E-04	6.8E-04	5.8E-04	3.5E-04
FRACTILE 90.0	5.2E-04	8.9E-04	6.6E-04	6.2E-04	5.4E-04	3.3E-04
FRACTILE 50.0	8.3E-05	1.4E-04	8.9E-05	6.5E-05	4.9E-05	3.1E-05
MEAN DOSES	1.9E-04	2.8E-04	2.3E-04	1.8E-04	1.5E-04	9.5E-05

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	3.8E-04	2.8E-04	9.8E-05	5.4E-05	3.0E-05	1.9E-05
FRACTILE 99.0	3.8E-04	2.2E-04	6.9E-05	3.2E-05	2.6E-05	8.9E-06
FRACTILE 95.0	3.1E-04	1.8E-04	6.9E-05	3.0E-05	1.3E-05	7.6E-06
FRACTILE 90.0	2.2E-04	1.7E-04	4.4E-05	2.8E-05	1.2E-05	7.6E-06
FRACTILE 50.0	1.9E-05	1.4E-05	6.9E-06	4.5E-06	2.5E-06	1.3E-06
MEAN DOSES	7.0E-05	4.6E-05	1.7E-05	9.6E-06	4.8E-06	2.3E-06

CAT-IV-HT-ground, EDE, with ingestion (Cadarache)

RADIUS (KM)	0.145	0.210	0.320	0.500	0.680	1.000
MAX. DOSES	3.0E-01	2.8E-01	2.1E-01	1.4E-01	1.1E-01	7.0E-02
FRACTILE 99.0	2.8E-01	2.6E-01	1.9E-01	1.3E-01	9.8E-02	6.2E-02
FRACTILE 95.0	2.8E-01	2.6E-01	1.9E-01	1.3E-01	9.5E-02	6.0E-02
FRACTILE 90.0	2.5E-01	2.3E-01	1.7E-01	1.2E-01	9.3E-02	5.9E-02
FRACTILE 50.0	3.0E-02	2.5E-02	1.4E-02	8.3E-03	5.6E-03	3.3E-03
MEAN DOSES	9.0E-02	8.2E-02	5.6E-02	3.8E-02	2.7E-02	1.7E-02

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	4.9E-02	3.1E-02	1.2E-02	4.3E-03	3.2E-03	1.5E-03
FRACTILE 99.0	3.8E-02	2.4E-02	9.1E-03	4.3E-03	2.1E-03	6.2E-04
FRACTILE 95.0	3.7E-02	1.8E-02	5.6E-03	4.1E-03	1.6E-03	4.4E-04
FRACTILE 90.0	3.6E-02	1.3E-02	4.9E-03	3.1E-03	1.2E-03	3.4E-04
FRACTILE 50.0	1.9E-03	1.2E-03	4.6E-04	2.5E-04	1.2E-04	5.5E-05
MEAN DOSES	1.0E-02	4.3E-03	1.6E-03	8.4E-04	3.6E-04	1.1E-04

CAT-IV-Cu-elevated, early dose (Cadarache)

NO.	NUCLIDE	SUM
30	CO- 60M	1.610E+13
31	CO- 60	9.810E+11
34	NI- 63	1.840E+11
36	CU- 62	3.410E+14
37	CU- 64	7.220E+14
38	CU- 66	2.240E+14
157	TA-182	3.460E+11

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	5.3E-02	4.4E-02	2.6E-02	1.8E-02	1.2E-02	7.8E-03
FRACTILE 99.0	4.6E-03	3.9E-03	2.6E-03	2.0E-03	1.7E-03	1.4E-03
FRACTILE 95.0	4.8E-04	5.9E-04	1.1E-03	1.0E-03	8.1E-04	5.5E-04
FRACTILE 90.0	4.5E-04	5.6E-04	5.9E-04	4.7E-04	3.6E-04	3.8E-04
FRACTILE 50.0	3.7E-05	3.9E-05	1.8E-04	1.4E-04	2.0E-04	1.8E-04
MEAN DOSES	2.9E-04	2.8E-04	3.2E-04	2.8E-04	2.6E-04	2.5E-04

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	4.4E-03	2.8E-03	1.2E-03	8.7E-04	4.2E-04	2.6E-04
FRACTILE 99.0	1.0E-03	7.9E-04	4.8E-04	4.1E-04	2.5E-04	1.3E-04
FRACTILE 95.0	5.4E-04	5.8E-04	4.4E-04	4.0E-04	1.7E-04	1.0E-04
FRACTILE 90.0	5.0E-04	4.9E-04	3.8E-04	2.9E-04	1.1E-04	5.8E-05
FRACTILE 50.0	1.2E-04	9.3E-05	4.5E-05	2.3E-05	1.2E-05	5.6E-06
MEAN DOSES	2.4E-04	2.2E-04	1.4E-04	1.0E-04	4.5E-05	2.2E-05

CAT-IV-Cu-elevated, EDE with ingestion (Cadarache)

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	1.6E+00	1.3E+00	7.9E-01	5.6E-01	3.7E-01	2.4E-01
FRACTILE 99.0	1.0E-01	1.0E-01	7.2E-02	5.5E-02	4.1E-02	3.0E-02
FRACTILE 95.0	2.8E-03	3.7E-03	7.2E-03	7.6E-03	6.2E-03	4.3E-03
FRACTILE 90.0	2.0E-03	2.7E-03	4.2E-03	3.2E-03	2.5E-03	2.3E-03
FRACTILE 50.0	4.0E-05	4.7E-05	2.3E-04	4.1E-04	8.5E-04	1.1E-03
MEAN DOSES	6.5E-03	5.7E-03	4.2E-03	3.4E-03	2.8E-03	2.5E-03

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	1.3E-01	8.5E-02	3.9E-02	2.5E-02	1.3E-02	8.4E-03
FRACTILE 99.0	2.2E-02	1.7E-02	1.1E-02	7.6E-03	4.3E-03	2.7E-03
FRACTILE 95.0	3.9E-03	4.6E-03	3.5E-03	3.2E-03	2.0E-03	1.6E-03
FRACTILE 90.0	3.8E-03	4.2E-03	3.1E-03	2.9E-03	1.1E-03	1.0E-03
FRACTILE 50.0	8.1E-04	6.3E-04	3.2E-04	1.9E-04	1.0E-04	4.5E-05
MEAN DOSES	2.3E-03	2.0E-03	1.4E-03	9.9E-04	4.8E-04	3.0E-04

CAT-IV-Cu-ground, early dose (Cadarache)

NO.	NUCLIDE	SUM
30	CO- 60M	1.610E+12
31	CO- 60	9.810E+10
34	NI- 63	1.840E+10
36	CU- 62	3.410E+13
37	CU- 64	7.220E+13
38	CU- 66	2.240E+13
157	TA-182	3.460E+10

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	9.5E-03	8.2E-03	4.9E-03	3.2E-03	1.9E-03	9.6E-04
FRACTILE 99.0	3.8E-03	3.5E-03	2.6E-03	1.9E-03	1.3E-03	8.1E-04
FRACTILE 95.0	3.8E-03	3.5E-03	2.6E-03	1.9E-03	1.3E-03	8.1E-04
FRACTILE 90.0	3.7E-03	3.5E-03	2.5E-03	1.9E-03	1.2E-03	7.6E-04
FRACTILE 50.0	5.2E-04	4.1E-04	2.4E-04	1.5E-04	8.9E-05	5.2E-05
MEAN DOSES	1.4E-03	1.3E-03	8.7E-04	6.2E-04	4.1E-04	2.5E-04

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	7.6E-04	4.2E-04	1.7E-04	1.1E-04	9.4E-05	1.1E-04
FRACTILE 99.0	5.2E-04	2.9E-04	1.0E-04	1.1E-04	4.0E-05	3.6E-05
FRACTILE 95.0	5.1E-04	2.8E-04	8.7E-05	5.6E-05	2.6E-05	1.4E-05
FRACTILE 90.0	4.4E-04	1.7E-04	6.9E-05	3.6E-05	1.4E-05	8.5E-06
FRACTILE 50.0	3.0E-05	1.7E-05	5.4E-06	2.6E-06	1.4E-06	7.2E-07
MEAN DOSES	1.5E-04	6.4E-05	2.4E-05	1.4E-05	6.0E-06	3.4E-06

CAT-IV-Cu-ground, EDE with ingestion (Cadarache)

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	2.4E-01	2.1E-01	1.3E-01	8.9E-02	5.3E-02	2.8E-02
FRACTILE 99.0	3.6E-02	3.2E-02	2.1E-02	1.6E-02	1.1E-02	7.4E-03
FRACTILE 95.0	3.2E-02	3.0E-02	2.1E-02	1.6E-02	1.1E-02	6.9E-03
FRACTILE 90.0	3.2E-02	3.0E-02	2.1E-02	1.5E-02	1.0E-02	6.6E-03
FRACTILE 50.0	4.1E-03	3.2E-03	1.9E-03	1.2E-03	6.6E-04	3.9E-04
MEAN DOSES	1.2E-02	1.1E-02	7.5E-03	5.4E-03	3.6E-03	2.2E-03

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	1.5E-02	1.1E-02	4.9E-03	3.3E-03	2.9E-03	3.2E-03
FRACTILE 99.0	5.9E-03	3.3E-03	1.8E-03	1.7E-03	9.8E-04	7.8E-04
FRACTILE 95.0	4.4E-03	2.4E-03	1.3E-03	7.1E-04	5.0E-04	4.0E-04
FRACTILE 90.0	4.2E-03	1.8E-03	6.6E-04	5.0E-04	2.8E-04	2.1E-04
FRACTILE 50.0	2.3E-04	1.4E-04	4.3E-05	2.1E-05	1.0E-05	5.8E-06
MEAN DOSES	1.3E-03	6.1E-04	2.6E-04	1.7E-04	1.0E-04	7.1E-05

CAT-IV-St-elevated, early dose (Cadarache)

NO.	NUCLIDE	SUM
16	CR- 51	3.890E+13
20	MN- 54	7.450E+12
21	MN- 56	1.410E+14
23	FE- 55	4.580E+13
27	CO- 57	9.450E+12
28	CO- 58M	2.580E+13
29	CO- 58	1.550E+13
30	CO- 60M	9.860E+12
31	CO- 60	1.560E+12
75	MO- 99	7.400E+12
80	TC- 99M	6.470E+12

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	8.7E-02	7.2E-02	4.3E-02	3.0E-02	2.0E-02	1.3E-02
FRACTILE 99.0	7.4E-03	6.2E-03	4.1E-03	3.2E-03	2.7E-03	2.2E-03
FRACTILE 95.0	5.6E-04	7.1E-04	1.4E-03	1.4E-03	1.2E-03	8.3E-04
FRACTILE 90.0	4.1E-04	6.3E-04	7.8E-04	6.2E-04	4.8E-04	5.0E-04
FRACTILE 50.0	2.2E-05	2.5E-05	1.2E-04	1.1E-04	2.0E-04	2.2E-04
MEAN DOSES	4.2E-04	3.9E-04	4.0E-04	3.6E-04	3.4E-04	3.5E-04

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	7.4E-03	4.6E-03	2.1E-03	1.4E-03	7.2E-04	4.5E-04
FRACTILE 99.0	1.7E-03	1.3E-03	7.8E-04	6.5E-04	3.9E-04	2.0E-04
FRACTILE 95.0	7.8E-04	8.9E-04	6.8E-04	6.2E-04	2.8E-04	1.5E-04
FRACTILE 90.0	7.2E-04	7.8E-04	5.9E-04	4.7E-04	1.9E-04	1.0E-04
FRACTILE 50.0	1.6E-04	1.2E-04	6.2E-05	3.6E-05	1.9E-05	8.7E-06
MEAN DOSES	3.5E-04	3.2E-04	2.2E-04	1.6E-04	7.0E-05	3.5E-05

CAT-IV-St-elevated, EDE with ingestion (Cadarache)

RESULTS ARE CALCULATED FOR THE WHOLE DISTANCE BAND

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	6.2E+00	5.2E+00	3.1E+00	2.2E+00	1.4E+00	9.1E-01
FRACTILE 99.0	1.0E-01	1.0E-01	1.0E-01	1.0E-01	1.0E-01	1.0E-01
FRACTILE 95.0	9.5E-03	1.3E-02	2.6E-02	2.7E-02	2.2E-02	1.5E-02
FRACTILE 90.0	6.9E-03	9.3E-03	1.5E-02	1.2E-02	8.7E-03	7.9E-03
FRACTILE 50.0	2.9E-05	6.3E-05	7.6E-04	1.4E-03	2.9E-03	4.1E-03
MEAN DOSES	2.5E-02	2.2E-02	1.6E-02	1.3E-02	1.0E-02	9.3E-03

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	5.2E-01	3.3E-01	1.5E-01	9.5E-02	5.2E-02	3.3E-02
FRACTILE 99.0	8.3E-02	6.5E-02	4.5E-02	3.0E-02	1.7E-02	1.0E-02
FRACTILE 95.0	1.4E-02	1.7E-02	1.3E-02	1.2E-02	7.4E-03	6.2E-03
FRACTILE 90.0	1.4E-02	1.5E-02	1.1E-02	1.1E-02	4.3E-03	3.9E-03
FRACTILE 50.0	2.9E-03	2.2E-03	1.1E-03	7.1E-04	3.7E-04	1.6E-04
MEAN DOSES	8.5E-03	7.5E-03	5.2E-03	3.7E-03	1.8E-03	1.1E-03

CAT-IV-St-ground, early dose (Cadarache)

NO.	NUCLIDE	SUM
16	CR- 51	3.890E+12
20	MN- 54	7.450E+11
21	MN- 56	1.410E+13
23	FE- 55	4.580E+12
27	CO- 57	9.450E+11
28	CO- 58M	2.580E+12
29	CO- 58	1.550E+12
30	CO- 60M	9.860E+11
31	CO- 60	1.560E+11
75	MO- 99	7.400E+11
80	TC- 99M	6.470E+11

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	1.5E-02	1.3E-02	8.0E-03	5.3E-03	3.1E-03	1.6E-03
FRACTILE 99.0	5.6E-03	5.2E-03	3.8E-03	2.8E-03	2.0E-03	1.3E-03
FRACTILE 95.0	5.6E-03	5.2E-03	3.8E-03	2.8E-03	1.9E-03	1.2E-03
FRACTILE 90.0	5.5E-03	5.1E-03	3.7E-03	2.8E-03	1.9E-03	1.2E-03
FRACTILE 50.0	7.2E-04	5.8E-04	3.4E-04	2.2E-04	1.3E-04	7.2E-05
MEAN DOSES	2.1E-03	1.9E-03	1.3E-03	9.2E-04	6.1E-04	3.8E-04

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	1.2E-03	6.5E-04	2.8E-04	1.8E-04	1.6E-04	1.9E-04
FRACTILE 99.0	8.1E-04	4.5E-04	1.7E-04	1.8E-04	6.5E-05	5.9E-05
FRACTILE 95.0	7.9E-04	4.4E-04	1.4E-04	8.7E-05	4.6E-05	2.6E-05
FRACTILE 90.0	6.9E-04	2.6E-04	1.1E-04	5.6E-05	2.3E-05	1.4E-05
FRACTILE 50.0	4.1E-05	2.7E-05	8.1E-06	3.8E-06	2.0E-06	1.1E-06
MEAN DOSES	2.3E-04	1.0E-04	3.7E-05	2.2E-05	9.8E-06	5.7E-06

CAT-IV-St-ground, EDE with ingestion (Cadarache)

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	9.3E-01	8.1E-01	5.1E-01	3.4E-01	2.1E-01	1.1E-01
FRACTILE 99.0	1.0E-01	1.0E-01	8.1E-02	6.2E-02	4.2E-02	2.8E-02
FRACTILE 95.0	1.0E-01	1.0E-01	7.8E-02	5.8E-02	4.0E-02	2.5E-02
FRACTILE 90.0	1.0E-01	1.0E-01	7.8E-02	5.8E-02	3.8E-02	2.4E-02
FRACTILE 50.0	1.5E-02	1.2E-02	6.8E-03	4.3E-03	2.4E-03	1.4E-03
MEAN DOSES	4.5E-02	4.1E-02	2.8E-02	2.0E-02	1.3E-02	8.2E-03

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	5.8E-02	4.1E-02	1.9E-02	1.3E-02	1.1E-02	1.2E-02
FRACTILE 99.0	2.2E-02	1.3E-02	6.9E-03	6.6E-03	3.8E-03	3.0E-03
FRACTILE 95.0	1.6E-02	8.7E-03	5.1E-03	2.7E-03	1.9E-03	1.6E-03
FRACTILE 90.0	1.5E-02	6.6E-03	2.4E-03	1.8E-03	1.1E-03	8.3E-04
FRACTILE 50.0	8.7E-04	5.1E-04	1.5E-04	7.9E-05	3.8E-05	2.1E-05
MEAN DOSES	5.0E-03	2.3E-03	9.7E-04	6.5E-04	3.8E-04	2.7E-04

CAT-IV-W-elevated, early dose (Cadarache)

NO.	NUCLIDE	SUM
90	AG-110	1.290E+11
155	TA-179	4.750E+11
157	TA-182	3.920E+11
159	W -181	4.340E+13
160	W -183M	2.600E+14
161	W -185	9.180E+13
162	W -187	2.560E+14
166	RE-186	8.570E+12
167	RE-188M	2.450E+11
168	RE-188	3.600E+12

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	7.6E-02	6.3E-02	3.8E-02	2.6E-02	1.8E-02	1.1E-02
FRACTILE 99.0	6.5E-03	5.5E-03	3.5E-03	2.7E-03	2.1E-03	1.6E-03
FRACTILE 95.0	2.3E-04	2.9E-04	5.8E-04	5.9E-04	4.8E-04	3.4E-04
FRACTILE 90.0	1.7E-04	2.6E-04	3.2E-04	2.5E-04	1.9E-04	2.0E-04
FRACTILE 50.0	1.7E-05	1.7E-05	5.2E-05	4.7E-05	8.3E-05	9.1E-05
MEAN DOSES	3.3E-04	3.0E-04	2.5E-04	2.1E-04	1.8E-04	1.7E-04

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	6.4E-03	4.0E-03	1.8E-03	1.2E-03	6.2E-04	3.9E-04
FRACTILE 99.0	1.1E-03	8.9E-04	5.9E-04	3.7E-04	2.2E-04	1.4E-04
FRACTILE 95.0	3.2E-04	3.7E-04	2.8E-04	2.6E-04	1.7E-04	8.7E-05
FRACTILE 90.0	3.1E-04	3.3E-04	2.5E-04	2.3E-04	8.7E-05	5.5E-05
FRACTILE 50.0	6.5E-05	5.0E-05	2.6E-05	1.5E-05	8.3E-06	3.7E-06
MEAN DOSES	1.6E-04	1.5E-04	1.0E-04	7.3E-05	3.4E-05	1.9E-05

CAT-IV-W-elevated, EDE with ingestion (Cadarache)

RESULTS ARE CALCULATED FOR THE WHOLE DISTANCE BAND

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	1.3E+00	1.0E+00	6.2E-01	4.4E-01	2.9E-01	1.8E-01
FRACTILE 99.0	1.0E-01	8.9E-02	5.6E-02	4.3E-02	3.2E-02	2.4E-02
FRACTILE 95.0	1.9E-03	2.7E-03	5.2E-03	5.6E-03	4.6E-03	3.2E-03
FRACTILE 90.0	1.4E-03	1.9E-03	3.0E-03	2.4E-03	1.8E-03	1.7E-03
FRACTILE 50.0	1.8E-05	2.6E-05	1.6E-04	2.8E-04	6.0E-04	8.3E-04
MEAN DOSES	5.1E-03	4.4E-03	3.2E-03	2.6E-03	2.1E-03	1.9E-03

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	1.1E-01	6.6E-02	3.1E-02	1.9E-02	1.0E-02	6.6E-03
FRACTILE 99.0	1.7E-02	1.3E-02	9.1E-03	5.9E-03	3.4E-03	2.1E-03
FRACTILE 95.0	2.9E-03	3.4E-03	2.6E-03	2.4E-03	1.5E-03	1.3E-03
FRACTILE 90.0	2.8E-03	3.1E-03	2.3E-03	2.2E-03	8.7E-04	8.1E-04
FRACTILE 50.0	5.9E-04	4.6E-04	2.3E-04	1.4E-04	7.6E-05	3.3E-05
MEAN DOSES	1.7E-03	1.5E-03	1.1E-03	7.5E-04	3.6E-04	2.3E-04

CAT-IV-W-ground, early dose (Cadarache)

NO.	NUCLIDE	SUM
90	AG-110	1.290E+10
155	TA-179	4.750E+10
157	TA-182	3.920E+10
159	W -181	4.340E+12
160	W -183M	2.600E+13
161	W -185	9.180E+12
162	W -187	2.560E+13
166	RE-186	8.570E+11
167	RE-188M	2.450E+10
168	RE-188	3.600E+11

RESULTS ARE CALCULATED FOR THE WHOLE DISTANCE BAND

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	1.2E-02	1.0E-02	6.4E-03	4.3E-03	2.6E-03	1.4E-03
FRACTILE 99.0	2.3E-03	2.1E-03	1.5E-03	1.1E-03	8.1E-04	5.2E-04
FRACTILE 95.0	2.2E-03	2.1E-03	1.5E-03	1.1E-03	7.9E-04	5.0E-04
FRACTILE 90.0	2.2E-03	2.1E-03	1.5E-03	1.1E-03	7.6E-04	4.8E-04
FRACTILE 50.0	3.0E-04	2.3E-04	1.3E-04	8.9E-05	5.1E-05	3.0E-05
MEAN DOSES	8.6E-04	7.7E-04	5.3E-04	3.8E-04	2.6E-04	1.6E-04

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	7.1E-04	5.1E-04	2.3E-04	1.6E-04	1.3E-04	1.5E-04
FRACTILE 99.0	3.6E-04	1.9E-04	1.1E-04	1.0E-04	4.6E-05	4.1E-05
FRACTILE 95.0	3.3E-04	1.8E-04	6.9E-05	3.8E-05	2.6E-05	1.8E-05
FRACTILE 90.0	3.0E-04	1.1E-04	5.0E-05	2.7E-05	1.4E-05	1.0E-05
FRACTILE 50.0	1.7E-05	1.1E-05	3.5E-06	1.7E-06	8.7E-07	4.8E-07
MEAN DOSES	9.8E-05	4.4E-05	1.8E-05	1.1E-05	5.7E-06	3.7E-06

CAT-IV-W-ground, EDE with ingestion (Cadarache)

RESULTS ARE CALCULATED FOR THE WHOLE DISTANCE BAND

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	1.9E-01	1.7E-01	1.0E-01	7.0E-02	4.2E-02	2.2E-02
FRACTILE 99.0	2.8E-02	2.5E-02	1.7E-02	1.3E-02	8.5E-03	5.8E-03
FRACTILE 95.0	2.3E-02	2.2E-02	1.6E-02	1.2E-02	7.9E-03	5.1E-03
FRACTILE 90.0	2.3E-02	2.2E-02	1.6E-02	1.2E-02	7.8E-03	4.9E-03
FRACTILE 50.0	3.0E-03	2.4E-03	1.4E-03	8.7E-04	4.9E-04	2.8E-04
MEAN DOSES	9.2E-03	8.3E-03	5.6E-03	4.1E-03	2.7E-03	1.7E-03

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	1.2E-02	8.3E-03	3.9E-03	2.6E-03	2.3E-03	2.5E-03
FRACTILE 99.0	4.5E-03	2.6E-03	1.4E-03	1.3E-03	7.6E-04	6.0E-04
FRACTILE 95.0	3.2E-03	1.8E-03	1.0E-03	5.5E-04	3.9E-04	3.2E-04
FRACTILE 90.0	3.2E-03	1.3E-03	4.9E-04	3.7E-04	2.2E-04	1.7E-04
FRACTILE 50.0	1.8E-04	1.0E-04	3.2E-05	1.6E-05	7.8E-06	4.4E-06
MEAN DOSES	1.0E-03	4.6E-04	2.0E-04	1.3E-04	7.7E-05	5.5E-05

CAT-IV-ACP-elevated, early dose (Cadarache)

NO.	NUCLIDE	SUM
16	CR- 51	1.270E+12
20	MN- 54	7.700E+11
23	FE- 55	3.820E+12
27	CO- 57	1.650E+12
29	CO- 58	2.440E+12
31	CO- 60	2.870E+11

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	1.0E-02	8.4E-03	5.0E-03	3.5E-03	2.4E-03	1.5E-03
FRACTILE 99.0	8.5E-04	7.2E-04	4.6E-04	3.7E-04	3.2E-04	2.6E-04
FRACTILE 95.0	5.9E-05	8.1E-05	1.6E-04	1.7E-04	1.4E-04	9.5E-05
FRACTILE 90.0	4.3E-05	5.8E-05	9.1E-05	7.2E-05	5.5E-05	5.0E-05
FRACTILE 50.0	9.5E-07	9.5E-07	4.8E-06	8.7E-06	1.8E-05	2.5E-05
MEAN DOSES	4.6E-05	4.3E-05	4.2E-05	3.9E-05	3.6E-05	3.8E-05

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	8.8E-04	5.5E-04	2.5E-04	1.7E-04	8.9E-05	5.5E-05
FRACTILE 99.0	1.9E-04	1.5E-04	9.3E-05	7.6E-05	4.7E-05	2.5E-05
FRACTILE 95.0	8.7E-05	1.0E-04	8.1E-05	7.2E-05	3.1E-05	1.9E-05
FRACTILE 90.0	8.3E-05	8.7E-05	6.9E-05	5.5E-05	2.3E-05	1.2E-05
FRACTILE 50.0	1.8E-05	1.4E-05	7.2E-06	4.1E-06	2.3E-06	1.0E-06
MEAN DOSES	4.0E-05	3.7E-05	2.6E-05	1.9E-05	8.3E-06	4.3E-06

CAT-IV-ACP-elevated, EDE with ingestion (Cadarache)

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	8.6E-01	7.1E-01	4.2E-01	3.0E-01	2.0E-01	1.2E-01
FRACTILE 99.0	7.2E-02	6.0E-02	3.8E-02	2.9E-02	2.2E-02	1.6E-02
FRACTILE 95.0	1.3E-03	1.8E-03	3.5E-03	3.7E-03	3.0E-03	2.1E-03
FRACTILE 90.0	9.3E-04	1.3E-03	2.0E-03	1.6E-03	1.2E-03	1.1E-03
FRACTILE 50.0	1.6E-06	7.2E-06	1.0E-04	1.9E-04	3.8E-04	5.5E-04
MEAN DOSES	3.4E-03	3.0E-03	2.2E-03	1.8E-03	1.4E-03	1.3E-03

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	7.2E-02	4.5E-02	2.1E-02	1.3E-02	7.1E-03	4.5E-03
FRACTILE 99.0	1.1E-02	8.9E-03	6.2E-03	4.0E-03	2.3E-03	1.4E-03
FRACTILE 95.0	1.9E-03	2.2E-03	1.8E-03	1.6E-03	1.0E-03	8.5E-04
FRACTILE 90.0	1.9E-03	2.0E-03	1.5E-03	1.4E-03	5.8E-04	5.4E-04
FRACTILE 50.0	3.9E-04	3.1E-04	1.6E-04	9.5E-05	5.1E-05	2.2E-05
MEAN DOSES	1.2E-03	1.0E-03	7.1E-04	5.0E-04	2.4E-04	1.6E-04

CAT-IV-ACP-ground, early dose (Cadarache)

NO.	NUCLIDE	SUM
16	CR- 51	1.270E+11
20	MN- 54	7.700E+10
23	FE- 55	3.820E+11
27	CO- 57	1.650E+11
29	CO- 58	2.440E+11
31	CO- 60	2.870E+10

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	1.8E-03	1.6E-03	9.6E-04	6.3E-04	3.7E-04	1.9E-04
FRACTILE 99.0	7.2E-04	6.6E-04	4.8E-04	3.5E-04	2.5E-04	1.5E-04
FRACTILE 95.0	7.1E-04	6.6E-04	4.8E-04	3.5E-04	2.4E-04	1.5E-04
FRACTILE 90.0	7.1E-04	6.6E-04	4.8E-04	3.5E-04	2.3E-04	1.5E-04
FRACTILE 50.0	8.9E-05	7.2E-05	4.2E-05	2.6E-05	1.5E-05	8.5E-06
MEAN DOSES	2.6E-04	2.4E-04	1.6E-04	1.2E-04	7.6E-05	4.7E-05

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	1.5E-04	8.1E-05	3.5E-05	2.2E-05	2.0E-05	2.3E-05
FRACTILE 99.0	1.0E-04	5.6E-05	2.0E-05	2.2E-05	8.3E-06	6.9E-06
FRACTILE 95.0	9.8E-05	5.5E-05	1.7E-05	1.1E-05	6.3E-06	3.5E-06
FRACTILE 90.0	8.5E-05	3.2E-05	1.3E-05	6.9E-06	3.0E-06	1.7E-06
FRACTILE 50.0	4.8E-06	3.2E-06	9.3E-07	5.0E-07	2.3E-07	1.3E-07
MEAN DOSES	2.8E-05	1.2E-05	4.6E-06	2.7E-06	1.2E-06	7.2E-07

CAT-IV-ACP-ground, EDE with ingestion (Cadarache)

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	1.3E-01	1.1E-01	7.0E-02	4.7E-02	2.8E-02	1.5E-02
FRACTILE 99.0	1.9E-02	1.7E-02	1.1E-02	8.5E-03	5.8E-03	3.8E-03
FRACTILE 95.0	1.6E-02	1.5E-02	1.1E-02	7.9E-03	5.4E-03	3.5E-03
FRACTILE 90.0	1.6E-02	1.4E-02	1.0E-02	7.8E-03	5.2E-03	3.3E-03
FRACTILE 50.0	2.0E-03	1.6E-03	9.3E-04	5.8E-04	3.3E-04	1.9E-04
MEAN DOSES	6.2E-03	5.6E-03	3.8E-03	2.7E-03	1.8E-03	1.1E-03

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	8.0E-03	5.6E-03	2.6E-03	1.8E-03	1.5E-03	1.7E-03
FRACTILE 99.0	3.0E-03	1.7E-03	9.5E-04	9.1E-04	5.1E-04	4.1E-04
FRACTILE 95.0	2.2E-03	1.2E-03	6.9E-04	3.7E-04	2.6E-04	2.1E-04
FRACTILE 90.0	2.1E-03	8.9E-04	3.3E-04	2.5E-04	1.5E-04	1.1E-04
FRACTILE 50.0	1.2E-04	6.9E-05	2.1E-05	1.1E-05	5.1E-06	2.9E-06
MEAN DOSES	6.8E-04	3.1E-04	1.3E-04	8.9E-05	5.2E-05	3.7E-05

Probabilistic potential doses from source terms of case 3 (CAT-IV-bypass)

CAT-IV-bypass-Cu-elevated, early dose (Cadarache)

NO.	NUCLIDE	SUM
	HTO	0.85100E+16
16	CR- 51	0.38000E+10
20	MN- 54	0.23100E+10
21	MN- 56	0.64600E+11
23	FE- 55	0.11500E+11
27	CO- 57	0.49600E+10
29	CO- 58	0.53600E+11
30	CO- 60M	0.88900E+12
31	CO- 60	0.54800E+11
34	NI- 63	0.10100E+11
36	CU- 62	0.18800E+14
37	CU- 64	0.39700E+14
38	CU- 66	0.12300E+14
157	TA-182	0.19000E+11

RADIUS (KM)	0.145	0.180	0.320	0.500	0.680	1.000
MAX. DOSES	3.4E-03	2.9E-03	1.9E-03	1.7E-03	1.6E-03	1.2E-03
FRACTILE 99.0	6.9E-04	9.5E-04	1.4E-03	1.4E-03	1.2E-03	9.3E-04
FRACTILE 95.0	4.5E-04	6.0E-04	8.1E-04	7.4E-04	6.5E-04	6.3E-04
FRACTILE 90.0	2.2E-04	5.0E-04	6.0E-04	5.6E-04	4.8E-04	4.4E-04
FRACTILE 50.0	3.1E-06	4.5E-06	4.3E-05	1.0E-04	1.5E-04	2.4E-04
MEAN DOSES	7.6E-05	1.1E-04	2.0E-04	2.3E-04	2.4E-04	2.8E-04

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MAX. DOSES	8.5E-04	8.8E-04	7.3E-04	7.3E-04	3.9E-04	2.0E-04
FRACTILE 99.0	7.6E-04	8.8E-04	6.9E-04	6.3E-04	3.9E-04	2.0E-04
FRACTILE 95.0	7.4E-04	8.1E-04	6.0E-04	6.0E-04	2.2E-04	1.0E-04
FRACTILE 90.0	7.2E-04	7.2E-04	5.9E-04	4.5E-04	1.5E-04	7.2E-05
FRACTILE 50.0	1.8E-04	1.2E-04	7.1E-05	3.9E-05	2.2E-05	9.5E-06
MEAN DOSES	3.1E-04	3.0E-04	2.1E-04	1.5E-04	6.3E-05	2.8E-05

CAT-IV-bypass-Cu-elevated, EDE with ingestion (Cadarache)

RADIUS (KM)	0.145	0.180	0.320	0.500	0.680	1.000
MAX. DOSES	2.0E-01	1.7E-01	1.0E-01	6.9E-02	5.2E-02	3.6E-02
FRACTILE 99.0	2.7E-02	2.2E-02	2.2E-02	1.6E-02	1.3E-02	1.1E-02
FRACTILE 95.0	6.0E-03	8.3E-03	1.1E-02	1.2E-02	1.0E-02	7.4E-03
FRACTILE 90.0	3.9E-03	5.1E-03	7.4E-03	7.4E-03	6.3E-03	4.5E-03
FRACTILE 50.0	1.3E-05	4.5E-05	6.3E-04	9.1E-04	1.3E-03	1.9E-03
MEAN DOSES	1.8E-03	2.1E-03	3.1E-03	3.2E-03	3.0E-03	2.7E-03

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MAX. DOSES	2.2E-02	1.4E-02	6.8E-03	6.4E-03	3.5E-03	1.5E-03
FRACTILE 99.0	9.1E-03	6.9E-03	4.1E-03	2.8E-03	1.7E-03	1.3E-03
FRACTILE 95.0	4.7E-03	4.0E-03	2.9E-03	2.3E-03	1.2E-03	6.3E-04
FRACTILE 90.0	4.3E-03	3.3E-03	2.7E-03	2.2E-03	9.5E-04	5.1E-04
FRACTILE 50.0	2.3E-03	1.9E-03	1.0E-03	5.9E-04	3.2E-04	1.3E-04
MEAN DOSES	2.3E-03	2.0E-03	1.3E-03	8.7E-04	4.4E-04	2.1E-04

CAT-IV-bypass-St-elevated, early dose (Cadarache)

NO.	NUCLIDE	SUM
	HTO	0.85100E+16
16	CR- 51	0.21400E+13
20	MN- 54	0.41200E+12
21	MN- 56	0.78100E+13
23	FE- 55	0.25300E+13
27	CO- 57	0.52500E+12
28	CO- 58M	0.14200E+13
29	CO- 58	0.86200E+12
30	CO- 60M	0.54200E+12
31	CO- 60	0.86900E+11
75	MO- 99	0.40700E+12
80	TC- 99M	0.35600E+12

RADIUS (KM)	0.145	0.180	0.320	0.500	0.680	1.000
MAX. DOSES	5.2E-03	4.4E-03	2.7E-03	2.2E-03	1.9E-03	1.5E-03
FRACTILE 99.0	7.1E-04	9.5E-04	1.4E-03	1.5E-03	1.2E-03	9.5E-04
FRACTILE 95.0	4.5E-04	6.0E-04	8.3E-04	7.4E-04	7.2E-04	6.5E-04
FRACTILE 90.0	2.4E-04	5.0E-04	6.0E-04	5.8E-04	4.9E-04	4.4E-04
FRACTILE 50.0	2.0E-06	4.7E-06	4.3E-05	1.0E-04	1.6E-04	2.5E-04
MEAN DOSES	8.2E-05	1.2E-04	2.1E-04	2.3E-04	2.5E-04	2.9E-04

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MAX. DOSES	9.4E-04	9.0E-04	7.5E-04	7.3E-04	4.0E-04	2.0E-04
FRACTILE 99.0	7.8E-04	9.0E-04	7.1E-04	6.3E-04	4.0E-04	2.0E-04
FRACTILE 95.0	7.6E-04	8.1E-04	6.2E-04	6.2E-04	2.3E-04	1.1E-04
FRACTILE 90.0	7.4E-04	7.4E-04	6.0E-04	4.6E-04	1.6E-04	7.4E-05
FRACTILE 50.0	1.8E-04	1.2E-04	7.2E-05	3.9E-05	2.2E-05	9.8E-06
MEAN DOSES	3.2E-04	3.0E-04	2.1E-04	1.6E-04	6.5E-05	2.9E-05

CAT-IV-bypass-St-elevated, EDE with ingestion (Cadarache)

RADIUS (KM)	0.145	0.180	0.320	0.500	0.680	1.000
MAX. DOSES	4.5E-01	3.8E-01	2.3E-01	1.5E-01	1.1E-01	7.3E-02
FRACTILE 99.0	4.8E-02	4.2E-02	2.8E-02	2.2E-02	1.9E-02	1.5E-02
FRACTILE 95.0	6.3E-03	8.7E-03	1.3E-02	1.3E-02	1.2E-02	7.9E-03
FRACTILE 90.0	4.2E-03	5.6E-03	7.9E-03	7.8E-03	6.6E-03	4.7E-03
FRACTILE 50.0	1.2E-05	4.6E-05	6.6E-04	1.0E-03	1.4E-03	2.0E-03
MEAN DOSES	2.8E-03	3.0E-03	3.7E-03	3.7E-03	3.4E-03	3.1E-03

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MAX. DOSES	4.3E-02	2.7E-02	1.3E-02	9.3E-03	5.6E-03	2.4E-03
FRACTILE 99.0	1.1E-02	9.1E-03	5.5E-03	3.3E-03	2.2E-03	1.4E-03
FRACTILE 95.0	5.1E-03	4.5E-03	3.4E-03	2.6E-03	1.9E-03	7.9E-04
FRACTILE 90.0	4.4E-03	3.9E-03	3.1E-03	2.4E-03	1.1E-03	5.9E-04
FRACTILE 50.0	2.7E-03	1.9E-03	1.0E-03	6.0E-04	3.4E-04	1.5E-04
MEAN DOSES	2.7E-03	2.3E-03	1.5E-03	9.8E-04	5.1E-04	2.5E-04

CAT-IV-bypass-W-elevated, early dose (Cadarache)

NO.	NUCLIDE	SUM
	HTO	0.85100E+16
16	CR- 51	0.38000E+10
20	MN- 54	0.23100E+10
21	MN- 56	0.64600E+11
23	FE- 55	0.11500E+11
27	CO- 57	0.49600E+10
29	CO- 58	0.73100E+10
31	CO- 60	0.86200E+09
90	AG-110	0.71000E+10
155	TA-179	0.26100E+11
157	TA-182	0.21500E+11
159	W -181	0.23900E+13
160	W -183M	0.14300E+14
161	W -185	0.50500E+13
162	W -187	0.14100E+14
166	RE-186	0.47200E+12
167	RE-188M	0.13500E+11
168	RE-188	0.19800E+12

RADIUS (KM)	0.145	0.180	0.320	0.500	0.680	1.000
MAX. DOSES	4.6E-03	3.9E-03	2.4E-03	2.0E-03	1.8E-03	1.4E-03
FRACTILE 99.0	6.9E-04	9.3E-04	1.3E-03	1.4E-03	1.2E-03	9.3E-04
FRACTILE 95.0	4.4E-04	5.9E-04	8.1E-04	7.2E-04	6.9E-04	6.3E-04
FRACTILE 90.0	2.2E-04	4.8E-04	5.9E-04	5.6E-04	4.7E-04	4.3E-04
FRACTILE 50.0	2.2E-06	4.0E-06	4.1E-05	9.5E-05	1.5E-04	2.4E-04
MEAN DOSES	7.7E-05	1.1E-04	2.0E-04	2.3E-04	2.4E-04	2.8E-04

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MAX. DOSES	9.0E-04	8.7E-04	7.2E-04	7.2E-04	3.8E-04	2.0E-04
FRACTILE 99.0	7.4E-04	8.7E-04	6.8E-04	6.3E-04	3.8E-04	2.0E-04
FRACTILE 95.0	7.2E-04	7.9E-04	5.9E-04	6.0E-04	2.2E-04	1.0E-04
FRACTILE 90.0	7.1E-04	7.2E-04	5.8E-04	4.5E-04	1.5E-04	7.1E-05
FRACTILE 50.0	1.7E-04	1.2E-04	7.1E-05	3.8E-05	2.1E-05	9.3E-06
MEAN DOSES	3.1E-04	2.9E-04	2.1E-04	1.5E-04	6.3E-05	2.8E-05

CAT-IV-bypass-W-elevated, EDE with ingestion (Cadarache)

RADIUS (KM)	0.145	0.180	0.320	0.500	0.680	1.000
MAX. DOSES	1.8E-01	1.5E-01	9.1E-02	6.3E-02	4.8E-02	3.3E-02
FRACTILE 99.0	2.5E-02	2.1E-02	2.2E-02	1.6E-02	1.3E-02	1.1E-02
FRACTILE 95.0	5.9E-03	8.1E-03	1.1E-02	1.2E-02	1.0E-02	7.2E-03
FRACTILE 90.0	3.8E-03	4.8E-03	7.4E-03	7.4E-03	6.3E-03	4.5E-03
FRACTILE 50.0	1.1E-05	4.4E-05	6.2E-04	8.9E-04	1.3E-03	1.8E-03
MEAN DOSES	1.7E-03	2.0E-03	3.0E-03	3.2E-03	3.0E-03	2.6E-03

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MAX. DOSES	2.0E-02	1.3E-02	6.3E-03	6.3E-03	3.3E-03	1.4E-03
FRACTILE 99.0	9.1E-03	6.9E-03	4.1E-03	2.8E-03	1.6E-03	1.3E-03
FRACTILE 95.0	4.7E-03	3.8E-03	2.8E-03	2.3E-03	1.2E-03	6.3E-04
FRACTILE 90.0	4.3E-03	3.2E-03	2.6E-03	2.1E-03	9.5E-04	5.0E-04
FRACTILE 50.0	2.2E-03	1.9E-03	1.0E-03	5.8E-04	3.2E-04	1.3E-04
MEAN DOSES	2.3E-03	1.9E-03	1.3E-03	8.6E-04	4.3E-04	2.1E-04

Probabilistic potential doses from source terms of case 4 (CAT-V-bypass)

CAT-V-Cu- bypass-ground, early dose (Cadarache)

NO.	NUCLIDE	SUM
	HTO	0.15540E+17
16	CR- 51	0.46100E+10
20	MN- 54	0.28000E+10
21	MN- 56	0.78400E+11
23	FE- 55	0.13900E+11
27	CO- 57	0.60200E+10
29	CO- 58	0.88700E+10
30	CO- 60M	0.32700E+14
31	CO- 60	0.19900E+13
34	NI- 63	0.37400E+12
36	CU- 62	0.69200E+15
37	CU- 64	0.14600E+16
38	CU- 66	0.45500E+15
157	TA-182	0.70200E+12

RADIUS (KM)	0.145	0.180	0.320	0.500	0.680	1.000
MAX. DOSES	2.6E-01	2.2E-01	1.3E-01	8.5E-02	6.3E-02	4.2E-02
FRACTILE 99.0	1.0E-01	1.0E-01	1.0E-01	8.5E-02	6.3E-02	3.9E-02
FRACTILE 95.0	1.0E-01	1.0E-01	1.0E-01	8.5E-02	6.2E-02	3.9E-02
FRACTILE 90.0	1.0E-01	1.0E-01	1.0E-01	8.3E-02	6.0E-02	3.7E-02
FRACTILE 50.0	2.4E-02	1.9E-02	1.1E-02	6.6E-03	4.5E-03	2.6E-03
MEAN DOSES	7.1E-02	6.1E-02	4.1E-02	2.7E-02	1.9E-02	1.2E-02

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MAX. DOSES	3.2E-02	2.0E-02	7.5E-03	3.9E-03	2.2E-03	2.6E-03
FRACTILE 99.0	2.5E-02	1.4E-02	4.9E-03	2.6E-03	1.1E-03	7.4E-04
FRACTILE 95.0	2.5E-02	1.3E-02	3.5E-03	1.8E-03	8.3E-04	3.0E-04
FRACTILE 90.0	2.1E-02	7.8E-03	3.2E-03	1.3E-03	5.9E-04	2.7E-04
FRACTILE 50.0	1.5E-03	8.3E-04	2.5E-04	1.2E-04	6.9E-05	3.4E-05
MEAN DOSES	7.0E-03	2.9E-03	1.0E-03	4.7E-04	2.2E-04	9.5E-05

CAT-V-Cu- bypass-ground, EDE with ingestion (Cadarache)

RADIUS (KM)	0.145	0.180	0.320	0.500	0.680	1.000
MAX. DOSES	5.6E+00	4.9E+00	3.0E+00	1.8E+00	1.2E+00	6.4E-01
FRACTILE 99.0	1.2E+00	1.0E+00	7.4E-01	5.1E-01	3.6E-01	2.3E-01
FRACTILE 95.0	1.1E+00	1.0E+00	7.1E-01	4.9E-01	3.5E-01	2.3E-01
FRACTILE 90.0	1.0E+00	9.5E-01	6.8E-01	4.8E-01	3.5E-01	2.2E-01
FRACTILE 50.0	2.4E-01	1.9E-01	1.1E-01	6.2E-02	3.9E-02	2.2E-02
MEAN DOSES	4.9E-01	4.2E-01	2.8E-01	1.8E-01	1.3E-01	7.9E-02

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MAX. DOSES	3.4E-01	2.6E-01	1.2E-01	1.0E-01	6.4E-02	7.2E-02
FRACTILE 99.0	1.7E-01	9.1E-02	4.5E-02	2.8E-02	2.3E-02	1.7E-02
FRACTILE 95.0	1.4E-01	7.8E-02	3.2E-02	1.4E-02	1.2E-02	8.7E-03
FRACTILE 90.0	1.3E-01	5.5E-02	2.3E-02	1.1E-02	6.5E-03	4.4E-03
FRACTILE 50.0	1.2E-02	7.9E-03	3.1E-03	1.7E-03	9.3E-04	4.9E-04
MEAN DOSES	4.7E-02	2.3E-02	9.1E-03	4.4E-03	2.9E-03	1.8E-03

CAT-V-St- bypass-ground, early dose (Cadarache)

NO.	NUCLIDE	SUM
	HTO	0.15540E+17
16	CR- 51	0.79000E+14
20	MN- 54	0.15100E+14
21	MN- 56	0.28600E+15
23	FE- 55	0.92900E+14
27	CO- 57	0.19200E+14
28	CO- 58M	0.52300E+14
29	CO- 58	0.31500E+14
30	CO- 60M	0.20000E+14
31	CO- 60	0.31800E+13
75	MO- 99	0.15000E+14
80	TC- 99M	0.13100E+14

RADIUS (KM)	0.145	0.180	0.320	0.500	0.680	1.000
MAX. DOSES	3.8E-01	3.3E-01	1.9E-01	1.1E-01	7.7E-02	5.1E-02
FRACTILE 99.0	1.0E-01	1.0E-01	1.0E-01	1.0E-01	7.7E-02	4.8E-02
FRACTILE 95.0	1.0E-01	1.0E-01	1.0E-01	1.0E-01	7.6E-02	4.8E-02
FRACTILE 90.0	1.0E-01	1.0E-01	1.0E-01	1.0E-01	7.2E-02	4.6E-02
FRACTILE 50.0	2.8E-02	2.2E-02	1.3E-02	7.8E-03	5.2E-03	3.1E-03
MEAN DOSES	8.4E-02	7.3E-02	5.0E-02	3.3E-02	2.4E-02	1.5E-02

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MAX. DOSES	4.1E-02	2.4E-02	9.3E-03	6.1E-03	3.5E-03	4.1E-03
FRACTILE 99.0	3.1E-02	1.7E-02	6.2E-03	3.2E-03	1.5E-03	1.2E-03
FRACTILE 95.0	3.0E-02	1.6E-02	4.5E-03	1.9E-03	1.0E-03	5.2E-04
FRACTILE 90.0	2.6E-02	9.8E-03	4.0E-03	1.6E-03	7.4E-04	3.5E-04
FRACTILE 50.0	1.7E-03	1.0E-03	3.0E-04	1.4E-04	8.1E-05	4.3E-05
MEAN DOSES	8.6E-03	3.7E-03	1.3E-03	5.8E-04	2.9E-04	1.4E-04

CAT-V-St- bypass-ground, EDE with ingestion (Cadarache)

RADIUS (KM)	0.145	0.180	0.320	0.500	0.680	1.000
MAX. DOSES	2.0E+01	1.7E+01	1.1E+01	6.5E+00	4.3E+00	2.3E+00
FRACTILE 99.0	3.2E+00	2.8E+00	1.9E+00	1.3E+00	9.5E-01	6.3E-01
FRACTILE 95.0	2.8E+00	2.6E+00	1.9E+00	1.3E+00	9.3E-01	6.0E-01
FRACTILE 90.0	2.7E+00	2.5E+00	1.8E+00	1.3E+00	9.3E-01	5.8E-01
FRACTILE 50.0	4.6E-01	3.6E-01	1.9E-01	1.1E-01	7.6E-02	4.4E-02
MEAN DOSES	1.2E+00	1.0E+00	6.9E-01	4.5E-01	3.2E-01	2.0E-01

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MAX. DOSES	1.2E+00	8.7E-01	4.1E-01	3.6E-01	2.3E-01	2.6E-01
FRACTILE 99.0	5.0E-01	2.8E-01	1.5E-01	8.7E-02	7.9E-02	6.3E-02
FRACTILE 95.0	3.8E-01	2.1E-01	1.1E-01	4.4E-02	4.2E-02	3.3E-02
FRACTILE 90.0	3.6E-01	1.5E-01	5.5E-02	4.0E-02	2.2E-02	1.7E-02
FRACTILE 50.0	2.5E-02	1.6E-02	5.5E-03	2.6E-03	1.5E-03	7.9E-04
MEAN DOSES	1.2E-01	5.7E-02	2.4E-02	1.2E-02	8.7E-03	5.9E-03

CAT-V-W- bypass-ground, early dose (Cadarache)

NO.	NUCLIDE	SUM
	HTO	0.15540E+17
16	CR- 51	0.46100E+10
20	MN- 54	0.28000E+10
21	MN- 56	0.78400E+11
23	FE- 55	0.13900E+11
27	CO- 57	0.60200E+10
29	CO- 58	0.88700E+10
31	CO- 60	0.10500E+10
90	AG-110	0.26200E+12
155	TA-179	0.96400E+12
157	TA-182	0.79500E+12
159	W -181	0.88200E+14
160	W -183M	0.52900E+15
161	W -185	0.18600E+15
162	W -187	0.52000E+15
166	RE-186	0.17400E+14
167	RE-188M	0.49700E+12
168	RE-188	0.73200E+13

RADIUS (KM)	0.145	0.180	0.320	0.500	0.680	1.000
MAX. DOSES	3.1E-01	2.7E-01	1.6E-01	9.5E-02	6.1E-02	3.5E-02
FRACTILE 99.0	1.0E-01	1.0E-01	1.0E-01	7.2E-02	5.4E-02	3.3E-02
FRACTILE 95.0	1.0E-01	1.0E-01	1.0E-01	7.1E-02	5.2E-02	3.2E-02
FRACTILE 90.0	1.0E-01	1.0E-01	1.0E-01	6.9E-02	5.0E-02	3.1E-02
FRACTILE 50.0	1.9E-02	1.6E-02	9.1E-03	5.4E-03	3.6E-03	2.1E-03
MEAN DOSES	6.0E-02	5.1E-02	3.5E-02	2.3E-02	1.6E-02	1.0E-02

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MAX. DOSES	2.9E-02	1.7E-02	6.4E-03	5.1E-03	3.0E-03	3.4E-03
FRACTILE 99.0	2.1E-02	1.1E-02	4.3E-03	2.2E-03	1.3E-03	8.3E-04
FRACTILE 95.0	2.1E-02	1.1E-02	3.0E-03	1.7E-03	7.4E-04	3.9E-04
FRACTILE 90.0	1.8E-02	6.6E-03	2.7E-03	1.2E-03	5.8E-04	2.3E-04
FRACTILE 50.0	1.2E-03	7.1E-04	2.1E-04	1.0E-04	6.0E-05	2.9E-05
MEAN DOSES	5.9E-03	2.5E-03	9.0E-04	4.3E-04	2.1E-04	1.0E-04

CAT-V-W- bypass-ground, EDE with ingestion (Cadarache)

RADIUS (KM)	0.145	0.180	0.320	0.500	0.680	1.000
MAX. DOSES	4.5E+00	4.0E+00	2.4E+00	1.5E+00	9.7E-01	5.2E-01
FRACTILE 99.0	1.1E+00	8.9E-01	6.3E-01	4.4E-01	3.2E-01	1.9E-01
FRACTILE 95.0	9.8E-01	8.7E-01	5.9E-01	4.1E-01	3.0E-01	1.9E-01
FRACTILE 90.0	8.7E-01	8.1E-01	5.8E-01	4.0E-01	3.0E-01	1.8E-01
FRACTILE 50.0	2.2E-01	1.8E-01	9.8E-02	5.6E-02	3.7E-02	2.0E-02
MEAN DOSES	4.3E-01	3.7E-01	2.4E-01	1.6E-01	1.1E-01	6.7E-02

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MAX. DOSES	2.7E-01	2.1E-01	9.7E-02	8.1E-02	5.2E-02	5.8E-02
FRACTILE 99.0	1.4E-01	7.8E-02	3.8E-02	2.3E-02	1.9E-02	1.3E-02
FRACTILE 95.0	1.2E-01	6.5E-02	2.6E-02	1.2E-02	9.5E-03	6.8E-03
FRACTILE 90.0	1.1E-01	4.9E-02	2.0E-02	8.9E-03	5.6E-03	3.4E-03
FRACTILE 50.0	1.1E-02	7.2E-03	2.9E-03	1.6E-03	8.9E-04	4.6E-04
MEAN DOSES	4.0E-02	1.9E-02	7.8E-03	3.8E-03	2.4E-03	1.4E-03

APPENDIX D - Italian site

Doses from routine releases (CAT-I)

CAT-I-Cu-elevated, EDE with ingestion (Italian site)

NO.	NUCLIDE	SUM
	HTO	1.120E+14
8	AR- 41	2.000E+12
16	CR- 51	3.040E+08
20	MN- 54	1.850E+08
21	MN- 56	5.170E+09
23	FE- 55	9.160E+08
27	CO- 57	3.970E+08
29	CO- 58	5.850E+08
30	CO- 60M	4.030E+10
31	CO- 60	2.520E+09
34	NI- 63	4.600E+08
36	CU- 62	8.530E+11
37	CU- 64	1.800E+12
38	CU- 66	5.610E+11
157	TA-182	8.640E+08

RESULTS ARE CALCULATED FOR THE WHOLE DISTANCE BAND

RADIUS (KM)	.145	.210	.320	.500	.680	1.000
MEAN DOSES	2.0E-06	1.5E-06	1.2E-06	9.9E-07	9.1E-07	8.0E-07

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MEAN DOSES	6.5E-07	5.2E-07	3.1E-07	1.8E-07	1.2E-07	6.8E-08

RADIUS (KM)	15.000	21.000	32.000	46.000	68.000	100.000
MEAN DOSES	4.2E-08	2.9E-08	1.9E-08	1.3E-08	9.2E-09	6.2E-09

CAT-I-St-elevated, EDE with ingestion (Italian site)

NO.	NUCLIDE	SUM
	HTO	1.120E+14
8	AR- 41	2.000E+12
16	CR- 51	9.760E+10
20	MN- 54	1.880E+10
21	MN- 56	3.570E+11
23	FE- 55	1.150E+11
27	CO- 57	2.400E+10
28	CO- 58M	6.440E+10
29	CO- 58	3.940E+10
30	CO- 60M	2.470E+10
31	CO- 60	3.980E+09
75	MO- 99	1.850E+10
80	TC- 99M	1.620E+10

RESULTS ARE CALCULATED FOR THE WHOLE DISTANCE BAND

RADIUS (KM)	.145	.210	.320	.500	.680	1.000
MEAN DOSES	2.0E-06	1.5E-06	1.2E-06	1.1E-06	1.0E-06	9.4E-07

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MEAN DOSES	7.6E-07	6.0E-07	3.6E-07	2.0E-07	1.3E-07	7.6E-08

RADIUS (KM)	15.000	21.000	32.000	46.000	68.000	100.000
MEAN DOSES	4.6E-08	3.2E-08	2.1E-08	1.5E-08	1.0E-08	6.7E-09

CAT-I-W-elevated, EDE with ingestion (Italian site)

NO.	NUCLIDE	SUM
	HTO	1.120E+14
8	AR- 41	2.000E+12
16	CR- 51	3.040E+08
20	MN- 54	1.850E+08
21	MN- 56	5.170E+09
23	FE- 55	9.160E+08
27	CO- 57	3.970E+08
29	CO- 58	5.850E+08
31	CO- 60	6.900E+07
90	AG-110	3.230E+08
155	TA-179	1.190E+09
157	TA-182	9.790E+08
159	W -181	1.090E+11
160	W -183M	6.510E+11
161	W -185	2.290E+11
162	W -187	6.410E+11
166	RE-186	2.140E+10
167	RE-188M	6.120E+08
168	RE-188	9.010E+09

RESULTS ARE CALCULATED FOR THE WHOLE DISTANCE BAND

RADIUS (KM)	.145	.210	.320	.500	.680	1.000
MEAN DOSES	2.0E-06	1.5E-06	1.2E-06	9.8E-07	8.9E-07	7.8E-07

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MEAN DOSES	6.3E-07	5.0E-07	3.1E-07	1.7E-07	1.1E-07	6.7E-08

RADIUS (KM)	15.000	21.000	32.000	46.000	68.000	100.000
MEAN DOSES	4.1E-08	2.8E-08	1.9E-08	1.3E-08	9.0E-09	6.1E-09

CAT-I-Cu-ground, EDE with ingestion (Italian site)

NO.	NUCLIDE	SUM
	HTO	1.120E+14
8	AR- 41	2.000E+12
16	CR- 51	3.040E+08
20	MN- 54	1.850E+08
21	MN- 56	5.170E+09
23	FE- 55	9.160E+08
27	CO- 57	3.970E+08
29	CO- 58	5.850E+08
30	CO- 60M	4.030E+10
31	CO- 60	2.520E+09
34	NI- 63	4.600E+08
36	CU- 62	8.530E+11
37	CU- 64	1.800E+12
38	CU- 66	5.610E+11
157	TA-182	8.640E+08

RESULTS ARE CALCULATED FOR THE WHOLE DISTANCE BAND

RADIUS (KM)	.145	.210	.320	.500	.680	1.000
MEAN DOSES	1.0E-04	5.8E-05	2.9E-05	1.4E-05	8.4E-06	4.4E-06

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MEAN DOSES	2.2E-06	1.4E-06	6.4E-07	3.1E-07	1.9E-07	1.1E-07

RADIUS (KM)	15.000	21.000	32.000	46.000	68.000	100.000
MEAN DOSES	6.4E-08	4.3E-08	2.8E-08	1.9E-08	1.3E-08	8.7E-09

CAT-I-St-ground, EDE with ingestion (Italian site)

NO.	NUCLIDE	SUM
	HTO	1.120E+14
8	AR- 41	2.000E+12
16	CR- 51	9.760E+10
20	MN- 54	1.880E+10
21	MN- 56	3.570E+11
23	FE- 55	1.150E+11
27	CO- 57	2.400E+10
28	CO- 58M	6.440E+10
29	CO- 58	3.940E+10
30	CO- 60M	2.470E+10
31	CO- 60	3.980E+09
75	MO- 99	1.850E+10
80	TC- 99M	1.620E+10

RESULTS ARE CALCULATED FOR THE WHOLE DISTANCE BAND

RADIUS (KM)	.145	.210	.320	.500	.680	1.000
MEAN DOSES	1.3E-04	7.2E-05	3.6E-05	1.7E-05	1.0E-05	5.4E-06

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MEAN DOSES	2.7E-06	1.7E-06	7.8E-07	3.8E-07	2.3E-07	1.3E-07

RADIUS (KM)	15.000	21.000	32.000	46.000	68.000	100.000
MEAN DOSES	7.4E-08	5.0E-08	3.2E-08	2.2E-08	1.5E-08	1.0E-08

CAT-I-W-ground, EDE with ingestion (Italian site)

NO.	NUCLIDE	SUM
	HTO	1.120E+14
8	AR- 41	2.000E+12
16	CR- 51	3.040E+08
20	MN- 54	1.850E+08
21	MN- 56	5.170E+09
23	FE- 55	9.160E+08
27	CO- 57	3.970E+08
29	CO- 58	5.850E+08
31	CO- 60	6.900E+07
90	AG-110	3.230E+08
155	TA-179	1.190E+09
157	TA-182	9.790E+08
159	W -181	1.090E+11
160	W -183M	6.510E+11
161	W -185	2.290E+11
162	W -187	6.410E+11
166	RE-186	2.140E+10
167	RE-188M	6.120E+08
168	RE-188	9.010E+09

RESULTS ARE CALCULATED FOR THE WHOLE DISTANCE BAND

RADIUS (KM)	.145	.210	.320	.500	.680	1.000
MEAN DOSES	9.9E-05	5.6E-05	2.8E-05	1.3E-05	8.0E-06	4.2E-06

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MEAN DOSES	2.2E-06	1.3E-06	6.2E-07	3.0E-07	1.9E-07	1.1E-07

RADIUS (KM)	15.000	21.000	32.000	46.000	68.000	100.000
MEAN DOSES	6.3E-08	4.2E-08	2.7E-08	1.9E-08	1.3E-08	8.5E-09

Probabilistic potential doses from source terms of case 2 (release limits)

CAT-IV-HTO-elevated, early dose (Italian site)

NO.	NUCLIDE	SUM
1	HTO	3.70000E+16

RADIUS (KM)	0.145	0.210	0.320	0.500	0.680	1.000
MAX. DOSES	6.1E-03	8.0E-03	8.9E-03	7.0E-03	6.1E-03	4.6E-03
MEAN	1.3E-04	2.2E-04	4.7E-04	6.1E-04	7.1E-04	9.2E-04
FRACTILE 95	7.8E-04	1.1E-03	1.7E-03	2.0E-03	1.8E-03	2.5E-03
FRACTILE 90	2.1E-04	5.1E-04	1.4E-03	1.5E-03	1.3E-03	1.5E-03
FRACTILE 50	2.7E-06	8.3E-06	4.6E-05	2.5E-04	4.1E-04	5.6E-04

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSE	3.2E-03	3.5E-03	3.5E-03	3.2E-03	1.1E-03	8.1E-04
MEAN	1.1E-03	1.0E-03	7.4E-04	5.9E-04	2.0E-04	1.1E-04
FRACTILE 95	2.8E-03	3.0E-03	2.5E-03	2.2E-03	9.3E-04	5.4E-04
FRACTILE 90	2.7E-03	3.0E-03	2.4E-03	2.0E-03	6.7E-04	3.7E-04
FRACTILE 50	5.1E-04	4.7E-04	2.7E-04	1.5E-04	7.6E-05	4.1E-05

CAT-IV-HTO-elevated, EDE, with ingestion (Italian site)

RADIUS (KM)	0.145	0.210	0.320	0.500	0.680	1.000
MAX. DOSE	3.4E-01	3.0E-01	2.1E-01	1.5E-01	1.2E-01	8.6E-02
FRACTILE 99.0	1.9E-01	1.6E-01	1.1E-01	9.1E-02	7.6E-02	5.6E-02
FRACTILE 95.0	2.4E-02	2.8E-02	6.8E-02	7.1E-02	5.9E-02	4.1E-02
FRACTILE 90.0	1.0E-02	2.3E-02	6.8E-02	5.9E-02	5.2E-02	4.1E-02
FRACTILE 50.0	4.0E-05	9.8E-05	3.2E-04	1.7E-03	2.9E-03	5.6E-03
MEAN DOSE	7.3E-03	8.3E-03	1.2E-02	1.3E-02	1.3E-02	1.1E-02

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MAX. DOSE	6.0E-02	4.4E-02	2.5E-02	2.0E-02	6.0E-03	5.5E-03
FRACTILE 99.0	4.0E-02	2.7E-02	1.7E-02	1.5E-02	6.0E-03	3.3E-03
FRACTILE 95.0	2.8E-02	1.9E-02	1.3E-02	1.3E-02	3.8E-03	2.3E-03
FRACTILE 90.0	2.5E-02	1.7E-02	1.1E-02	9.8E-03	3.2E-03	1.7E-03
FRACTILE 50.0	6.9E-03	6.5E-03	4.5E-03	3.0E-03	1.3E-03	6.3E-04
MEAN DOSE	9.8E-03	8.2E-03	5.3E-03	3.9E-03	1.6E-03	8.6E-04

CAT-IV-HTO-ground, early dose (Italian site)

NO.	NUCLIDE	SUM
1	HTO	3.70000E+15

RADIUS (KM)	0.145	0.210	0.320	0.500	0.680	1.000
MAX. DOSE	2.6E-02	2.3E-02	1.7E-02	1.2E-02	8.6E-03	5.7E-03
FRACTILE 99.0	2.6E-02	2.3E-02	1.7E-02	1.2E-02	8.3E-03	5.2E-03
FRACTILE 95.0	2.6E-02	2.3E-02	1.7E-02	1.1E-02	8.3E-03	5.1E-03
FRACTILE 90.0	2.6E-02	2.3E-02	1.7E-02	1.1E-02	8.3E-03	5.1E-03
FRACTILE 50.0	2.8E-03	2.2E-03	1.3E-03	7.4E-04	5.0E-04	2.9E-04
MEAN DOSE	7.9E-03	7.2E-03	4.9E-03	3.2E-03	2.3E-03	1.4E-03

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MAX. DOSE	4.3E-03	1.9E-03	9.1E-04	5.1E-04	4.8E-04	1.3E-04
FRACTILE 99.0	3.8E-03	1.9E-03	8.9E-04	4.5E-04	2.1E-04	3.0E-05
FRACTILE 95.0	3.2E-03	1.7E-03	6.0E-04	1.6E-04	4.1E-05	2.3E-05
FRACTILE 90.0	3.0E-03	9.1E-04	4.6E-04	1.2E-04	3.6E-05	2.1E-05
FRACTILE 50.0	1.6E-04	1.0E-04	5.0E-05	3.0E-05	1.3E-05	7.2E-06
MEAN DOSE	8.2E-04	3.2E-04	1.3E-04	5.3E-05	2.2E-05	9.6E-06

CAT-IV-HTO-ground, EDE, with ingestion (Italian site)

RADIUS (KM)	0.145	0.210	0.320	0.500	0.680	1.000
MAX. DOSE	2.2E-01	1.9E-01	1.3E-01	8.0E-02	5.4E-02	3.2E-02
FRACTILE 99.0	1.5E-01	1.3E-01	9.5E-02	6.6E-02	4.7E-02	2.9E-02
FRACTILE 95.0	1.2E-01	1.1E-01	8.1E-02	5.5E-02	4.0E-02	2.4E-02
FRACTILE 90.0	1.1E-01	1.1E-01	7.6E-02	5.0E-02	3.4E-02	2.0E-02
FRACTILE 50.0	5.0E-02	4.8E-02	2.6E-02	1.5E-02	1.0E-02	6.2E-03
MEAN DOSE	5.5E-02	4.8E-02	3.1E-02	1.9E-02	1.4E-02	8.1E-03

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MAX. DOSE	2.2E-02	1.1E-02	5.6E-03	2.7E-03	1.5E-03	4.4E-04
FRACTILE 99.0	1.7E-02	8.7E-03	3.8E-03	1.6E-03	1.2E-03	2.9E-04
FRACTILE 95.0	1.6E-02	5.9E-03	2.3E-03	1.0E-03	4.9E-04	2.8E-04
FRACTILE 90.0	1.3E-02	4.4E-03	2.1E-03	8.9E-04	4.9E-04	2.8E-04
FRACTILE 50.0	3.5E-03	1.9E-03	8.7E-04	3.0E-04	1.5E-04	7.4E-05
MEAN DOSE	4.8E-03	2.2E-03	1.0E-03	4.8E-04	2.4E-04	1.1E-04

CAT-IV-HT-elevated, early dose (Italian site)

NO.	NUCLIDE	SUM
1	HT	1.11000E+18

RADIUS (KM)	0.145	0.210	0.320	0.500	0.680	1.000
MAX. DOSE	6.5E-04	7.4E-04	9.7E-04	1.0E-03	7.6E-04	5.1E-04
FRACTILE 99.0	2.5E-04	3.2E-04	4.7E-04	6.3E-04	6.5E-04	5.1E-04
FRACTILE 95.0	7.2E-05	7.6E-05	1.0E-04	1.5E-04	1.7E-04	1.8E-04
FRACTILE 90.0	4.3E-05	5.6E-05	8.7E-05	1.1E-04	1.2E-04	1.3E-04
FRACTILE 50.0	1.6E-06	2.0E-06	9.3E-06	3.1E-05	3.9E-05	5.2E-05
MEAN DOSE	1.9E-05	2.4E-05	3.7E-05	5.5E-05	6.6E-05	6.5E-05

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MAX. DOSE	4.4E-04	3.7E-04	2.6E-04	2.0E-04	1.3E-04	4.5E-05
FRACTILE 99.0	3.9E-04	2.8E-04	1.7E-04	1.7E-04	1.3E-04	4.5E-05
FRACTILE 95.0	2.2E-04	1.9E-04	1.3E-04	1.4E-04	9.1E-05	3.8E-05
FRACTILE 90.0	1.9E-04	1.7E-04	1.1E-04	1.1E-04	6.2E-05	2.8E-05
FRACTILE 50.0	4.5E-05	4.0E-05	2.3E-05	1.4E-05	1.1E-05	6.3E-06
MEAN DOSE	7.1E-05	6.6E-05	4.2E-05	3.5E-05	2.4E-05	1.0E-05

CAT-IV-HT-elevated, EDE, with ingestion (Italian site)

RADIUS (KM)	0.145	0.210	0.320	0.500	0.680	1.000
MAX. DOSE	6.7E-02	9.1E-02	1.0E-01	7.9E-02	7.5E-02	6.3E-02
FRACTILE 99.0	2.2E-02	3.0E-02	7.2E-02	7.8E-02	6.5E-02	4.7E-02
FRACTILE 95.0	6.2E-03	8.5E-03	1.7E-02	2.3E-02	1.9E-02	2.6E-02
FRACTILE 90.0	2.4E-03	5.8E-03	1.7E-02	1.7E-02	1.4E-02	1.9E-02
FRACTILE 50.0	1.8E-05	1.3E-04	5.2E-04	2.8E-03	4.7E-03	6.0E-03
MEAN DOSE	1.2E-03	2.1E-03	4.9E-03	6.4E-03	7.5E-03	9.9E-03

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MAX. DOSE	4.9E-02	5.5E-02	4.6E-02	2.6E-02	1.3E-02	1.0E-02
FRACTILE 99.0	4.1E-02	4.1E-02	3.6E-02	2.1E-02	1.1E-02	7.9E-03
FRACTILE 95.0	3.5E-02	3.6E-02	3.0E-02	1.7E-02	9.5E-03	6.0E-03
FRACTILE 90.0	3.2E-02	3.3E-02	2.7E-02	1.5E-02	8.1E-03	4.9E-03
FRACTILE 50.0	4.7E-03	4.4E-03	2.6E-03	1.3E-03	8.5E-04	4.9E-04
MEAN DOSE	1.2E-02	1.1E-02	8.1E-03	4.6E-03	2.3E-03	1.2E-03

CAT-IV-HT-ground, early dose (Italian site)

1 HT 1.11000E+17

RADIUS (KM)	0.145	0.210	0.320	0.500	0.680	1.000
MAX. DOSE	2.3E-03	1.5E-03	1.0E-03	8.0E-04	6.7E-04	4.0E-04
FRACTILE 99.0	2.3E-03	1.5E-03	1.0E-03	7.8E-04	5.5E-04	3.6E-04
FRACTILE 95.0	1.5E-03	1.3E-03	8.9E-04	7.2E-04	5.2E-04	3.2E-04
FRACTILE 90.0	1.0E-03	1.1E-03	7.6E-04	6.5E-04	4.9E-04	3.1E-04
FRACTILE 50.0	6.5E-05	1.4E-04	9.3E-05	7.2E-05	5.9E-05	3.5E-05
MEAN DOSE	3.1E-04	3.6E-04	2.4E-04	1.9E-04	1.4E-04	8.7E-05

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MAX. DOSE	3.1E-04	2.1E-04	9.4E-05	5.1E-05	2.9E-05	1.6E-05
FRACTILE 99.0	3.1E-04	2.1E-04	9.4E-05	3.7E-05	2.9E-05	1.1E-05
FRACTILE 95.0	2.3E-04	1.5E-04	6.5E-05	3.2E-05	1.7E-05	7.6E-06
FRACTILE 90.0	1.9E-04	1.1E-04	4.7E-05	2.5E-05	1.3E-05	5.9E-06
FRACTILE 50.0	2.2E-05	1.6E-05	7.6E-06	4.4E-06	3.1E-06	1.6E-06
MEAN DOSE	5.7E-05	3.8E-05	1.5E-05	7.9E-06	4.9E-06	2.5E-06

CAT-IV-HT-ground, EDE, with ingestion (Italian site)

RADIUS (KM)	0.145	0.210	0.320	0.500	0.680	1.000
MAX. DOSE	3.8E-01	3.6E-01	2.6E-01	1.9E-01	1.4E-01	9.0E-02
FRACTILE 99.0	3.5E-01	3.2E-01	2.3E-01	1.6E-01	1.1E-01	7.2E-02
FRACTILE 95.0	3.1E-01	2.9E-01	2.1E-01	1.4E-01	1.0E-01	6.5E-02
FRACTILE 90.0	2.8E-01	2.6E-01	1.9E-01	1.3E-01	9.5E-02	6.0E-02
FRACTILE 50.0	3.0E-02	2.4E-02	1.4E-02	8.1E-03	5.5E-03	3.3E-03
MEAN DOSE	8.7E-02	7.9E-02	5.4E-02	3.6E-02	2.6E-02	1.6E-02

RADIUS (KM)	1.500	2.000	3.200	5.000	6.800	10.000
MAX. DOSE	7.0E-02	3.0E-02	1.6E-02	6.7E-03	7.2E-03	2.1E-03
FRACTILE 99.0	5.0E-02	2.3E-02	1.0E-02	5.2E-03	3.4E-03	4.4E-04
FRACTILE 95.0	4.5E-02	2.0E-02	7.8E-03	1.6E-03	5.9E-04	3.0E-04
FRACTILE 90.0	3.5E-02	1.2E-02	6.2E-03	9.3E-04	4.0E-04	2.5E-04
FRACTILE 50.0	1.9E-03	1.3E-03	6.3E-04	3.1E-04	1.9E-04	1.0E-04
MEAN DOSE	1.0E-02	3.8E-03	1.7E-03	5.4E-04	3.0E-04	1.3E-04

CAT-IV-Cu-elevated, early dose (Italian site)

NO.	NUCLIDE	SUM
30	CO- 60M	1.610E+13
31	CO- 60	9.810E+11
34	NI- 63	1.840E+11
36	CU- 62	3.410E+14
37	CU- 64	7.220E+14
38	CU- 66	2.240E+14
157	TA-182	3.460E+11

RADIUS (KM)	0.145	0.180	0.320	0.460	0.680	1.000
MAX. DOSES	2.6E-02	2.2E-02	1.3E-02	9.8E-03	7.1E-03	5.0E-03
FRACTILE 99.0	1.0E-02	8.7E-03	5.5E-03	4.3E-03	3.4E-03	2.3E-03
FRACTILE 95.0	8.7E-04	8.1E-04	9.5E-04	7.8E-04	6.2E-04	5.6E-04
FRACTILE 90.0	1.9E-04	2.1E-04	2.8E-04	2.8E-04	3.1E-04	3.7E-04
FRACTILE 50.0	3.5E-05	3.6E-05	1.0E-04	1.3E-04	1.2E-04	1.1E-04
MEAN DOSES	3.7E-04	3.2E-04	3.1E-04	2.6E-04	2.4E-04	2.3E-04

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	3.3E-03	2.3E-03	1.2E-03	1.0E-03	3.0E-04	1.7E-04
FRACTILE 99.0	1.6E-03	1.2E-03	6.0E-04	5.4E-04	2.1E-04	1.6E-04
FRACTILE 95.0	5.4E-04	5.5E-04	3.9E-04	4.1E-04	1.5E-04	1.1E-04
FRACTILE 90.0	4.7E-04	4.9E-04	3.7E-04	3.2E-04	1.1E-04	7.9E-05
FRACTILE 50.0	9.3E-05	8.5E-05	5.6E-05	3.7E-05	1.3E-05	7.4E-06
MEAN DOSES	2.2E-04	2.0E-04	1.3E-04	1.0E-04	3.8E-05	2.3E-05

CAT-IV-Cu-elevated, EDE with ingestion (Italian site)

RADIUS (KM)	0.145	0.180	0.320	0.460	0.680	1.000
MAX. DOSES	7.9E-01	6.6E-01	4.0E-01	3.0E-01	2.1E-01	1.4E-01
FRACTILE 99.0	1.0E-01	1.0E-01	1.0E-01	1.0E-01	8.9E-02	6.2E-02
FRACTILE 95.0	2.0E-02	1.8E-02	1.2E-02	1.0E-02	8.3E-03	6.0E-03
FRACTILE 90.0	1.2E-03	1.5E-03	2.1E-03	2.5E-03	2.2E-03	2.6E-03
FRACTILE 50.0	3.7E-05	3.7E-05	1.8E-04	2.7E-04	5.6E-04	7.2E-04
MEAN DOSES	9.6E-03	8.2E-03	5.5E-03	4.4E-03	3.5E-03	3.0E-03

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	9.4E-02	6.7E-02	3.7E-02	3.2E-02	9.7E-03	5.2E-03
FRACTILE 99.0	4.1E-02	3.2E-02	1.8E-02	7.8E-03	5.5E-03	2.6E-03
FRACTILE 95.0	4.8E-03	5.4E-03	6.0E-03	4.8E-03	2.0E-03	1.3E-03
FRACTILE 90.0	3.5E-03	3.7E-03	3.1E-03	2.8E-03	1.2E-03	9.3E-04
FRACTILE 50.0	6.2E-04	5.8E-04	3.9E-04	2.6E-04	1.0E-04	5.4E-05
MEAN DOSES	2.6E-03	2.2E-03	1.5E-03	1.1E-03	4.8E-04	3.1E-04

CAT-IV-Cu-ground, early dose (Italian site)

NO.	NUCLIDE	SUM
30	CO- 60M	1.610E+12
31	CO- 60	9.810E+10
34	NI- 63	1.840E+10
36	CU- 62	3.410E+13
37	CU- 64	7.220E+13
38	CU- 66	2.240E+13
157	TA-182	3.460E+10

RADIUS (KM)	0.145	0.180	0.320	0.460	0.680	1.000
MAX. DOSES	6.2E-03	5.4E-03	3.4E-03	2.3E-03	1.5E-03	8.9E-04
FRACTILE 99.0	3.8E-03	3.5E-03	2.6E-03	1.9E-03	1.3E-03	8.7E-04
FRACTILE 95.0	3.8E-03	3.5E-03	2.5E-03	1.9E-03	1.2E-03	7.8E-04
FRACTILE 90.0	3.7E-03	3.5E-03	2.5E-03	1.9E-03	1.2E-03	7.6E-04
FRACTILE 50.0	4.6E-04	3.6E-04	2.1E-04	1.4E-04	8.7E-05	5.4E-05
MEAN DOSES	1.2E-03	1.1E-03	7.6E-04	5.4E-04	3.6E-04	2.2E-04

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	6.7E-04	4.8E-04	1.4E-04	9.5E-05	7.0E-05	7.4E-05
FRACTILE 99.0	6.5E-04	2.9E-04	1.4E-04	8.1E-05	3.5E-05	3.5E-05
FRACTILE 95.0	5.0E-04	2.7E-04	1.0E-04	4.8E-05	1.9E-05	8.5E-06
FRACTILE 90.0	4.5E-04	1.6E-04	7.4E-05	2.1E-05	7.6E-06	5.4E-06
FRACTILE 50.0	3.2E-05	2.0E-05	9.1E-06	4.6E-06	2.5E-06	1.3E-06
MEAN DOSES	1.4E-04	5.3E-05	2.4E-05	1.1E-05	4.7E-06	3.0E-06

CAT-IV-Cu-ground, EDE with ingestion (Italian site)

RADIUS (KM)	0.145	0.180	0.320	0.460	0.680	1.000
MAX. DOSES	1.3E-01	1.2E-01	7.9E-02	5.7E-02	3.8E-02	2.4E-02
FRACTILE 99.0	5.9E-02	5.1E-02	3.4E-02	2.5E-02	1.7E-02	1.1E-02
FRACTILE 95.0	3.2E-02	3.0E-02	2.1E-02	1.5E-02	1.0E-02	6.8E-03
FRACTILE 90.0	3.2E-02	2.9E-02	2.1E-02	1.5E-02	1.0E-02	6.5E-03
FRACTILE 50.0	4.4E-03	3.8E-03	2.2E-03	1.4E-03	8.7E-04	5.6E-04
MEAN DOSES	1.1E-02	1.0E-02	6.8E-03	4.9E-03	3.3E-03	2.1E-03

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	1.5E-02	1.4E-02	3.3E-03	2.1E-03	1.1E-03	2.2E-03
FRACTILE 99.0	8.7E-03	3.5E-03	1.9E-03	1.4E-03	6.9E-04	6.3E-04
FRACTILE 95.0	4.9E-03	2.3E-03	1.3E-03	7.1E-04	3.2E-04	2.6E-04
FRACTILE 90.0	3.9E-03	2.0E-03	8.9E-04	3.5E-04	1.5E-04	1.0E-04
FRACTILE 50.0	3.9E-04	1.9E-04	9.3E-05	3.9E-05	1.9E-05	1.0E-05
MEAN DOSES	1.3E-03	5.4E-04	2.8E-04	1.3E-04	6.6E-05	5.1E-05

CAT-IV-St-elevated, early dose (Italian site)

NO.	NUCLIDE	SUM
16	CR- 51	3.890E+13
20	MN- 54	7.450E+12
21	MN- 56	1.410E+14
23	FE- 55	4.580E+13
27	CO- 57	9.450E+12
28	CO- 58M	2.580E+13
29	CO- 58	1.550E+13
30	CO- 60M	9.860E+12
31	CO- 60	1.560E+12
75	MO- 99	7.400E+12
80	TC- 99M	6.470E+12

RADIUS (KM)	0.145	0.180	0.320	0.460	0.680	1.000
MAX. DOSES	4.2E-02	3.5E-02	2.2E-02	1.6E-02	1.2E-02	8.2E-03
FRACTILE 99.0	1.7E-02	1.4E-02	8.9E-03	6.9E-03	5.4E-03	3.8E-03
FRACTILE 95.0	1.3E-03	1.2E-03	1.4E-03	1.2E-03	9.5E-04	8.3E-04
FRACTILE 90.0	2.3E-04	2.6E-04	3.5E-04	3.5E-04	3.6E-04	5.0E-04
FRACTILE 50.0	2.1E-05	2.4E-05	1.0E-04	1.1E-04	1.5E-04	1.4E-04
MEAN DOSES	5.6E-04	4.9E-04	4.1E-04	3.6E-04	3.3E-04	3.3E-04

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	5.4E-03	3.8E-03	2.1E-03	1.7E-03	5.2E-04	2.8E-04
FRACTILE 99.0	2.6E-03	1.9E-03	1.0E-03	8.5E-04	3.3E-04	2.5E-04
FRACTILE 95.0	7.8E-04	8.3E-04	6.2E-04	6.3E-04	2.3E-04	1.9E-04
FRACTILE 90.0	6.8E-04	7.2E-04	5.8E-04	4.9E-04	1.8E-04	1.3E-04
FRACTILE 50.0	1.2E-04	1.1E-04	7.6E-05	5.1E-05	2.1E-05	1.1E-05
MEAN DOSES	3.2E-04	2.9E-04	2.1E-04	1.6E-04	5.9E-05	3.6E-05

CAT-IV-St-elevated, EDE with ingestion (Italian site)

RADIUS (KM)	0.145	0.180	0.320	0.460	0.680	1.000
MAX. DOSES	3.0E+00	2.5E+00	1.6E+00	1.1E+00	8.1E-01	5.6E-01
FRACTILE 99.0	1.0E-01	1.0E-01	1.0E-01	1.0E-01	1.0E-01	1.0E-01
FRACTILE 95.0	7.9E-02	6.9E-02	4.7E-02	3.8E-02	3.2E-02	2.3E-02
FRACTILE 90.0	3.8E-03	5.5E-03	7.6E-03	8.9E-03	7.9E-03	9.5E-03
FRACTILE 50.0	2.7E-05	2.8E-05	2.2E-04	9.3E-04	1.8E-03	2.6E-03
MEAN DOSES	3.7E-02	3.1E-02	2.1E-02	1.7E-02	1.3E-02	1.1E-02

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	3.7E-01	2.6E-01	1.5E-01	1.2E-01	3.8E-02	2.0E-02
FRACTILE 99.0	1.0E-01	1.0E-01	6.9E-02	3.0E-02	2.1E-02	1.0E-02
FRACTILE 95.0	1.7E-02	1.9E-02	2.3E-02	1.8E-02	7.8E-03	5.1E-03
FRACTILE 90.0	1.3E-02	1.3E-02	1.1E-02	1.0E-02	4.7E-03	3.7E-03
FRACTILE 50.0	2.2E-03	2.0E-03	1.4E-03	9.3E-04	3.8E-04	1.9E-04
MEAN DOSES	9.6E-03	8.3E-03	5.6E-03	3.9E-03	1.8E-03	1.2E-03

CAT-IV-St-ground, early dose (Italian site)

NO.	NUCLIDE	SUM
16	CR- 51	3.890E+12
20	MN- 54	7.450E+11
21	MN- 56	1.410E+13
23	FE- 55	4.580E+12
27	CO- 57	9.450E+11
28	CO- 58M	2.580E+12
29	CO- 58	1.550E+12
30	CO- 60M	9.860E+11
31	CO- 60	1.560E+11
75	MO- 99	7.400E+11
80	TC- 99M	6.470E+11

RESULTS ARE CALCULATED FOR THE WHOLE DISTANCE BAND

RADIUS (KM)	0.145	0.180	0.320	0.460	0.680	1.000
MAX. DOSES	9.7E-03	8.5E-03	5.4E-03	3.8E-03	2.4E-03	1.5E-03
FRACTILE 99.0	5.6E-03	5.1E-03	3.8E-03	2.9E-03	1.9E-03	1.3E-03
FRACTILE 95.0	5.5E-03	5.1E-03	3.7E-03	2.8E-03	1.9E-03	1.2E-03
FRACTILE 90.0	5.5E-03	5.1E-03	3.7E-03	2.8E-03	1.9E-03	1.2E-03
FRACTILE 50.0	6.5E-04	5.4E-04	3.0E-04	2.0E-04	1.2E-04	7.8E-05
MEAN DOSES	1.8E-03	1.6E-03	1.1E-03	8.1E-04	5.3E-04	3.4E-04

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	1.0E-03	8.1E-04	2.2E-04	1.5E-04	1.1E-04	1.2E-04
FRACTILE 99.0	1.0E-03	4.5E-04	2.2E-04	1.3E-04	5.5E-05	5.8E-05
FRACTILE 95.0	8.3E-04	4.2E-04	1.5E-04	7.6E-05	3.3E-05	1.7E-05
FRACTILE 90.0	6.9E-04	2.5E-04	1.2E-04	3.4E-05	1.2E-05	8.5E-06
FRACTILE 50.0	4.7E-05	3.1E-05	1.3E-05	6.8E-06	3.7E-06	2.1E-06
MEAN DOSES	2.1E-04	8.1E-05	3.7E-05	1.7E-05	7.6E-06	5.0E-06

CAT-IV-St-ground, EDE with ingestion (Italian site)

RADIUS (KM)	0.145	0.180	0.320	0.460	0.680	1.000
MAX. DOSES	5.1E-01	4.6E-01	3.0E-01	2.2E-01	1.5E-01	9.3E-02
FRACTILE 99.0	1.0E-01	1.0E-01	1.0E-01	9.3E-02	6.5E-02	4.4E-02
FRACTILE 95.0	1.0E-01	1.0E-01	7.8E-02	5.8E-02	3.8E-02	2.5E-02
FRACTILE 90.0	1.0E-01	1.0E-01	7.8E-02	5.8E-02	3.8E-02	2.4E-02
FRACTILE 50.0	1.6E-02	1.4E-02	8.1E-03	5.2E-03	3.2E-03	2.1E-03
MEAN DOSES	4.1E-02	3.7E-02	2.5E-02	1.8E-02	1.2E-02	7.7E-03

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	5.7E-02	5.4E-02	1.3E-02	8.1E-03	4.1E-03	8.6E-03
FRACTILE 99.0	3.4E-02	1.4E-02	7.4E-03	5.4E-03	2.7E-03	2.4E-03
FRACTILE 95.0	1.9E-02	8.3E-03	4.6E-03	2.6E-03	1.3E-03	1.0E-03
FRACTILE 90.0	1.4E-02	7.6E-03	3.2E-03	1.3E-03	5.9E-04	4.0E-04
FRACTILE 50.0	1.5E-03	6.8E-04	3.4E-04	1.4E-04	6.8E-05	3.8E-05
MEAN DOSES	4.9E-03	2.0E-03	1.0E-03	5.0E-04	2.5E-04	1.9E-04

CAT-IV-W-elevated, early dose (Italian site)

NO.	NUCLIDE	SUM
90	AG-110	1.290E+11
155	TA-179	4.750E+11
157	TA-182	3.920E+11
159	W -181	4.340E+13
160	W -183M	2.600E+14
161	W -185	9.180E+13
162	W -187	2.560E+14
166	RE-186	8.570E+12
167	RE-188M	2.450E+11
168	RE-188	3.600E+12

RADIUS (KM)	0.145	0.180	0.320	0.460	0.680	1.000
MAX. DOSES	3.7E-02	3.1E-02	1.9E-02	1.4E-02	1.0E-02	6.9E-03
FRACTILE 99.0	1.5E-02	1.2E-02	7.8E-03	5.9E-03	4.4E-03	3.0E-03
FRACTILE 95.0	1.0E-03	9.1E-04	6.5E-04	5.9E-04	4.9E-04	3.8E-04
FRACTILE 90.0	9.5E-05	1.2E-04	1.5E-04	1.6E-04	1.5E-04	2.2E-04
FRACTILE 50.0	8.7E-06	1.0E-05	4.3E-05	4.7E-05	6.3E-05	5.8E-05
MEAN DOSES	4.7E-04	4.0E-04	2.9E-04	2.4E-04	2.0E-04	1.8E-04

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	4.5E-03	3.2E-03	1.8E-03	1.5E-03	4.5E-04	2.5E-04
FRACTILE 99.0	2.0E-03	1.6E-03	8.7E-04	4.1E-04	2.6E-04	1.3E-04
FRACTILE 95.0	3.5E-04	3.9E-04	3.4E-04	2.9E-04	1.1E-04	1.1E-04
FRACTILE 90.0	2.8E-04	3.0E-04	2.4E-04	2.1E-04	1.0E-04	6.6E-05
FRACTILE 50.0	4.9E-05	4.5E-05	3.1E-05	2.1E-05	8.7E-06	4.5E-06
MEAN DOSES	1.6E-04	1.5E-04	1.0E-04	7.4E-05	3.1E-05	2.0E-05

CAT-IV-W-elevated, EDE with ingestion (Italian site)

RADIUS (KM)	0.145	0.180	0.320	0.460	0.680	1.000
MAX. DOSES	6.2E-01	5.2E-01	3.2E-01	2.3E-01	1.6E-01	1.1E-01
FRACTILE 99.0	1.0E-01	1.0E-01	1.0E-01	9.5E-02	6.9E-02	4.8E-02
FRACTILE 95.0	1.6E-02	1.4E-02	9.5E-03	7.8E-03	6.5E-03	4.7E-03
FRACTILE 90.0	8.1E-04	1.1E-03	1.5E-03	1.8E-03	1.6E-03	1.9E-03
FRACTILE 50.0	1.1E-05	2.5E-05	5.6E-05	2.0E-04	3.7E-04	5.2E-04
MEAN DOSES	7.5E-03	6.4E-03	4.3E-03	3.4E-03	2.7E-03	2.3E-03

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	7.4E-02	5.3E-02	2.9E-02	2.5E-02	7.6E-03	4.1E-03
FRACTILE 99.0	3.2E-02	2.5E-02	1.4E-02	6.2E-03	4.4E-03	2.0E-03
FRACTILE 95.0	3.5E-03	4.1E-03	4.7E-03	3.7E-03	1.6E-03	1.0E-03
FRACTILE 90.0	2.6E-03	2.8E-03	2.3E-03	2.1E-03	9.5E-04	7.2E-04
FRACTILE 50.0	4.6E-04	4.2E-04	2.9E-04	1.9E-04	7.8E-05	4.0E-05
MEAN DOSES	2.0E-03	1.7E-03	1.1E-03	8.0E-04	3.7E-04	2.4E-04

CAT-IV-W-ground, early dose (Italian site)

NO.	NUCLIDE	SUM
90	AG-110	1.290E+10
155	TA-179	4.750E+10
157	TA-182	3.920E+10
159	W -181	4.340E+12
160	W -183M	2.600E+13
161	W -185	9.180E+12
162	W -187	2.560E+13
166	RE-186	8.570E+11
167	RE-188M	2.450E+10
168	RE-188	3.600E+11

RADIUS (KM)	0.145	0.180	0.320	0.460	0.680	1.000
MAX. DOSES	6.8E-03	6.1E-03	4.0E-03	2.9E-03	1.9E-03	1.2E-03
FRACTILE 99.0	3.3E-03	2.9E-03	1.9E-03	1.3E-03	8.7E-04	5.9E-04
FRACTILE 95.0	2.2E-03	2.1E-03	1.5E-03	1.1E-03	7.6E-04	4.9E-04
FRACTILE 90.0	2.2E-03	2.1E-03	1.5E-03	1.1E-03	7.6E-04	4.8E-04
FRACTILE 50.0	3.1E-04	2.6E-04	1.5E-04	1.0E-04	6.5E-05	3.9E-05
MEAN DOSES	7.6E-04	6.8E-04	4.7E-04	3.4E-04	2.3E-04	1.5E-04

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	7.0E-04	6.7E-04	1.6E-04	9.9E-05	6.0E-05	1.1E-04
FRACTILE 99.0	4.6E-04	1.9E-04	9.5E-05	7.4E-05	3.4E-05	3.5E-05
FRACTILE 95.0	3.7E-04	1.7E-04	7.2E-05	4.6E-05	1.9E-05	1.1E-05
FRACTILE 90.0	2.9E-04	1.0E-04	6.3E-05	1.8E-05	7.2E-06	5.5E-06
FRACTILE 50.0	2.2E-05	1.5E-05	6.3E-06	3.2E-06	1.5E-06	8.7E-07
MEAN DOSES	9.3E-05	3.7E-05	1.8E-05	8.5E-06	4.0E-06	2.9E-06

CAT-IV-W-ground, EDE with ingestion (Italian site)

RADIUS (KM)	0.145	0.180	0.320	0.460	0.680	1.000
MAX. DOSES	1.0E-01	9.3E-02	6.2E-02	4.5E-02	3.0E-02	1.9E-02
FRACTILE 99.0	4.5E-02	4.0E-02	2.6E-02	1.9E-02	1.3E-02	8.9E-03
FRACTILE 95.0	2.3E-02	2.2E-02	1.6E-02	1.2E-02	7.8E-03	5.0E-03
FRACTILE 90.0	2.3E-02	2.2E-02	1.6E-02	1.2E-02	7.8E-03	4.9E-03
FRACTILE 50.0	3.2E-03	2.8E-03	1.7E-03	1.0E-03	6.5E-04	4.4E-04
MEAN DOSES	8.3E-03	7.4E-03	5.1E-03	3.7E-03	2.5E-03	1.6E-03

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	1.1E-02	1.1E-02	2.6E-03	1.6E-03	8.4E-04	1.7E-03
FRACTILE 99.0	6.8E-03	2.8E-03	1.5E-03	1.1E-03	5.4E-04	4.9E-04
FRACTILE 95.0	3.7E-03	1.7E-03	9.3E-04	5.4E-04	2.5E-04	2.0E-04
FRACTILE 90.0	2.9E-03	1.5E-03	6.6E-04	2.7E-04	1.2E-04	7.9E-05
FRACTILE 50.0	3.0E-04	1.4E-04	6.9E-05	2.9E-05	1.4E-05	7.8E-06
MEAN DOSES	1.0E-03	4.1E-04	2.1E-04	1.0E-04	5.1E-05	3.9E-05

CAT-IV-ACP-elevated, early dose (Italian site)

NO.	NUCLIDE	SUM
16	CR- 51	1.270E+12
20	MN- 54	7.700E+11
23	FE- 55	3.820E+12
27	CO- 57	1.650E+12
29	CO- 58	2.440E+12
31	CO- 60	2.870E+11

RADIUS (KM)	0.145	0.180	0.320	0.460	0.680	1.000
MAX. DOSES	4.9E-03	4.1E-03	2.6E-03	1.9E-03	1.4E-03	9.7E-04
FRACTILE 99.0	1.9E-03	1.6E-03	1.0E-03	8.1E-04	6.3E-04	4.5E-04
FRACTILE 95.0	1.5E-04	1.4E-04	1.6E-04	1.3E-04	1.1E-04	9.5E-05
FRACTILE 90.0	2.5E-05	2.9E-05	3.9E-05	4.1E-05	3.4E-05	4.9E-05
FRACTILE 50.0	3.6E-07	7.9E-07	1.8E-06	5.6E-06	1.1E-05	1.6E-05
MEAN DOSES	6.3E-05	5.5E-05	4.4E-05	3.8E-05	3.5E-05	3.6E-05

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	6.4E-04	4.6E-04	2.5E-04	2.1E-04	6.5E-05	3.6E-05
FRACTILE 99.0	3.1E-04	2.3E-04	1.2E-04	1.0E-04	4.3E-05	3.0E-05
FRACTILE 95.0	8.7E-05	9.8E-05	7.1E-05	7.4E-05	2.8E-05	2.3E-05
FRACTILE 90.0	7.8E-05	8.5E-05	6.9E-05	5.8E-05	2.1E-05	1.6E-05
FRACTILE 50.0	1.4E-05	1.3E-05	8.7E-06	5.8E-06	2.3E-06	1.2E-06
MEAN DOSES	3.7E-05	3.4E-05	2.4E-05	1.8E-05	6.9E-06	4.4E-06

CAT-IV-ACP-elevated, EDE with ingestion (Italian site)

RESULTS ARE CALCULATED FOR THE WHOLE DISTANCE BAND

RADIUS (KM)	0.145	0.180	0.320	0.460	0.680	1.000
MAX. DOSES	4.2E-01	3.5E-01	2.1E-01	1.6E-01	1.1E-01	7.7E-02
FRACTILE 99.0	1.0E-01	1.0E-01	8.7E-02	6.5E-02	4.7E-02	3.2E-02
FRACTILE 95.0	1.1E-02	9.5E-03	6.5E-03	5.2E-03	4.4E-03	3.2E-03
FRACTILE 90.0	4.9E-04	7.4E-04	1.0E-03	1.2E-03	1.1E-03	1.3E-03
FRACTILE 50.0	1.5E-06	1.5E-06	2.8E-05	1.2E-04	2.5E-04	3.5E-04
MEAN DOSES	5.1E-03	4.3E-03	2.9E-03	2.3E-03	1.8E-03	1.5E-03

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	5.0E-02	3.6E-02	2.0E-02	1.7E-02	5.2E-03	2.8E-03
FRACTILE 99.0	2.1E-02	1.7E-02	9.5E-03	4.2E-03	3.0E-03	1.4E-03
FRACTILE 95.0	2.4E-03	2.7E-03	3.2E-03	2.5E-03	1.1E-03	7.1E-04
FRACTILE 90.0	1.7E-03	1.9E-03	1.5E-03	1.4E-03	6.3E-04	5.0E-04
FRACTILE 50.0	3.0E-04	2.8E-04	1.9E-04	1.3E-04	5.1E-05	2.6E-05
MEAN DOSES	1.3E-03	1.1E-03	7.6E-04	5.4E-04	2.5E-04	1.6E-04

CAT-IV-ACP-ground, early dose (Italian site)

NO.	NUCLIDE	SUM
16	CR- 51	1.270E+11
20	MN- 54	7.700E+10
23	FE- 55	3.820E+11
27	CO- 57	1.650E+11
29	CO- 58	2.440E+11
31	CO- 60	2.870E+10

RADIUS (KM)	0.145	0.180	0.320	0.460	0.680	1.000
MAX. DOSES	1.2E-03	1.0E-03	6.5E-04	4.5E-04	2.9E-04	1.8E-04
FRACTILE 99.0	7.1E-04	6.6E-04	4.8E-04	3.6E-04	2.5E-04	1.7E-04
FRACTILE 95.0	7.1E-04	6.6E-04	4.8E-04	3.5E-04	2.3E-04	1.5E-04
FRACTILE 90.0	7.1E-04	6.6E-04	4.8E-04	3.5E-04	2.3E-04	1.5E-04
FRACTILE 50.0	7.9E-05	6.6E-05	3.6E-05	2.4E-05	1.5E-05	9.1E-06
MEAN DOSES	2.3E-04	2.0E-04	1.4E-04	1.0E-04	6.6E-05	4.2E-05

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	1.3E-04	9.9E-05	2.8E-05	1.9E-05	1.5E-05	1.5E-05
FRACTILE 99.0	1.2E-04	5.6E-05	2.8E-05	1.7E-05	7.2E-06	7.2E-06
FRACTILE 95.0	1.0E-04	5.1E-05	1.9E-05	9.8E-06	4.6E-06	2.4E-06
FRACTILE 90.0	8.7E-05	3.1E-05	1.5E-05	4.7E-06	1.6E-06	1.1E-06
FRACTILE 50.0	5.5E-06	3.5E-06	1.5E-06	7.6E-07	4.3E-07	2.3E-07
MEAN DOSES	2.6E-05	9.9E-06	4.6E-06	2.1E-06	9.5E-07	6.3E-07

CAT-IV-ACP-ground, EDE with ingestion (Italian site)

RADIUS (KM)	0.145	0.180	0.320	0.460	0.680	1.000
MAX. DOSES	7.0E-02	6.3E-02	4.2E-02	3.0E-02	2.0E-02	1.3E-02
FRACTILE 99.0	3.0E-02	2.7E-02	1.8E-02	1.3E-02	8.7E-03	6.0E-03
FRACTILE 95.0	1.6E-02	1.4E-02	1.0E-02	7.8E-03	5.2E-03	3.4E-03
FRACTILE 90.0	1.6E-02	1.4E-02	1.0E-02	7.8E-03	5.2E-03	3.2E-03
FRACTILE 50.0	2.2E-03	1.9E-03	1.1E-03	7.1E-04	4.3E-04	3.0E-04
MEAN DOSES	5.6E-03	5.0E-03	3.4E-03	2.5E-03	1.6E-03	1.1E-03

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	7.8E-03	7.4E-03	1.8E-03	1.1E-03	5.7E-04	1.2E-03
FRACTILE 99.0	4.6E-03	1.9E-03	1.0E-03	7.2E-04	3.6E-04	3.3E-04
FRACTILE 95.0	2.5E-03	1.1E-03	6.3E-04	3.6E-04	1.7E-04	1.4E-04
FRACTILE 90.0	1.9E-03	1.0E-03	4.5E-04	1.8E-04	8.1E-05	5.5E-05
FRACTILE 50.0	2.0E-04	9.1E-05	4.6E-05	1.9E-05	9.3E-06	5.1E-06
MEAN DOSES	6.7E-04	2.8E-04	1.4E-04	6.9E-05	3.4E-05	2.7E-05

Probabilistic potential doses from source terms of case 3 (CAT-IV-bypass)

CAT-IV-bypass-Cu-elevated, early dose (Italian site)

NO.	NUCLIDE	SUM
	HTO	0.85100E+16
16	CR- 51	0.38000E+10
20	MN- 54	0.23100E+10
21	MN- 56	0.64600E+11
23	FE- 55	0.11500E+11
27	CO- 57	0.49600E+10
29	CO- 58	0.53600E+11
30	CO- 60M	0.88900E+12
31	CO- 60	0.54800E+11
34	NI- 63	0.10100E+11
36	CU- 62	0.18800E+14
37	CU- 64	0.39700E+14
38	CU- 66	0.12300E+14
157	TA-182	0.19000E+11

RADIUS (KM)	0.145	0.180	0.320	0.460	0.680	1.000
MAX. DOSES	1.9E-03	2.1E-03	2.3E-03	2.1E-03	1.7E-03	1.3E-03
FRACTILE 99.0	1.0E-03	1.2E-03	1.7E-03	1.7E-03	1.3E-03	9.8E-04
FRACTILE 95.0	2.8E-04	3.8E-04	4.6E-04	4.9E-04	4.5E-04	5.9E-04
FRACTILE 90.0	7.1E-05	1.3E-04	3.5E-04	3.7E-04	3.1E-04	3.7E-04
FRACTILE 50.0	2.6E-06	3.2E-06	1.4E-05	5.0E-05	1.0E-04	1.3E-04
MEAN DOSES	5.1E-05	6.9E-05	1.3E-04	1.5E-04	1.8E-04	2.2E-04

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	9.4E-04	8.4E-04	8.4E-04	7.8E-04	2.6E-04	1.9E-04
FRACTILE 99.0	7.8E-04	7.4E-04	6.2E-04	7.8E-04	2.3E-04	1.8E-04
FRACTILE 95.0	6.8E-04	7.2E-04	6.0E-04	5.4E-04	2.2E-04	1.3E-04
FRACTILE 90.0	6.6E-04	7.2E-04	5.9E-04	4.8E-04	1.6E-04	8.5E-05
FRACTILE 50.0	1.2E-04	1.1E-04	6.6E-05	3.9E-05	1.8E-05	9.8E-06
MEAN DOSES	2.6E-04	2.5E-04	1.8E-04	1.4E-04	4.9E-05	2.6E-05

CAT-IV-bypass-Cu-elevated, EDE, with ingestion (Italian site)

RADIUS (KM)	0.145	0.180	0.320	0.460	0.680	1.000
MAX. DOSES	1.2E-01	1.1E-01	6.6E-02	5.1E-02	3.8E-02	2.8E-02
FRACTILE 99.0	5.6E-02	5.1E-02	3.5E-02	2.7E-02	2.1E-02	1.7E-02
FRACTILE 95.0	6.9E-03	7.4E-03	1.5E-02	1.7E-02	1.3E-02	9.5E-03
FRACTILE 90.0	2.4E-03	5.4E-03	1.5E-02	1.7E-02	1.3E-02	9.3E-03
FRACTILE 50.0	1.1E-05	2.3E-05	7.8E-05	3.4E-04	6.9E-04	1.3E-03
MEAN DOSES	2.2E-03	2.4E-03	3.2E-03	3.3E-03	3.1E-03	2.8E-03

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	1.9E-02	1.4E-02	7.6E-03	6.0E-03	1.9E-03	1.3E-03
FRACTILE 99.0	1.1E-02	7.8E-03	4.3E-03	3.7E-03	1.4E-03	7.8E-04
FRACTILE 95.0	6.5E-03	4.5E-03	3.1E-03	3.3E-03	9.3E-04	6.3E-04
FRACTILE 90.0	5.8E-03	4.0E-03	2.8E-03	2.4E-03	7.4E-04	4.4E-04
FRACTILE 50.0	1.6E-03	1.5E-03	1.0E-03	7.1E-04	3.1E-04	1.5E-04
MEAN DOSES	2.4E-03	2.0E-03	1.3E-03	9.5E-04	4.0E-04	2.1E-04

CAT-IV-bypass-St-elevated, early dose (Italian site)

NO.	NUCLIDE	SUM
	HTO	0.85100E+16
16	CR- 51	0.21400E+13
20	MN- 54	0.41200E+12
21	MN- 56	0.78100E+13
23	FE- 55	0.25300E+13
27	CO- 57	0.52500E+12
28	CO- 58M	0.14200E+13
29	CO- 58	0.86200E+12
30	CO- 60M	0.54200E+12
31	CO- 60	0.86900E+11
75	MO- 99	0.40700E+12
80	TC- 99M	0.35600E+12

RADIUS (KM)	0.145	0.180	0.320	0.460	0.680	1.000
MAX. DOSES	2.7E-03	2.5E-03	2.6E-03	2.3E-03	1.9E-03	1.4E-03
FRACTILE 99.0	1.3E-03	1.5E-03	2.0E-03	1.8E-03	1.4E-03	1.0E-03
FRACTILE 95.0	2.9E-04	4.0E-04	4.9E-04	5.0E-04	4.6E-04	6.0E-04
FRACTILE 90.0	8.7E-05	1.3E-04	3.5E-04	3.8E-04	3.1E-04	3.7E-04
FRACTILE 50.0	1.8E-06	2.8E-06	1.2E-05	5.0E-05	1.0E-04	1.3E-04
MEAN DOSES	6.1E-05	7.7E-05	1.3E-04	1.5E-04	1.8E-04	2.3E-04

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	1.1E-03	8.5E-04	8.5E-04	7.9E-04	2.7E-04	2.0E-04
FRACTILE 99.0	7.9E-04	7.4E-04	6.3E-04	7.9E-04	2.4E-04	1.8E-04
FRACTILE 95.0	6.9E-04	7.4E-04	6.0E-04	5.5E-04	2.3E-04	1.3E-04
FRACTILE 90.0	6.8E-04	7.4E-04	6.0E-04	4.9E-04	1.7E-04	8.5E-05
FRACTILE 50.0	1.2E-04	1.2E-04	6.8E-05	4.0E-05	1.8E-05	1.0E-05
MEAN DOSES	2.6E-04	2.5E-04	1.8E-04	1.4E-04	5.0E-05	2.6E-05

CAT-IV-bypass-St-elevated, EDE with ingestion (Italian site)

RADIUS (KM)	0.145	0.180	0.320	0.460	0.680	1.000
MAX. DOSES	2.4E-01	2.1E-01	1.3E-01	9.7E-02	7.1E-02	5.1E-02
FRACTILE 99.0	1.0E-01	9.1E-02	6.0E-02	4.6E-02	3.5E-02	2.7E-02
FRACTILE 95.0	1.3E-02	1.1E-02	1.7E-02	1.9E-02	1.5E-02	1.1E-02
FRACTILE 90.0	2.5E-03	5.5E-03	1.6E-02	1.7E-02	1.4E-02	9.5E-03
FRACTILE 50.0	1.1E-05	2.3E-05	1.1E-04	3.8E-04	7.6E-04	1.6E-03
MEAN DOSES	3.7E-03	3.7E-03	4.0E-03	4.0E-03	3.6E-03	3.2E-03

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	3.4E-02	2.5E-02	1.4E-02	1.1E-02	3.4E-03	1.8E-03
FRACTILE 99.0	1.8E-02	1.3E-02	6.9E-03	4.6E-03	2.1E-03	1.0E-03
FRACTILE 95.0	6.6E-03	5.1E-03	3.9E-03	3.6E-03	1.1E-03	7.8E-04
FRACTILE 90.0	5.9E-03	4.5E-03	3.3E-03	3.1E-03	1.0E-03	5.9E-04
FRACTILE 50.0	1.7E-03	1.6E-03	1.1E-03	7.4E-04	3.6E-04	2.0E-04
MEAN DOSES	2.8E-03	2.3E-03	1.5E-03	1.1E-03	4.6E-04	2.5E-04

CAT-IV-bypass-W-elevated, early dose (Italian site)

NO.	NUCLIDE	SUM
	HTO	0.85100E+16
16	CR- 51	0.38000E+10
20	MN- 54	0.23100E+10
21	MN- 56	0.64600E+11
23	FE- 55	0.11500E+11
27	CO- 57	0.49600E+10
29	CO- 58	0.73100E+10
31	CO- 60	0.86200E+09
90	AG-110	0.71000E+10
155	TA-179	0.26100E+11
157	TA-182	0.21500E+11
159	W -181	0.23900E+13
160	W -183M	0.14300E+14
161	W -185	0.50500E+13
162	W -187	0.14100E+14
166	RE-186	0.47200E+12
167	RE-188M	0.13500E+11
168	RE-188	0.19800E+12

RADIUS (KM)	0.145	0.180	0.320	0.460	0.680	1.000
MAX. DOSES	2.4E-03	2.3E-03	2.5E-03	2.2E-03	1.8E-03	1.4E-03
FRACTILE 99.0	1.2E-03	1.4E-03	1.9E-03	1.7E-03	1.3E-03	1.0E-03
FRACTILE 95.0	2.7E-04	3.7E-04	4.7E-04	4.8E-04	4.4E-04	5.9E-04
FRACTILE 90.0	8.1E-05	1.2E-04	3.4E-04	3.6E-04	3.0E-04	3.6E-04
FRACTILE 50.0	1.1E-06	2.5E-06	1.1E-05	4.8E-05	9.5E-05	1.3E-04
MEAN DOSES	5.6E-05	7.3E-05	1.3E-04	1.5E-04	1.7E-04	2.2E-04

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	1.0E-03	8.3E-04	8.3E-04	7.7E-04	2.6E-04	1.9E-04
FRACTILE 99.0	7.8E-04	7.2E-04	6.2E-04	7.7E-04	2.3E-04	1.8E-04
FRACTILE 95.0	6.6E-04	7.2E-04	5.9E-04	5.4E-04	2.2E-04	1.3E-04
FRACTILE 90.0	6.6E-04	7.1E-04	5.8E-04	4.8E-04	1.6E-04	8.5E-05
FRACTILE 50.0	1.2E-04	1.1E-04	6.6E-05	3.8E-05	1.8E-05	9.8E-06
MEAN DOSES	2.6E-04	2.4E-04	1.8E-04	1.4E-04	4.8E-05	2.6E-05

CAT-IV-bypass-W-elevated, EDE with ingestion (Italian site)

RADIUS (KM)	0.145	0.180	0.320	0.460	0.680	1.000
MAX. DOSES	1.1E-01	9.7E-02	6.1E-02	4.7E-02	3.6E-02	2.6E-02
FRACTILE 99.0	5.1E-02	4.8E-02	3.2E-02	2.6E-02	2.0E-02	1.6E-02
FRACTILE 95.0	6.5E-03	7.1E-03	1.5E-02	1.7E-02	1.3E-02	9.5E-03
FRACTILE 90.0	2.4E-03	5.4E-03	1.5E-02	1.7E-02	1.3E-02	9.3E-03
FRACTILE 50.0	9.8E-06	2.3E-05	7.6E-05	3.4E-04	6.9E-04	1.3E-03
MEAN DOSES	2.1E-03	2.3E-03	3.1E-03	3.2E-03	3.0E-03	2.7E-03

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	1.8E-02	1.3E-02	7.2E-03	5.6E-03	1.7E-03	1.3E-03
FRACTILE 99.0	1.1E-02	7.4E-03	4.3E-03	3.6E-03	1.4E-03	7.8E-04
FRACTILE 95.0	6.5E-03	4.5E-03	3.0E-03	3.2E-03	9.1E-04	6.2E-04
FRACTILE 90.0	5.8E-03	4.0E-03	2.8E-03	2.3E-03	7.4E-04	4.2E-04
FRACTILE 50.0	1.6E-03	1.5E-03	1.0E-03	7.1E-04	3.0E-04	1.5E-04
MEAN DOSES	2.4E-03	2.0E-03	1.3E-03	9.4E-04	3.9E-04	2.1E-04

Probabilistic potential doses from source terms of case 4 (CAT-V-bypass)

CAT-V-Cu- bypass-ground, early dose (Italian site)

NO.	NUCLIDE	SUM
	HTO	0.15540E+17
16	CR- 51	0.46100E+10
20	MN- 54	0.28000E+10
21	MN- 56	0.78400E+11
23	FE- 55	0.13900E+11
27	CO- 57	0.60200E+10
29	CO- 58	0.88700E+10
30	CO- 60M	0.32700E+14
31	CO- 60	0.19900E+13
34	NI- 63	0.37400E+12
36	CU- 62	0.69200E+15
37	CU- 64	0.14600E+16
38	CU- 66	0.45500E+15
157	TA-182	0.70200E+12

RADIUS (KM)	0.145	0.180	0.320	0.460	0.680	1.000
MAX. DOSES	2.0E-01	1.7E-01	1.2E-01	9.2E-02	6.2E-02	4.1E-02
FRACTILE 99.0	1.0E-01	1.0E-01	1.0E-01	9.1E-02	6.2E-02	3.9E-02
FRACTILE 95.0	1.0E-01	1.0E-01	1.0E-01	9.1E-02	6.0E-02	3.7E-02
FRACTILE 90.0	1.0E-01	1.0E-01	1.0E-01	8.9E-02	6.0E-02	3.7E-02
FRACTILE 50.0	2.1E-02	1.7E-02	9.3E-03	6.2E-03	3.8E-03	2.2E-03
MEAN DOSES	5.8E-02	5.2E-02	3.6E-02	2.6E-02	1.7E-02	1.0E-02

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	3.2E-02	1.4E-02	6.7E-03	3.8E-03	3.4E-03	1.6E-03
FRACTILE 99.0	2.8E-02	1.4E-02	6.6E-03	3.8E-03	1.6E-03	8.1E-04
FRACTILE 95.0	2.3E-02	1.3E-02	4.6E-03	1.5E-03	4.2E-04	2.3E-04
FRACTILE 90.0	2.1E-02	6.6E-03	3.0E-03	9.3E-04	3.2E-04	1.7E-04
FRACTILE 50.0	1.3E-03	8.1E-04	4.0E-04	2.1E-04	1.2E-04	6.5E-05
MEAN DOSES	6.2E-03	2.4E-03	1.0E-03	4.3E-04	1.8E-04	1.0E-04

CAT-V-Cu- bypass-ground, EDE, with ingestion (Italian site)

RADIUS (KM)	0.145	0.180	0.320	0.500	0.680	1.000
MAX. DOSES	3.3E+00	2.9E+00	1.9E+00	1.4E+00	9.0E-01	5.6E-01
FRACTILE 99.0	1.5E+00	1.3E+00	8.9E-01	6.3E-01	4.2E-01	2.8E-01
FRACTILE 95.0	1.2E+00	1.1E+00	7.6E-01	5.8E-01	3.9E-01	2.5E-01
FRACTILE 90.0	1.1E+00	1.0E+00	7.6E-01	5.6E-01	3.7E-01	2.3E-01
FRACTILE 50.0	3.1E-01	2.8E-01	1.7E-01	1.1E-01	6.5E-02	3.6E-02
MEAN DOSES	4.5E-01	4.0E-01	2.7E-01	1.9E-01	1.2E-01	7.6E-02

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	3.4E-01	3.2E-01	7.5E-02	4.7E-02	2.3E-02	4.7E-02
FRACTILE 99.0	2.1E-01	9.5E-02	4.9E-02	3.5E-02	1.7E-02	1.3E-02
FRACTILE 95.0	1.5E-01	7.2E-02	3.2E-02	1.8E-02	7.8E-03	5.4E-03
FRACTILE 90.0	1.3E-01	5.4E-02	2.6E-02	1.0E-02	4.5E-03	2.4E-03
FRACTILE 50.0	1.9E-02	1.3E-02	5.9E-03	3.2E-03	1.2E-03	5.2E-04
MEAN DOSES	4.7E-02	2.0E-02	9.6E-03	4.7E-03	2.3E-03	1.5E-03

CAT-V-St- bypass-ground, early dose (Italian site)

NO.	NUCLIDE	SUM
	HTO	0.15540E+17
16	CR- 51	0.79000E+14
20	MN- 54	0.15100E+14
21	MN- 56	0.28600E+15
23	FE- 55	0.92900E+14
27	CO- 57	0.19200E+14
28	CO- 58M	0.52300E+14
29	CO- 58	0.31500E+14
30	CO- 60M	0.20000E+14
31	CO- 60	0.31800E+13
75	MO- 99	0.15000E+14
80	TC- 99M	0.13100E+14

RADIUS (KM)	0.145	0.180	0.320	0.500	0.680	1.000
MAX. DOSES	2.7E-01	2.3E-01	1.5E-01	1.1E-01	7.6E-02	5.1E-02
FRACTILE 99.0	1.0E-01	1.0E-01	1.0E-01	1.0E-01	7.6E-02	4.9E-02
FRACTILE 95.0	1.0E-01	1.0E-01	1.0E-01	1.0E-01	7.2E-02	4.6E-02
FRACTILE 90.0	1.0E-01	1.0E-01	1.0E-01	1.0E-01	7.2E-02	4.6E-02
FRACTILE 50.0	2.5E-02	1.9E-02	1.1E-02	7.2E-03	4.4E-03	2.6E-03
MEAN DOSES	7.0E-02	6.3E-02	4.3E-02	3.1E-02	2.0E-02	1.3E-02

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	3.9E-02	1.9E-02	8.3E-03	4.9E-03	4.3E-03	2.6E-03
FRACTILE 99.0	3.5E-02	1.7E-02	8.3E-03	4.8E-03	2.0E-03	1.3E-03
FRACTILE 95.0	2.9E-02	1.6E-02	5.8E-03	2.2E-03	6.8E-04	3.5E-04
FRACTILE 90.0	2.6E-02	8.3E-03	3.5E-03	1.3E-03	4.0E-04	2.2E-04
FRACTILE 50.0	1.5E-03	9.5E-04	4.8E-04	2.6E-04	1.4E-04	8.1E-05
MEAN DOSES	7.7E-03	2.9E-03	1.3E-03	5.5E-04	2.4E-04	1.4E-04

CAT-V-St- bypass-ground, EDE with ingestion (Italian site)

RADIUS (KM)	0.145	0.180	0.320	0.500	0.680	1.000
MAX. DOSES	1.1E+01	9.8E+00	6.5E+00	4.7E+00	3.1E+00	2.0E+00
FRACTILE 99.0	4.9E+00	4.3E+00	2.8E+00	2.0E+00	1.4E+00	9.3E-01
FRACTILE 95.0	3.0E+00	2.7E+00	1.9E+00	1.4E+00	9.8E-01	6.0E-01
FRACTILE 90.0	2.8E+00	2.6E+00	1.9E+00	1.4E+00	9.3E-01	5.9E-01
FRACTILE 50.0	5.6E-01	5.0E-01	3.0E-01	2.0E-01	1.2E-01	7.1E-02
MEAN DOSES	1.1E+00	9.5E-01	6.4E-01	4.6E-01	3.0E-01	1.9E-01

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	1.2E+00	1.1E+00	2.7E-01	1.7E-01	8.4E-02	1.8E-01
FRACTILE 99.0	7.1E-01	2.9E-01	1.6E-01	1.1E-01	5.8E-02	4.9E-02
FRACTILE 95.0	4.3E-01	1.9E-01	1.0E-01	6.0E-02	2.8E-02	2.1E-02
FRACTILE 90.0	3.5E-01	1.7E-01	7.6E-02	3.0E-02	1.2E-02	8.3E-03
FRACTILE 50.0	3.9E-02	2.1E-02	1.1E-02	4.2E-03	2.1E-03	1.1E-03
MEAN DOSES	1.2E-01	5.0E-02	2.5E-02	1.2E-02	6.0E-03	4.4E-03

CAT-V-W- bypass-ground, early dose (Italian site)

NO.	NUCLIDE	SUM
	HTO	0.15540E+17
16	CR- 51	0.46100E+10
20	MN- 54	0.28000E+10
21	MN- 56	0.78400E+11
23	FE- 55	0.13900E+11
27	CO- 57	0.60200E+10
29	CO- 58	0.88700E+10
31	CO- 60	0.10500E+10
90	AG-110	0.26200E+12
155	TA-179	0.96400E+12
157	TA-182	0.79500E+12
159	W -181	0.88200E+14
160	W -183M	0.52900E+15
161	W -185	0.18600E+15
162	W -187	0.52000E+15
166	RE-186	0.17400E+14
167	RE-188M	0.49700E+12
168	RE-188	0.73200E+13

RADIUS (KM)	0.145	0.180	0.320	0.500	0.680	1.000
MAX. DOSES	2.1E-01	1.8E-01	1.1E-01	7.9E-02	5.2E-02	3.5E-02
FRACTILE 99.0	1.0E-01	1.0E-01	1.0E-01	7.6E-02	5.2E-02	3.3E-02
FRACTILE 95.0	1.0E-01	1.0E-01	1.0E-01	7.6E-02	5.0E-02	3.2E-02
FRACTILE 90.0	1.0E-01	1.0E-01	1.0E-01	7.6E-02	5.0E-02	3.1E-02
FRACTILE 50.0	1.7E-02	1.4E-02	7.8E-03	5.1E-03	3.2E-03	1.9E-03
MEAN DOSES	4.9E-02	4.4E-02	3.0E-02	2.2E-02	1.4E-02	8.8E-03

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	2.7E-02	1.6E-02	5.7E-03	3.5E-03	3.0E-03	2.2E-03
FRACTILE 99.0	2.5E-02	1.2E-02	5.6E-03	3.3E-03	1.4E-03	8.1E-04
FRACTILE 95.0	1.9E-02	1.1E-02	3.9E-03	1.9E-03	4.1E-04	2.3E-04
FRACTILE 90.0	1.8E-02	5.8E-03	2.6E-03	8.9E-04	3.1E-04	1.5E-04
FRACTILE 50.0	1.1E-03	6.9E-04	3.2E-04	1.8E-04	1.0E-04	5.6E-05
MEAN DOSES	5.4E-03	2.1E-03	8.8E-04	3.8E-04	1.7E-04	9.6E-05

CAT-V-W- bypass-ground, EDE with ingestion (Italian site)

RADIUS (KM)	0.145	0.180	0.320	0.500	0.680	1.000
MAX. DOSES	2.7E+00	2.4E+00	1.6E+00	1.1E+00	7.3E-01	4.6E-01
FRACTILE 99.0	1.3E+00	1.2E+00	7.8E-01	5.5E-01	3.5E-01	2.3E-01
FRACTILE 95.0	1.0E+00	9.1E-01	6.6E-01	4.9E-01	3.3E-01	2.2E-01
FRACTILE 90.0	9.8E-01	8.9E-01	6.5E-01	4.8E-01	3.2E-01	2.0E-01
FRACTILE 50.0	2.8E-01	2.6E-01	1.7E-01	1.0E-01	6.2E-02	3.5E-02
MEAN DOSES	4.0E-01	3.5E-01	2.3E-01	1.6E-01	1.1E-01	6.6E-02

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	2.7E-01	2.6E-01	6.1E-02	3.8E-02	1.9E-02	3.7E-02
FRACTILE 99.0	1.7E-01	7.9E-02	4.1E-02	2.9E-02	1.3E-02	1.0E-02
FRACTILE 95.0	1.3E-01	6.2E-02	2.8E-02	1.4E-02	6.5E-03	4.2E-03
FRACTILE 90.0	1.2E-01	4.6E-02	2.1E-02	8.3E-03	3.7E-03	1.9E-03
FRACTILE 50.0	1.9E-02	1.1E-02	5.4E-03	2.8E-03	1.0E-03	4.7E-04
MEAN DOSES	4.1E-02	1.7E-02	8.3E-03	4.0E-03	2.0E-03	1.2E-03

CAT-V-St- bypass-ground, 24 hours release duration, early dose (Italian site)

NO.	NUCLIDE	SUM
	HTO	0.155E+17
16	CR- 51	7.812E+13
20	MN- 54	1.510E+13
21	MN- 56	4.513E+13
23	FE- 55	9.294E+13
27	CO- 57	1.919E+13
28	CO- 58M	2.468E+13
29	CO- 58	3.152E+13
30	CO- 60M	8.503E+11
31	CO- 60	3.182E+12
75	MO- 99	1.334E+13
80	TC- 99M	1.230E+13

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	6.3E-02	5.6E-02	3.6E-02	2.6E-02	1.6E-02	1.0E-02
FRACTILE 99.0	4.5E-02	4.0E-02	2.6E-02	1.9E-02	1.2E-02	7.4E-03
FRACTILE 95.0	4.5E-02	4.0E-02	2.6E-02	1.9E-02	1.2E-02	7.4E-03
FRACTILE 90.0	4.1E-02	3.3E-02	2.2E-02	1.6E-02	1.0E-02	6.3E-03
FRACTILE 50.0	2.2E-02	1.9E-02	1.1E-02	7.8E-03	4.9E-03	2.9E-03
MEAN DOSES	2.3E-02	1.9E-02	1.2E-02	7.9E-03	4.9E-03	3.0E-03

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	5.8E-03	3.4E-03	1.7E-03	9.1E-04	5.2E-04	2.1E-04
FRACTILE 99.0	4.3E-03	2.5E-03	1.1E-03	6.2E-04	3.1E-04	1.8E-04
FRACTILE 95.0	4.3E-03	2.5E-03	1.1E-03	6.2E-04	3.1E-04	1.8E-04
FRACTILE 90.0	3.6E-03	1.9E-03	8.9E-04	5.0E-04	2.0E-04	1.1E-04
FRACTILE 50.0	1.7E-03	8.7E-04	4.5E-04	1.6E-04	7.8E-05	4.5E-05
MEAN DOSES	1.8E-03	9.9E-04	4.8E-04	2.3E-04	1.1E-04	6.1E-05

CAT-V-St- bypass-ground, 24 hours release duration, EDE with ingestion (Italian site)

RADIUS (KM)	.145	.180	.320	.460	.680	1.000
MAX. DOSES	1.4E+00	1.2E+00	7.3E-01	5.2E-01	3.5E-01	2.2E-01
FRACTILE 99.0	1.4E+00	1.2E+00	7.3E-01	5.1E-01	3.3E-01	2.0E-01
FRACTILE 95.0	7.9E-01	6.6E-01	3.8E-01	2.6E-01	1.7E-01	1.1E-01
FRACTILE 90.0	6.2E-01	5.5E-01	3.6E-01	2.6E-01	1.7E-01	1.0E-01
FRACTILE 50.0	3.2E-01	2.7E-01	1.6E-01	1.1E-01	6.9E-02	4.3E-02
MEAN DOSES	3.7E-01	3.1E-01	1.9E-01	1.3E-01	8.1E-02	5.0E-02

RADIUS (KM)	1.500	2.000	3.200	4.600	6.800	10.000
MAX. DOSES	1.4E-01	9.3E-02	4.0E-02	1.9E-02	1.4E-02	8.8E-03
FRACTILE 99.0	1.2E-01	8.9E-02	3.2E-02	1.6E-02	1.2E-02	8.1E-03
FRACTILE 95.0	6.9E-02	4.0E-02	2.2E-02	9.8E-03	6.9E-03	5.2E-03
FRACTILE 90.0	5.8E-02	3.5E-02	1.7E-02	8.7E-03	6.3E-03	4.4E-03
FRACTILE 50.0	2.8E-02	1.3E-02	8.1E-03	3.4E-03	1.8E-03	1.3E-03
MEAN DOSES	3.1E-02	1.8E-02	9.3E-03	4.6E-03	2.7E-03	1.8E-03