

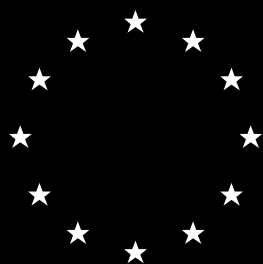
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**RODOS MODEM source term files (ASCII)  
for nuclear accidents in RODOS PV6final**

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**RODOS migration**  
contract

**D R A F T**  
V e r s i o n 2 . 0



**RODOS**  
REPORT

DECISION SUPPORT FOR NUCLEAR EMERGENCIES



**RODOS MODEM source term files (ASCII) for nuclear accidents in  
RODOS PV6final  
RODOS(RA1)-TN(04)-01**

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## Management Summary<sup>1</sup>

Report RODOS(RA1)-TN(04)-01 addresses the structure, format, and contents, of the RODOS ASCII source term files used for data exchange between decision support systems with the MODEM tool that was developed in the RODOS project. It is part of the documentation of the source term treatment for nuclear accidents in RODOS which is summarised in RODOS internal report RODOS(RA2)-TN(04)-04. The descriptions apply to RODOS Version PV6final. Changes with respect to versions PV5 and PV6.0 are indicated in the text.

**Note:** Since RODOS Version PV6.0 Patch 07 it is not only possible to consider accident scenarios for nuclear power plants (nuclear accidents), but also radiological emergencies, for example the explosion of a radiological dispersion device. **The source term files addressed in the report at hand apply exclusively to nuclear accidents. For radiological emergencies the source term exchange with the MODEM tool is currently impossible.**

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<sup>1</sup> The work described in this report has been performed with support of the European Commission under the contract “Migration of RODOS to practical applicability for supporting decisions in operational emergency response to nuclear accidents” (RODOS migration), contract no. FIKR-CT-2000-00077.

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## 1 Introduction

In the EC-supported project MODEM<sup>2</sup> "Monitoring data and information exchange among decision support systems" [MODEM|01|02], a Web server technology based data exchange tool using XML format has been developed that allows for general communication among decision support systems, such as RODOS [RODOS01]. With that facility, for example source term or weather data that were used in or generated by RODOS can be made available for non-RODOS systems, or, such information from non-RODOS-systems can be made available for RODOS. The report at hand describes the ASCII source term file a RODOS system uses for converting the corresponding information into or out from the MODEM XML format; in the following, such files are termed "RODOS MODEM source term file (ASCII)".

Readers who are mainly interested in how a RODOS MODEM source term file looks like and what information it contains are referred to Chapter 2, which gives an overview of such files oriented on this point of view.

Readers who have to generate a RODOS MODEM source term file (ASCII) for use in RODOS or people who write a computer program for utilising the data from such a file in their own code are referred to Chapter 3, which describes the file content, structure, and format, in detail.

Report RODOS(RA1)-TN(04)-01 applies to RODOS Version PV6final. Changes with respect to versions PV5 and PV6.0 are indicated in the text.

**Note:** Since RODOS Version PV6.0 Patch 07 it is not only possible to consider accident scenarios for nuclear power plants (nuclear accidents), but also radiological emergencies, for example the explosion of a radiological dispersion device. **The source term files addressed in the report at hand apply exclusively to nuclear accidents. For radiological emergencies the source term exchange with the MODEM tool is currently impossible.**

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<sup>2</sup> Project FIKR-CT-2001-00144

## 2 Overview of a RODOS MODEM Source Term File (ASCII)

Table 1 shows an example for a RODOS MODEM source term file (ASCII). Each line contains some symbol in the "note" column; the explanation of the notes follows after the Table.

Please note that the file consists of three separate parts:

1. The "file header" section from the 1<sup>st</sup> line downwards until the section with the "ADDITIONAL INFORMATION ABOUT SITE AND SOURCE TERM".
2. The section with the "ADDITIONAL INFORMATION ABOUT SITE AND SOURCE TERM".
3. The section with the "DATA DEPENDING ON THE INPUT MODE".

The information in the first and the third section is meaningful for RODOS. The information in the second section was introduced on request of the MODEM project. When producing the file, RODOS inserts that information correctly. However, when reading the file, RODOS, ignores that information.

**Table 1: Commented example of a RODOS MODEM source term file (ASCII)**

note	file content (example)
***	# =====
***	NCOMM = 4 ***** Number of comment lines to follow this line *****
***	# -----
***	# File <F6.STERMout> created by {STerm/User}
***	# --> RODOS MODEM source term file (ASCII) in F6_Extended format <---
***	# =====
***	#CQTORI=SouTerEx
***	#IRLTYP= 0 0 0 0 0 1 0 0 0 0 0
***	#CRLGID=DRS-A_7_GROUPS
***	#IRLGRP= 7
com	COMFR1 =Demo source term. Sum =52.5% noble gases; 0.75% iodine, aerosols weighted
com	COMFR2 =After EOC+3.75hrs. filt.vent. 01hr.; no rel. 03.5hrs.; release 03hrs.
***	# BEGIN OF RELEASE ("FREISETZUNG") AFTER EOC [h]
beg	BEGFRE = 3.75000E+00
***	# NUMBER OF SOURCE TERM ("QT") USER INPUT TIME INTERVALS
tim	NQTUIT = 8
***	#LOWER EDGES OF SOURCE TERM ("QT") USER INPUT TIME INTERVALS [h]
***	#QTUIT1=
tim	0.00 0.50 4.50 5.00 5.50
tim	6.00 6.50 7.00
***	#UPPER EDGES OF SOURCE TERM ("QT") USER INPUT TIME INTERVALS [h]
***	#QTUIT2=
tim	0.50 1.00 5.00 5.50 6.00
tim	6.50 7.00 7.50
***	# RELEASE HEIGHT [m]
***	#HFSIN =
hei	1.50000E+02 1.50000E+02 1.00000E+01 1.00000E+01 1.00000E+01
hei	1.00000E+01 1.00000E+01 1.00000E+01
***	# RELEASED THERMAL ENERGY [MW]
***	#QHIN =
ene	0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
ene	0.00000E+00 0.00000E+00 0.00000E+00
***	# VERTICALLY RELEASED VOLUME FLUX [m**3/s]
***	#VOLFIN=
vol	0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
vol	0.00000E+00 0.00000E+00 0.00000E+00



***	#	VENT AREA OF RELEASE TO THE ATMOSPHERE [m**2]				
***	#	VENTIN=				
ven		0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
ven		0.00000E+00	0.00000E+00	0.00000E+00		
***	#	IODINE FRACTIONS [%]				
***	#	ANTJIN=				
***	#	ELEMENTARY				
fio		1.00000E+02	1.00000E+02	1.00000E+02	1.00000E+02	1.00000E+02
fio		1.00000E+02	1.00000E+02	1.00000E+02		
***	#	ORGANICALLY BOUND				
fio		0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
fio		0.00000E+00	0.00000E+00	0.00000E+00		
***	#	AEROSOLS				
fio		0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00	0.00000E+00
fio		0.00000E+00	0.00000E+00	0.00000E+00		
***	#	-----				
***	#	ADDITIONAL INFORMATION ABOUT SITE AND SOURCE TERM				
***	#	-----				
***	#	AUTHOR OF SOURCE TERM FILE (32 CHARACTERS, LEFT ADJUSTED)				
aut		RODOS_ust3				
***	#	SITE NAME AND BLOCK NAME (32 CHARACTERS EACH, LEFT ADJUSTED)				
nam		Test Site TestBlock				
***	#	GEOGRAPHICAL LATITUDE AND LONGITUDE OF BLOCK				
coo		4.90925E+01	8.42580E+00			
***	#	TIME OF END OF CHAIN REACTION (DATE AND LOCAL TIME)				
eoc		2002:01:10:09:15:00				
***	#	TIME OF BEGIN OF RELEASE (DATE AND LOCAL TIME)				
bor		2002:02:10:19:15:15				
***	#	NOMINAL THERMAL POWER [MW] FOR SOURCE TERM GENERATION				
stg		3733				
***	#	[DAYS] OF OPERATION (999<=>EQUIL.) FOR SOURCE TERM GENERATION				
stg		999				
***	#	NAME OF INVENTORY FOR SOURCE TERM GENERATION				
stg		INVE.PWR_3733MWth_Leitfaden95				
***	#	-----				
***	#	NOW FOLLOWS THE SECTION WITH DATA DEPENDING ON THE INPUT MODE				
***	#	-----				
***	#	ARISIN[Bq]=				
nuc		Kr- 88				
act		1.22717E+17	1.08619E+17	2.35691E+16	1.85435E+16	1.23099E+16
act		8.17182E+15	7.23303E+15	3.37888E+15		
nuc		Rb- 88				
act		5.48050E+12	4.45793E+12	5.34624E+14	3.75915E+14	2.50177E+14
act		1.58710E+14	1.30831E+14	4.62745E+13		
nuc		Sr- 89				
act		2.11785E+12	2.11724E+12	8.23837E+14	6.96893E+14	5.70022E+14
act		4.43224E+14	4.43097E+14	1.89844E+14		
nuc		Sr- 90				
act		1.22099E+11	1.22098E+11	4.76178E+13	4.02919E+13	3.29661E+13
act		2.56402E+13	2.56402E+13	1.09886E+13		
nuc		Zr- 95				
act		2.88347E+11	2.88281E+11	1.12227E+14	9.49398E+13	7.70852E+13
act		6.03889E+13	6.03753E+13	2.58693E+13		
nuc		Te-132				
act		1.65111E+13	1.64362E+13	6.18138E+15	5.20670E+15	4.24072E+15
act		3.28339E+15	3.26851E+15	1.39444E+15		
nuc		I -131				
act		1.79091E+13	1.78811E+13	6.88584E+15	5.81727E+15	4.75205E+15
act		3.69018E+15	3.68432E+15	1.57649E+15		
nuc		I -132				
act		2.58761E+13	2.57744E+13	9.71900E+15	8.18857E+15	6.67136E+15
act		5.16698E+15	5.14524E+15	2.19584E+15		
nuc		I -133				
act		3.28951E+13	3.23515E+13	1.10425E+16	9.18928E+15	7.39427E+15
act		5.65607E+15	5.56261E+15	2.34458E+15		
nuc		I -135				
act		2.26060E+13	2.14512E+13	5.49984E+15	4.41599E+15	3.42853E+15
act		2.53042E+15	2.40116E+15	9.76503E+14		
nuc		Xe-133				
act		9.44794E+17	9.44759E+17	5.44991E+17	4.84559E+17	3.63603E+17
act		2.72897E+17	2.73138E+17	1.44311E+17		
nuc		Xe-135				
act		3.43787E+17	3.54450E+17	2.37957E+17	2.13285E+17	1.61574E+17
act		1.22503E+17	1.23848E+17	6.61004E+16		
nuc		Cs-134				
act		1.75471E+12	1.75468E+12	6.84220E+14	5.78945E+14	4.73673E+14
act		3.68406E+14	3.68399E+14	1.57882E+14		

nuc	Cs-137				
act	1.49498E+12	1.49498E+12	5.83037E+14	4.93338E+14	4.03640E+14
act	3.13942E+14	3.13941E+14	1.34546E+14		
nuc	Ba-140				
act	3.63335E+12	3.62924E+12	1.40264E+15	1.18550E+15	9.68859E+14
act	7.52704E+14	7.51852E+14	3.21857E+14		

### **Explanation of the notes**

**[\*\*\*]** Comment line or steering variables relevant for RODOS.

**[com]** Two lines containing a brief characterisation of the source term.

**[aut]** Indication of author of source term file.

**[beg]** Begin of the release after the end of the chain reaction, [hours].

**[tim]** Definition of time intervals in which the source term is specified<sup>3</sup>: The line with NQTUIT contains the number of the intervals (between 1 and 24), the following lines the lower (QTUIT1) and upper time boundaries (QTUIT2) of each 1...NQTUIT interval, [hours].

**[hei]** Release height above ground in each time interval, [m].

**[ene]** Thermal energy of the release in each time interval, [MW].

**[vol] (SINCE PV6.0)** Vertically released volume flux in each time interval, [m\*\*3/s].

**[ven] (SINCE PV6.0)** Vent area of the release to the atmosphere in each time interval, [m\*\*2].

**[iod]** Fractions of elementary iodine, organically bound iodine and iodine aerosols<sup>4</sup> of the total amount of iodine released in each time interval, [%].

**[nam]** Names of site and reactor block.

**[coo]** Geographical co-ordinates of the reactor block (latitude and longitude).

**[eoc]** Time of the end of the chain reaction (date and time).

**[bor]** Time of the onset of the release (date and time).

**[stg]** Information about the reactor status for which the source term was derived: Nominal thermal power, days of operation, radionuclide inventory. This information is necessary for consistency checks in RODOS.

**[nuc]** and **[act]** Name of nuclide followed by the activity released in each time interval, ([Bq]. *For files generated by STERM/USER<sup>5</sup>*: The

<sup>3</sup> For all time periods without data specification, in RODOS it is assumed that there is no release.

<sup>4</sup> "Aerosols" means here fission products released to the atmosphere as solid or liquid suspensions in air via a carrier (e.g. CsJ, NaOH etc.).

file contains data only for the near range nuclides<sup>6</sup>. *For files of other origin:* The file can contain data for any number of radionuclides.

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<sup>5</sup> Each time RODOS runs, program package {STERM/USER} produces a file containing the source term used in the run for eventual source term exchange. The name of the file is <F6.STERMout>; it resides in RODOS directory <~rodos/roextern/outall/{userID}/{runID}>.

<sup>6</sup> "Near range nuclides" denotes a subset of 1 to 25 nuclides selected from all nuclides possible in RODOS, that is defined by the user during a RODOS run.

### 3 Creating or Reading a RODOS MODEM Source Term File (ASCII)

#### 3.1 File Name and File Location in RODOS

The name of such a file must always start with the prefix "F6." followed by between 1 and 29 alphanumerical characters. The allowed characters are 0 - 9, a - z (upper and lower case), dot, underscore.

In every run with RODOS, program package STERM/USER produces a RODOS MODEM source term file (ASCII) with the source term used in the run. This output file always bears the name *F6.STERMout* and is located in RODOS directory `<~rodos/roextern/outall/userID/rundID/>`, with userID and rundID being the RODOS signature of user and run.

The output file can either be exported for RODOS-external use without or with renaming. Or it can be renamed according to the rules mentioned above to allow re-use in another RODOS run by the same or a different user:

- If the file shall be open for input to all RODOS users, it must be placed under it's new name in RODOS directory `<~rodos/roextern/data/sourceterm/public/>` (Example: New file name *F6.ST\_FileForAll*, full address `<~rodos/roextern/data/sourceterm/public/F6.ST_FileforAll>`).
- If the file shall only be accessible for the user who created it, it has to be placed in RODOS directory `<~rodos/roextern/data/sourceterm/input/>`; and the file name must get the user-identification as additional prefix. (Example: User *ust3*, file with name *F6.MyOwnST\_File*, full address `<~rodos/roextern/data/sourceterm/input/F6.MyOwnST_File>`).

#### 3.2 File Content and Format

Table 2 on page 15 ff. shows an example for a RODOS MODEM source term file (ASCII) that was created with RODOS version PV6final.

Columns 1 and 2 of Table 2 refer to notes and formats. The formats are collected at the bottom of the Table. The differences between RODOS versions PV5 and PV6.0 are summarised in Chapter 3.4. Due to requirements of the new RODOS-Lite user interface, there are some changes between RODOS versions PV6.0 and PV6final in the degree of freedom in the character (non-numerical) part of several lines. They are indicated in bold text in the Table, and summarized in Chapter 3.5.

Please note that the file consists of three separate parts:

1. The "file header" section from 1<sup>st</sup> line downwards until the section with "ADDITIONAL INFORMATION ABOUT SITE AND SOURCE TERM": This part contains general source term information not related to the activity release specification, such as the definition of the time intervals, the release height, the iodine fractions. This information is meaningful for RODOS. When producing the file, STERM/USER inserts that information according to the specifications during the RODOS run. When reading the file, STERM/USER interprets and uses the data.
2. The section with the "ADDITIONAL INFORMATION ABOUT SITE AND SOURCE TERM": This part was introduced on request of the MODEM project and contains information about the provider of the data, the accident, and the reactor considered. This information is meaningful for external programs, but not for RODOS. When producing the file, STERM/USER inserts that information according to the specifications during the RODOS run. When reading the file, STERM/USER skips (that is, ignores) this information.
3. The section with "DATA DEPENDING ON THE INPUT MODE": This part contains the activity release specification. This information is meaningful for RODOS. When producing the file, STERM/USER inserts that information according to the specifications during the RODOS run. When reading the file, STERM/USER interprets and uses the data.

*In the explanations below, "comment line" means that the line contains information introduced to make the file more readable for humans. When RODOS reads the file, the line is skipped.*

*"Line with steering variable(s) for RODOS" means that the information in the line is relevant for the RODOS source term interface. Any external code can skip (that is, ignore the contents of) the line.*

#### **Explanation of the notes**

**[nr01]** Comment line with up to 64 arbitrary characters.

**[nr02]** Number of comment lines to follow this line.

**[nr03]** Line with steering variable(s) for RODOS (must always look EXACTLY like the line in Table 2).

**[nr04]** Line contains a steering variable for program STERM/USER. If you are a provider of the file, and you "have no idea" or "do not care", then code the lines exactly as shown in the example in the Table 2.

Experienced source term creators for RODOS may refer to report [RODOS02] to make a different selection.

**[nr05]** Brief characterisation of source term (80 characters per line). This description will appear in text output of RODOS runs!

**[nr06]** Time span between the end of the chain reaction and the start of the release, [hours]. See also comment [nr16]!

**[nr07]** Definition of time intervals in which the source term is specified: The line with NQTUIT contains the number of the intervals (between 1 and 24), the following lines the lower (QTUIT1) and upper time boundaries (QTUIT2) of each 1...NQTUIT interval, [hours]. *For more details see Chapter 3.3.*

**[nr08]** Release height above ground for NQTUIT time intervals, [m]. Five data entries per line.

**[nr09]** Thermal energy of the release for NQTUIT time intervals, [MW]. Five data entries per line.

**[nr10] (SINCE PV6.0)** Vertically released volume flux for NQTUIT time intervals, [m<sup>3</sup>/s]. Five data entries per line.

**[nr11] (SINCE PV6.0)** Vent area of the release to the atmosphere for NQTUIT time intervals, [m<sup>2</sup>]. Five data entries per line.

**[nr12]** Fractions of elementary iodine, organically bound iodine and iodine aerosols<sup>7</sup> of the total amount of iodine released in each time interval, [%]. Five data entries per line. **Note:** In RODOS the iodine release is specified in terms of the total iodine activity released in each time interval for the individual iodine radionuclides, together with percent fractions of elementary iodine, organically bound iodine and iodine aerosols of the total amount of iodine released in each time interval. The sum of all three fractions must add up to 100 in each time interval (checked in RODOS!).

**[nr13]** Author of source term file.

**[nr14]** Names of site and reactor block.

**[nr15]** Geographical latitude and longitude of reactor block in decimal degrees. Latitude: South minus, north plus. Longitude: West minus, east plus.

**[nr16]** Time of the end of the chain reaction (date and time). Time of begin of the release (date and time). **Note:** Variable BEGFRE in [nr06] contains the difference of the release start and the end of chain reaction in [hours].

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<sup>7</sup> "Aerosols" means here fission products released to the atmosphere as solid or liquid suspensions in air via a carrier (e.g. CsJ, NaOH etc.).

**[nr17]** Information about the reactor status for which the source term was derived: Nominal thermal power, days of operation, name of RODOS core inventory file the source term refers to.

*For files generated by STERM/USER:* The name of the RODOS core inventory file is provided by the RODOS system.

*For files of other origin:* There are two possibilities:

- A core inventory file suitable for RODOS exists for the source term. In that case, the inventory file must also be delivered! For the description of the file content, structure and format see report [RODOS02].
- If a core inventory file suitable for RODOS does not exist for the source term, the line containing the name must be specified as UNDEFINED (capital letters, left adjusted).

**[nr18] [nr19]** Name of nuclide followed by the activity released for the nuclide for NQTUIT time intervals, ([Bq]), five data entries per activity release data line.

*For files generated by STERM/USER:* The file contains data only for the near range nuclides<sup>8</sup>. *For files of other origin:* The file can contain data for any number of radionuclides in any order. However, the nuclide names should comply with the naming conventions described in [RODOS03]<sup>9</sup>. For the data specification, study also the rules in Chapter 3.3!

**Table 2: Example for a RODOS MODEM source term file (ASCII) with detailed explanations**

note	format	file content (example)
nr01	F-01	# =====
nr02	F-02	NCOMM= 4 ***** Number of comment lines to follow this line *****
nr01	F-01	# -----
nr01	F-01	# File <F6.STERMout> created by {STerm/User}
nr01	F-01	# --> RODOS MODEM source term file (ASCII) in F6_Extended format <---
nr01	F-01	# =====
nr03	F-01+	#CQTORI=SouTerEx
nr03	F-01+	#IRLTYP= 0 0 0 0 0 1 0 0 0 0 0
nr04	F-05\$	#CRLGID=DRS-A_7_GROUPS
nr04	F-06\$	#IRLGRP= 7
nr05	F-07\$	COMFR1=Demo source term. Sum =52.5% noble gases; 0.75% iodine, aerosols
nr05	F-07\$	COMFR2=After EOC+3.75hrs. filt.vent. 01hr.; no rel. 03.5hrs.; .....'
nr01	F-01	# BEGIN OF RELEASE ("FREISETZUNG") AFTER EOC [h]
nr06	F-07b\$	BEGFRE= 3.75000E+00
nr01	F-01	# NUMBER OF SOURCE TERM ("QT") USER INPUT TIME INTERVALS

<sup>8</sup> "Near range nuclides" denotes a subset of 1 to 25 nuclides selected from all nuclides possible in RODOS, that is defined by the user during a RODOS run.

<sup>9</sup> STERM/USER identifies nuclides by their names and ignores any entry not of interest or not recognisable. If a nuclide name does not comply with the naming conventions of [RODOS03], it cannot be recognised and will always be skipped when the file is read.

note	format	file content (example)
nr07	F-06\$	<b>NQTUIT= 8</b>
nr01	F-01	#LOWER EDGES OF SOURCE TERM ("QT") USER INPUT TIME INTERVALS [h]
<b>nr03</b>	<b>F-01+</b>	#QTUIT1=
nr07	F-10	0.00 0.50 4.50 5.00 5.50
nr07	F-10	6.00 6.50 7.00
nr01	F-01	#UPPER EDGES OF SOURCE TERM ("QT") USER INPUT TIME INTERVALS [h]
<b>nr03</b>	<b>F-01+</b>	#QTUIT2=
nr07	F-10	0.50 1.00 5.00 5.50 6.00
nr07	F-10	6.50 7.00 7.50
nr01	F-01	# RELEASE HEIGHT [m]
<b>nr03</b>	<b>F-01+</b>	#HFSIN =
nr08	F-08	1.50000E+02 1.50000E+02 1.00000E+01 1.00000E+01 1.00000E+01
nr08	F-08	1.00000E+01 1.00000E+01 1.00000E+01
nr01	F-01	# RELEASED THERMAL ENERGY [MW]
<b>nr03</b>	<b>F-01+</b>	#QHIN =
nr09	F-08	0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
nr09	F-08	0.00000E+00 0.00000E+00 0.00000E+00
nr01	F-01	# VERTICALLY RELEASED VOLUME FLUX [m**3/s]
<b>nr03</b>	<b>F-01+</b>	#VOLFIN=
nr10	F-08	0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
nr10	F-08	0.00000E+00 0.00000E+00 0.00000E+00
nr01	F-01	# VENT AREA OF RELEASE TO THE ATMOSPHERE [m**2]
<b>nr03</b>	<b>F-01+</b>	#VENTIN=
nr11	F-08	0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
nr11	F-08	0.00000E+00 0.00000E+00 0.00000E+00
nr01	F-01	# IODINE FRACTIONS [%]
<b>nr03</b>	<b>F-01+</b>	#ANTJIN=
nr01	F-01	# ELEMENTARY
nr12	F-08	1.00000E+02 1.00000E+02 1.00000E+02 1.00000E+02 1.00000E+02
nr12	F-08	1.00000E+02 1.00000E+02 1.00000E+02
nr01	F-01	# ORGANICALLY BOUND
nr12	F-08	0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
nr12	F-08	0.00000E+00 0.00000E+00 0.00000E+00
nr01	F-01	# AEROSOLS
nr12	F-08	0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00 0.00000E+00
nr12	F-08	0.00000E+00 0.00000E+00 0.00000E+00
nr01	F-01	# -----
nr01	F-01	# ADDITIONAL INFORMATION ABOUT SITE AND SOURCE TERM
nr01	F-01	# -----
nr01	F-01	# AUTHOR OF SOURCE TERM FILE (32 CHARACTERS, LEFT ADJUSTED)
nr13	F-15	RODOS_ust3
nr01	F-01	# SITE NAME AND BLOCK NAME (32 CHARACTERS EACH, LEFT ADJUSTED)
nr14	F-11	Test Site TestBlock
nr01	F-01	# GEOGRAPHICAL LATITUDE AND LONGITUDE OF BLOCK
nr15	F-12	4.90925E+01 8.42580E+00
nr01	F-01	# TIME OF END OF CHAIN REACTION (DATE AND LOCAL TIME)
nr16	F-13	2002:01:10:09:15:00
nr01	F-01	# TIME OF BEGIN OF RELEASE (DATE AND LOCAL TIME)
nr16	F-13	2002:02:10:19:15:15
nr01	F-01	# NOMINAL THERMAL POWER [MW] THE SOURCE TERM IS VALID FOR
nr17	F-14	3733
nr01	F-01	# [DAYS] OF OPERATION (999<=>EQUIL.) THE SOURCE TERM IS VALID FOR
nr17	F-14	999
nr01	F-01	# NAME OF RODOS INVENTORY FILE THE SOURCE TERM IS VALID FOR
nr17	F-15	INVE.PWR_3733Mwth_Leitfaden95
nr01	F-01	# -----
nr01	F-01	# NOW FOLLOWS THE SECTION WITH DATA DEPENDING ON THE INPUT MODE
nr01	F-01	# -----
<b>nr03</b>	<b>F-01+</b>	#ARISIN=
nr18	F-09	Kr- 88
nr19	F-08	1.22717E+17 1.08619E+17 2.35691E+16 1.85435E+16 1.23099E+16
nr19	F-08	8.17182E+15 7.23303E+15 3.37888E+15
nr18	F-09	Rb- 88
nr19	F-08	5.48050E+12 4.45793E+12 5.34624E+14 3.75915E+14 2.50177E+14
nr19	F-08	1.58710E+14 1.30831E+14 4.62745E+13
nr18	F-09	Sr- 89
nr19	F-08	2.11785E+12 2.11724E+12 8.23837E+14 6.96893E+14 5.70022E+14
nr19	F-08	4.43224E+14 4.43097E+14 1.89844E+14
nr18	F-09	I -132
nr19	F-08	2.58761E+13 2.57744E+13 9.71900E+15 8.18857E+15 6.67136E+15
nr19	F-08	5.16698E+15 5.14524E+15 2.19584E+15
nr18	F-09	I -133
nr19	F-08	3.28951E+13 3.23515E+13 1.10425E+16 9.18928E+15 7.39427E+15
nr19	F-08	5.65607E+15 5.56261E+15 2.34458E+15
nr18	F-09	I -135



note	format	file content (example)
nr19	F-08	2.26060E+13 2.14512E+13 5.49984E+15 4.41599E+15 3.42853E+15
nr19	F-08	2.53042E+15 2.40116E+15 9.76503E+14
nr18	F-09	Xe-133
nr19	F-08	9.44794E+17 9.44759E+17 5.44991E+17 4.84559E+17 3.63603E+17
nr19	F-08	2.72897E+17 2.73138E+17 1.44311E+17
nr18	F-09	Xe-135
nr19	F-08	3.43787E+17 3.54450E+17 2.37957E+17 2.13285E+17 1.61574E+17
nr19	F-08	1.22503E+17 1.23848E+17 6.61004E+16
nr18	F-09	Cs-134
nr19	F-08	1.75471E+12 1.75468E+12 6.84220E+14 5.78945E+14 4.73673E+14
nr19	F-08	3.68406E+14 3.68399E+14 1.57882E+14
nr18	F-09	Cs-137
nr19	F-08	1.49498E+12 1.49498E+12 5.83037E+14 4.93338E+14 4.03640E+14
nr19	F-08	3.13942E+14 3.13941E+14 1.34546E+14

**Formats (Character "^" represents the blank character, "d" some digit 0...9)**

F-01 : Comment line with up to 64 arbitrary characters.  
F-01+ : Line with fixed content - type exactly as shown! **(SINCE RODOS PV6FINAL)**  
F-02 : 9 arbitrary characters, 1 right-adjusted integer with 4 digits.  
F-03 : 8 arbitrary characters, 8 characters for file type flag.  
F-04 : 8 arbitrary characters, 12 right-adjusted integers with 2 digits each.  
F-05 : 8 arbitrary characters, 16 characters for release block name, left adjusted.  
F-06 : 8 arbitrary characters, 1 right-adjusted integer with 2 digits each.  
F-07 : 8 arbitrary characters, 80 characters for source term comment.  
F-07b: 8 arbitrary characters, 1 floating point number with 12 digits "{sign}d.dddddE+dd".  
F-08 : 5\*(floating point number with 12 digits and trailing blank "{sign}d.dddddE+dd^").  
F-09 : 2 arbitrary characters, 7 characters containing the nuclide name, left adjusted.  
F-10 : 5\*(floating point number with 12 digits and trailing blank "{sign}ddddddd.dd^").  
F-11 : 2\*(32 characters), left adjusted, blanks in names are allowed.  
F-12 : 2\*(floating point number with 12 digits and trailing blank "{sign}d.dddddE+dd^").  
F-13 : 19 characters "yyyy:mm:dd:hh:mm:ss".  
F-14 : 1 Right-adjusted integer with 4 digits.  
F-15 : 32 characters, left adjusted.

**(SINCE RODOS PV6FINAL)** Postfix "\$" means "type the keyword part exactly as shown". The keyword part comprises all alphanumerical characters (including the Character '#' and the blank character until inclusively the character '=').

### 3.3 Interpretation and Specification of NQTUIT, QTUIT1, QTUIT2

In RODOS, the release height, the released thermal power, the iodine fractions, and the released activity are given for time intervals with variable duration. For all time periods without data specification, it is assumed that there is no release.

Between 1 and 24 time intervals can be used for the specification of a source term. If a release would be constant over time, one time interval suffices. If a release would strongly vary over time, the provider must condense the information to fit into the 24 time boxes maximally available. There is no upper limit for the duration of a source term, provided that the specification fits into 24 intervals.

The lower and upper boundaries of the time intervals are given in terms of hours after the start of the release. The decimal precision is two trailing digits, which means that 0.01 is the smallest increment

possible. The overlap of interval boundaries is not allowed and will be detected and rejected at runtime of RODOS.

Intervals  $j$  with  $QTUIT2(j) < QTUIT1(j)$  are not allowed. Boundary specifications of this type will be detected and rejected at runtime of RODOS.

For intervals  $j$  with  $QTUIT2(j) = QTUIT1(j)$ , all data in the corresponding input position are skipped at runtime of RODOS.

Intervals  $j$  with  $QTUIT2(j) > QTUIT1(j)$  are valid for source term input. At runtime of RODOS, all data in the corresponding input position are interpreted.

The intervals need not to be ordered with respect to time. *Example:*  $NQTUIT = 2$ ,  $QTUIT1(1,2) = (7.0, 0.0)$ ,  $QTUIT2(1,2) = (10.0, 5.0)$  would be a valid specification for the two time intervals [0.0 to 5.0] hours and [7.0 to 10.0] hours.

**The release specification must start at the onset of the release!**

**In valid intervals  $j$ , there must be a non-zero input for the activity release, which means at least one entry for the activity release must be greater than zero!**

Of course, when one generates a source term file from scratch, one would (and should!) specify the input for valid time-ordered intervals, omitting all no-release periods. However, when a source term file from an external source is imported it may contain no-release periods filled with zero release values, or some time periods for which one would like to specify other values. Making use of the possibilities to mark intervals for skipping or adding intervals at the end with boundaries lower in time than the previous ones can facilitate the adaptation of such files for RODOS.

### 3.4 Summary of Changes from RODOS Version PV5 to PV6.0

The PV5 line "#ISTFIL= 0 1" that appeared before the line "#CQTORI=SouTerEx" does no longer exist.

There are two additional variables and corresponding values VOLFIN and VENTIN (after the values for QHIN).

### 3.5 Summary of Changes from RODOS Version PV6.0 to PV6final

There is a new format characterisation "F-01+": Line with fixed content - type exactly as shown".

Several old format characterisations have now the postfix "\$" which means "Type the keyword part exactly as shown".

Both changes became necessary due to the new RODOS-LITE user interface.



## 4 References

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[MODEM02] T. J. Sullivan, M. Chino, J. Ehrhardt, V. Shershakov, International Exchange of Emergency Phase Information and Assessments: an Aid to National/International Decisionmakers. Rad., Prot. Dos. vol. 109, No 1-2, p. 133, 2004

[RODOS01] European Commission, J. Ehrhardt and A. Weis (ed.), RODOS: Decision support system for off-site nuclear emergency management in Europe, final project report, report EUR 19144 EN 2000, ISBN 92-828-9773-7.

[RODOS02] C. Landman, User Source Term Interface STERM/USER(NPP) in RODOS PV6final, RODOS internal report RODOS(RA1)-TN(04)-03, 2004.

[RODOS03] Fixdata nuclides, near range nuclides, and far range nuclides, in RODOS PV6.final, RODOS internal report RODOS(RA1)-TN(02)-04, Draft Version 2, 2007.

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