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Digital Imaging and Communications in Medicine (DICOM)

8 *Supplement 214: Enhanced X-Ray Radiation Dose SR (including Cone-beam CT)*

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78

Scope and Field of Application

This supplement creates a new DICOM SR IOD with the necessary flexibility to address cone-beam CT (CBCT) acquisitions.

CBCT is used in multiple fields (e.g., dentistry, radiotherapy, interventional radiology, image guided surgery), and there are different methodologies for describing the dose associated with each application (typically borrowing from either XA or CT). However, the underlying data acquisition, reconstruction, and testing parameters for image quality and dose evaluation are similar.

The proposed supplement defines a generic framework for the description of radiation dose amongst the different CBCT applications. It retains the capability to store legacy dosimetric values (e.g., CTDI, DAP), while allowing for reduced dependence on modality-specific conditions for populating fields. This generic radiation description is capable of representing acquisition types that already exist in the standard (Angiography, Mammography, CR/DR, CT).

There are two fundamental inclusions in the proposed supplement:

- Decoupling of irradiation events and dose descriptions (allowing dose-related characteristics to span multiple irradiation events, or breaking irradiation events into smaller time periods). For characteristics that remain constant (e.g., focal spot size), a value can be encoded once for the entire SR. For characteristics that change within irradiation events (e.g., tube current), multiple values can be encoded for improved understanding of dose distributions.
- Improved geometric description of the system. Describe the spatial relationship of different system components with respect to one another for modeling of spatial distributions of dose.

Radiotherapy treatment dose and radiopharmaceutical dose are out of scope.

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Changes to NEMA Standards Publication PS 3.2-2020a

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Digital Imaging and Communications in Medicine (DICOM)

Part 2: Conformance

108

Item #00: Add new SOP Classes in Table A.1-2

110

**Table A.1-2
UID VALUES**

UID Value	UID NAME	Category
...		
<u>1.2.840.10008.5.1.4.1.1.88.76</u>	<u>Enhanced X-Ray Radiation Dose SR Storage SOP Class</u>	<u>Transfer</u>
...		

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Changes to NEMA Standards Publication PS 3.3-2020a

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Digital Imaging and Communications in Medicine (DICOM)

Part 3: Information Object Definitions

122

124 **Item #01: Add the following column in PS 3.3 Section A.1.4, Table A.1-7b. Composite Information Object Modules Overview – More Structured Reports**

126

IODs Modules	<u>Enh RDSR</u>
Patient	<u>M</u>
Clinical Trial Subject	<u>U</u>
General Study	<u>M</u>
Patient Study	<u>U</u>
Clinical Trial Study	<u>U</u>
SR Document Series	<u>M</u>
Clinical Trial Series	<u>U</u>
Synchronization	<u>C</u>
General Equipment	<u>M</u>
Enhanced General Equipment	<u>M</u>
SR Document General	<u>M</u>
SR Document Content	<u>M</u>
SOP Common	<u>M</u>

128

Item #02: Add PS3.3 Section A.35.22:

130 **A.35.22 Enhanced X-Ray Radiation Dose SR IOD**

A.35.22.1 Enhanced X-Ray Radiation Dose SR IOD Description

132 The Enhanced X-Ray Radiation Dose Structured Report IOD addresses cone-beam CT and
 133 tomosynthesis. This generic radiation description is capable of representing previously addressed
 134 acquisition types (Angiography, Mammography, CR/DR, CT).

This IOD is not intended for documenting radiation doses delivered during radiotherapy or due to
 136 application of radiopharmaceuticals.

A.35.22.2 Enhanced X-Ray Radiation Dose SR IOD Entity-Relationship Model

138 The E-R Model in Section A.1.2 of this Part applies to the Enhanced X-Ray Radiation Dose Structured Report IOD.

A.35.22.3 Enhanced X-Ray Radiation Dose SR IOD Module Table

Table A.35.22-1 specifies the Modules of the Enhanced X-Ray Radiation Dose SR IOD.

142

**Table A.35.22-1
Enhanced X-Ray Radiation Dose Structured Report IOD MODULES**

IE	Module	Reference	Usage
Patient	Patient	C.7.1.1	M
	Clinical Trial Subject	C.7.1.3	U
Study	General Study	C.7.2.1	M
	Patient Study	C.7.2.2	U
	Clinical Trial Study	C.7.2.3	U
Series	SR Document Series	C.17.1	M
	Clinical Trial Series	C.7.3.2	U
Frame of Reference	Synchronization	C.7.4.2	C - shall be present if system time is synchronized to an external reference. May be present otherwise.
Equipment	General Equipment	C.7.5.1	M
	Enhanced General Equipment	C.7.5.2	M
Document	SR Document General	C.17.2	M
	SR Document Content	C.17.3	M
	SOP Common	C.12.1	M

144

A.35.22.3.1 Enhanced X-Ray Radiation Dose SR IOD Content Constraints

A.35.22.3.1.1 Template

146 The document shall be constructed from Baseline TID 10041 "Enhanced X-Ray Radiation Dose" invoked at
148 the root node.

A.35.22.3.1.2 Value Type

150 Value Type (0040,A040) in the Content Sequence (0040,A730) of the SR Document Content Module is
constrained to the following Enumerated Values (see Table C.17.3-7 for Value Type definitions):

- 152 TEXT
- CODE
- 154 NUM
- DATETIME
- 156 UIDREF
- PNAME
- 158 COMPOSITE

160 IMAGE
 CONTAINER

162 SCOORD3D
 TABLE

164 **A.35.22.3.1.3 Relationship Constraints**

166 Relationships between content items in the content of this IOD shall be conveyed by-value. Table A.35.22-
 2 specifies the relationship constraints of this IOD. See Table C.17.3-2 for Relationship Type definitions.

168 **Table A.35.22-2
 Relationship Content Constraints for Enhanced X-Ray Radiation Dose Structured Report IOD**

Source Value Type	Relationship Type (Enumerated Values)	Target Value Type
CONTAINER	CONTAINS	TEXT, CODE, NUM, DATETIME, UIDREF, PNAME, IMAGE, COMPOSITE, CONTAINER, SCOORD3D, TABLE
CONTAINER	HAS OBS CONTEXT	DATETIME, CODE, TEXT, UIDREF, PNAME, CONTAINER
TEXT, CODE, NUM, COMPOSITE	HAS OBS CONTEXT	TEXT, CODE, NUM, DATETIME, UIDREF, PNAME, COMPOSITE
CONTAINER, IMAGE, COMPOSITE	HAS ACQ CONTEXT	TEXT, CODE, NUM, DATETIME, UIDREF, PNAME, CONTAINER.
any type	HAS CONCEPT MOD	TEXT, CODE
TEXT, CODE, NUM, COMPOSITE	HAS PROPERTIES	TEXT, CODE, NUM, DATETIME, UIDREF, PNAME, IMAGE, COMPOSITE, CONTAINER.
PNAME	HAS PROPERTIES	TEXT, CODE, DATETIME, DATE, TIME, UIDREF, PNAME
TEXT, CODE, NUM	INFERRED FROM	TEXT, CODE, NUM, DATETIME, UIDREF, IMAGE, COMPOSITE, CONTAINER.

170

172 Note: The SOP Classes to which an IMAGE or COMPOSITE Value Type may refer, is documented in the
 Conformance Statement for an application (see PS 3.2 and PS 3.4).

174

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178

Changes to NEMA Standards Publication PS 3.4-2020a

Digital Imaging and Communications in Medicine (DICOM)

180

Part 4: Service Class Specifications

182 **Item #05: Add Standard and Related General SOP Class to Table B.3-3**

B.3.1.4 RELATED GENERAL SOP CLASSES (A-ASSOCIATE-RQ)

184 **Table B.3-3
 STANDARD AND RELATED GENERAL SOP CLASSES**

SOP Class Name	Related General SOP Class Name
...	...
<u>Enhanced X-Ray Radiation Dose SR Storage</u>	<u>Enhanced SR</u>
	<u>Comprehensive SR</u>
	<u>Comprehensive 3D SR</u>
	<u>Extensible SR</u>

186

Item #06: Add SOP Class to Table B.5-1

188 **B.5 STANDARD SOP CLASSES**

190 **Table B.5-1
 STANDARD SOP CLASSES**

SOP Class Name	SOP Class UID	IOD (See PS 3.3)
...		
<u>Enhanced X-Ray Radiation Dose SR Storage</u>	<u>1.2.840.10008.5.1.4.1.1.88.76</u>	<u>Enhanced X-Ray Radiation Dose SR IOD</u>

192 **Item #07: Add Structured Reporting SOP Class to Section B.5.1.5**

B.5.1.5 Structured Reporting Storage SOP Classes

194 The requirements of Annex O apply to the following SOP Classes:

- ...
- 196 • Enhanced X-Ray Radiation Dose SR Storage

198

200

Changes to NEMA Standards Publication PS 3.6-2020a

202

Digital Imaging and Communications in Medicine (DICOM)

Part 6: Data Dictionary

204

206 **Item #09: Add the following row to Table A-1**

UID Value	UID Name	UID Type	Part
...			
<u>1.2.840.10008.5.1.4.1.1.88.76</u>	<u>Enhanced X-Ray Radiation Dose SR Storage</u>	<u>SOP Class</u>	<u>PS 3.4</u>
...			

208 **Item #10: Add the following row to Table A-1**

Context UID	Context Identifier	Context Group Name
<u>1362</u>	<u>10072</u>	<u>Reported Value Types</u>
<u>1363</u>	<u>10073</u>	<u>Value Timings</u>
<u>1364</u>	<u>10074</u>	<u>RDSR Frame of Reference Origins</u>

212

214

Changes to NEMA Standards Publication PS 3.15-2020a

216

Digital Imaging and Communications in Medicine (DICOM)

Part 15: Security and System Management Profiles

218

220 **Item #10B: Add the following rows to Part 15 Annex E: Table E.3.4-1**

E.3.4 Clean Structured Content Option

222 **Table E.3.4-1 Application Level Confidentiality Profile Clean Structured Content Option Content Item Concept Name Codes**

Code Meaning	Code Value	Coding Scheme Designator	Value Type	Retd. (from PS3.16)	In Std. Tpl. (from PS3.16)	Basic Prof.	Rtn. UIDs Opt.	Rtn. Dev. Id. opt.	Rtn. Inst. Id. Opt.	Rtn. Pat. Chars. Opt.	Rtn. Long. Full Dates Opt.	Rtn. Long. Modif. Dates Opt.	Clean Desc. Opt.
...													
<u>RDSR Frame of Reference Description</u>	<u>130507</u>	<u>DCM</u>	<u>TEXT</u>	<u>N</u>	<u>Y</u>	<u>X</u>							<u>C</u>
<u>Identification of the Attenuator</u>	<u>130527</u>	<u>DCM</u>	<u>TEXT</u>	<u>N</u>	<u>Y</u>	<u>D</u>		<u>K</u>					

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Changes to NEMA Standards Publication PS 3.16-2020a

232

Digital Imaging and Communications in Medicine (DICOM)

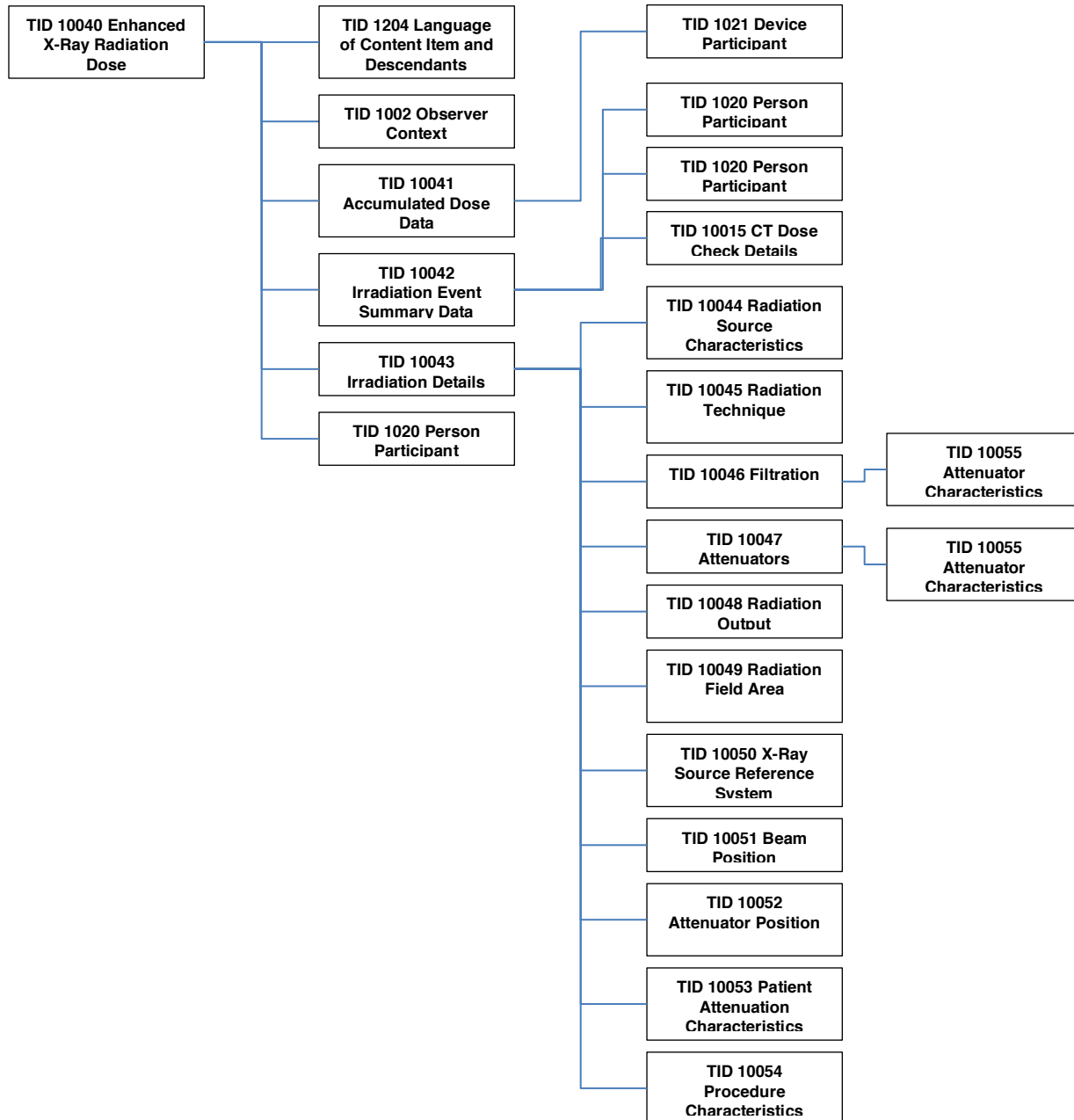
Part 16: Content Mapping Resource

234

Item #11: Add new Section to Annex A

236 **ENHANCED X-RAY RADIATION DOSE STRUCTURED REPORT IOD TEMPLATES**

238 The templates that comprise the Enhanced X-Ray Radiation Dose Structured Report are interconnected as in Figure A-18b.



240 **Figure A-18b: Enhanced X-Ray Radiation Dose Structured Report IOD Template Structure**

242 **TID 10040 Enhanced X-Ray Radiation Dose**

244 This template defines a container (the root) with subsidiary content items for documenting the radiation output for an ionizing radiation imaging device. This template supports cone-beam CT, in addition to other modalities.

246 **Table TID 10040**
Enhanced X-Ray Radiation Dose
Type: Extensible
Order: Non-Significant
Root: Yes

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (113701, DCM, "X-Ray Radiation Dose Report")	1	M		Root Node
2	>	HAS CONCEPT MOD	INCLUDE	DTID 1204 "Language of Content Item and Descendants"	1	M		
3	>	HAS CONCEPT MOD	CODE	EV (121058, DCM, "Procedure reported")	1	M		
4	>>	HAS CONCEPT MOD	CODE	EV (363703001, SCT, "Has Intent")	1	M		DCID 3629 "Procedure Intent"
5	>	HAS OBS CONTEXT	INCLUDE	DTID 1002 "Observer Context"	1-n	M		
6	>	HAS OBS CONTEXT	CODE	EV (113705, DCM, "Scope of Accumulation")	1	M		DCID 10000 "Scope of Accumulation"
7	>	CONTAINS	INCLUDE	DTID 10041 "Accumulated Dose Data"	1-n	U		
8	>	CONTAINS	INCLUDE	DTID 10042 "Irradiation Event Summary Data"	1-n	M		
9	>	CONTAINS	INCLUDE	DTID 10043, "Irradiation Details"	1	M		
10	>	CONTAINS	TEXT	EV (121106, DCM, "Comment")	1	U		
11	>	CONTAINS	INCLUDE	DTID 1020 "Person Participant"	1	U		\$PersonProcedureRole = EV (113850, DCM, "Irradiation Authorizing")
12	>	CONTAINS	CODE	EV (113854, DCM, "Source of Dose Information")	1-n	M		DCID 10020 "Source of Projection X-Ray Dose Information"

250

Content Item Descriptions

Row 7	TID 10041 may be included once for each source. Summary-level values that may include multiple sources, e.g., Dose Area Product Total from planes A and B of a biplane system, could be described by an instance of TID 10041 where the Identification of X-Ray Source indicates multiple sources, e.g., "A and B."
Row 8	TID 10042 shall be included once for each irradiation event. Irradiation event values that may include multiple sources, e.g., CTDI for a dual-source CT scanner, could be described by an instance of TID 10042 where the Identification of X-Ray Source indicates multiple sources, e.g., "1 and 2."

252

TID 10041 Accumulated Dose Data

254 This template documents scope of accumulation summary data for a single radiation source. Some rows are modality-specific and may not apply to all uses.

256

**Table TID 10041
Accumulated Dose Data**

258

**Type: Extensible
Order: Non-Significant**

260

Root: No

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (130500, DCM, "Accumulated Dose Data")	1	M		
2	>	CONTAINS	TEXT	EV (113832, DCM, "Identification of the X-Ray Source")	1	M		
3	>	CONTAINS	CONTAINER	EV (122505, DCM, "Calibration")	1-n	MC	IFF Calibration Data is available	
4	>>	HAS CONCEPT MOD	CODE	EV (113794, DCM, "Dose Measurement Device")	1	M		DCID 10010 "Dose Measurement Devices" DCID 7026 "Radiotherapeutic Dose Measurement Devices"
5	>>	CONTAINS	DATETIME	EV (113723, DCM, "Calibration DateTime")	1	M		
6	>>	CONTAINS	NUM	EV (122322, DCM, "Calibration Factor")	1	M		UNITS = EV (1, UCUM, "no units")
7	>>	CONTAINS	NUM	EV (113763, DCM, "Calibration Uncertainty")	1	M		UNITS = EV (% , UCUM, "Percent")
8	>>	CONTAINS	TEXT	EV (113724, DCM, "Calibration Responsible Party")	1	M		
9	>>	CONTAINS	TEXT	EV (113720, DCM, "Calibration Protocol")	1	U		
10	>	CONTAINS	INCLUDE	DTID 1021 "Device Participant"	1	MC	Required if the irradiating device is not the recording device and the dose was accumulated on a single device.	\$DeviceProcedureRole = EV (113859, DCM, "Irradiating Device")
11	>	CONTAINS	NUM	EV (113722, DCM, "Dose Area Product Total")	1	U		UNITS = EV (Gy.m2, UCUM, "Gy.m2")
12	>	CONTAINS	NUM	EV (113726, DCM, "Fluoro Dose Area Product Total")	1	U		UNITS = EV (Gy.m2, UCUM, "Gy.m2")
13	>	CONTAINS	NUM	EV (113727, DCM, "Acquisition Dose Area Product Total")	1	U		UNITS = EV (Gy.m2, UCUM, "Gy.m2")
14	>	CONTAINS	NUM	EV (113730, DCM, "Total Fluoro Time")	1	U		UNITS = EV (s, UCUM, "s")
15	>	CONTAINS	NUM	EV (113855, DCM, "Total Acquisition Time")	1	U		UNITS = EV (s, UCUM, "s")
16	>	CONTAINS	NUM	EV (111637, DCM, "Accumulated Average Glandular Dose")	1-2	U		UNITS = EV (mGy, UCUM, "mGy")

17	>>	HAS CONCEPT MOD	CODE	EV (272741003, SCT, "Laterality")	1	M		DCID 6022 "Side"
18	>	CONTAINS	CODE	EV (113947, DCM, "Detector Type")	1	U		DCID 10030 "Detector Types"
19	>	CONTAINS	NUM	EV (113731, DCM, "Total Number of Radiographic Frames")	1	U		UNITS = EV (1, UCUM, "no units")
20	>	CONTAINS	CONTAINER	EV (130502, DCM, "Reference Point Dosimetry")	1	U		
21	>>	CONTAINS	TEXT	EV (113780, DCM, "Reference Point Definition")	1	MC	XOR Row 22	
22	>>	CONTAINS	CODE	EV (113780, DCM, "Reference Point Definition")	1	MC	XOR Row 21	DCID 10025 "Radiation Dose Reference Points"
23	>>	CONTAINS	NUM	EV (113725, DCM, "Dose (RP) Total")	1	U		UNITS = EV (Gy, UCUM, "Gy")
24	>>	CONTAINS	NUM	EV (113728, DCM, "Fluoro Dose (RP) Total")	1	U		UNITS = EV (Gy, UCUM, "Gy")
25	>>	CONTAINS	NUM	EV (113729, DCM, "Acquisition Dose (RP) Total")	1	U		UNITS = EV (Gy, UCUM, "Gy")
26	>>	CONTAINS	NUM	EV (113737, DCM, "Distance Source to Reference Point")	1	U		UNITS = EV (mm, UCUM, "mm")
27	>	CONTAINS	NUM	EV (113812, DCM, "Total Number of Irradiation Events")	1	U		UNITS = EV ({events}, UCUM, "events")
28	>	CONTAINS	TEXT	EV (121106, DCM, "Comment")	1	U		

262 **Content Item Descriptions**

Row 2	Identification the X-Ray source. This designation shall not change for a given source throughout the entire RDSR. Summary-level values that may traditionally include multiple sources, e.g., Dose Area Product Total from planes A and B of a biplane system, could be described by an instance of this template where the Identification of X-Ray Source indicates multiple sources, e.g., "A and B." Summary-level values that are not traditionally described across multiple sources, e.g., Dose (RP) Total on a biplane system, should not accumulate these values across both sources.
Row 5	Date that the calibration of the equipment's dose indicators was performed
Row 6	Typically, a value provided by the medical physicist. The recorded dose or dose area product values in this report can be multiplied by this factor to obtain estimated real-world values. Note: It is important that this value must not be applied to the measured values before storing them in the report.
Row 7	Value range from 0 to 100 percent. Uncertainty of the 'actual' value expressed as +/- of the mean.
Row 8	Identifies Individual or organization responsible for calibration
Row 9	Describes calibration protocol according to equipment standards or local guidelines.
Row 10	The device that produced the irradiation accumulated in this template, i.e., the X-Ray source. This is not required to be present if the information is the same as that already recorded in TID 1004 "Device Observer Identifying Attributes" encoded via the inclusion of TID 1002 "Observer Context" in TID 10040 Row 5
Row 11	The total Dose Area Product for all fluoroscopy and acquisition events for a given X-Ray radiation source

Row 12	The fluoroscopy component of the total Dose Area Product
Row 13	The acquisition component of the total Dose Area Product
Row 14	Total clock time of Fluoroscopy accumulated over the defined scope of accumulation (i.e., the sum of the Irradiation Duration values for accumulated fluoroscopy irradiation events)
Row 15	Total clock time of acquisitions accumulated over the defined scope of accumulation (i.e., the sum of the Irradiation Duration values for accumulated acquisition irradiation events)
Row 21	A text definition of the Reference Point (RP) used for RP-related dose values.
Row 22	A coded definition of the Reference Point (RP) used for RP-related dose values
Row 23	Accumulated dose relative to reference point.
Row 24	The fluoroscopic component of the accumulated dose relative to reference point
Row 25	The acquisition component of the accumulated dose relative to reference point
Row 26	A single value for calculating reference point dose based on fixed distance.
Row 27	Total Number of irradiation events.

264

TID 10042 Irradiation Event Summary Data

266 This template documents irradiation event-level summary data.

268

Table TID 10042
Irradiation Event Summary Data
 Type: Extensible
 Order: Non-Significant
 Root: No

270

272

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (130501, DCM, "Irradiation Event Summary Data")	1	M		
2	>	CONTAINS	UIDREF	EV (113769, DCM, "Irradiation Event UID")	1	M		
3	>	CONTAINS	DATETIME	DT (111526, DCM, "DateTime Started")	1	M		
4	>	CONTAINS	DATETIME	DT (111527, DCM, "DateTime Ended")	1	M		
5	>	CONTAINS	TEXT	EV (113832, DCM, "Identification of the X-Ray Source")	1	M		
6	>	CONTAINS	TEXT	EV (113605, DCM, "Irradiation Event Label")	1	U		
7	>>	HAS CONCEPT MOD	CODE	EV (113606, DCM, "Label Type")	1	MC	IF the value of Row 6 is the value of an Attribute in the images.	DCID 10022 "Label Types"
8	>	CONTAINS	CODE	EV (113721, DCM, "Irradiation Event Type")	1	M		DCID 10002 "Irradiation Event Types"
9	>	CONTAINS	CODE	EV (111031, DCM, "Image View")	1	U		DCID 4010 "DX View" DCID 4014 "View for Mammography"

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10	>>	HAS CONCEPT MOD	CODE	EV (111032, DCM, "Image View Modifier")	1-n	U		DCID 4011 "DX View Modifier" DCID 4015 "View Modifier for Mammography"
11	>>	CONTAINS	CODE	EV (113946, DCM, "Projection Eponymous Name")	1	U		DCID 4012 "Projection Eponymous Name"
12	>	CONTAINS	NUM	EV (113845, DCM, "Exposure Index")	1	U		UNITS = EV (1, UCUM, "no units")
13	>	CONTAINS	NUM	EV (113846, DCM, "Target Exposure Index")	1	U		UNITS = EV (1, UCUM, "no units")
14	>	CONTAINS	NUM	EV (113847, DCM, "Deviation Index")	1	U		UNITS = EV (1, UCUM, "no units")
15	>	CONTAINS	IMAGE	EV (113795, DCM, "Acquired Image")	1-n	U		
16	>	CONTAINS	NUM	EV (113738, DCM, "Dose (RP)")	1	U		UNITS = EV (Gy, UCUM, "Gy")
17	>	CONTAINS	NUM	EV (111631, DCM, "Average Glandular Dose")	1	U		UNITS = EV (mGy, UCUM, "mGy")
18	>	CONTAINS	CODE	EV (128551, DCM, "Is Repeated Acquisition")	1	U		DCID 231 "Yes-No Only"
19	>>	HAS CONCEPT MOD	CODE	EV (128552, DCM, "Reason for Repeating Acquisition")	1	MC	IFF Row 18 = (373066001, SCT, "Yes")	DCID 10034 "Reason for Repeating Acquisition" OR DCID 7011 "Rejected for Quality Reasons"
20	>>	CONTAINS	UIDREF	EV (113769, DCM, "Irradiation Event UID")	1	UC	IFF Row 18 = (373066001, SCT, "Yes")	
21	>	CONTAINS	CODE	EV (130503, DCM, "Is Rejected Acquisition")	1	U		DCID 231 "Yes-No Only"
22	>>	HAS CONCEPT MOD	CODE	EV (130504, DCM, "Reason for Rejecting Acquisition")	1	MC	IFF Row 21 = (373066001, SCT, "Yes")	DCID 10034 "Reason for Repeating Acquisition" OR DCID 7011 "Rejected for Quality Reasons"
23	>	CONTAINS	NUM	EV (113768, DCM, "Number of Pulses")	1	U		UNITS = EV (1, UCUM, "no units")
24	>>	HAS CONCEPT MOD	CODE	EV (121401, DCM, "Derivation")	1	MC	IFF count of pulses in Row 23 is estimated	EV (414135002, SCT, "Estimated")
25	>	CONTAINS	NUM	EV (113820, DCM, "CT Acquisition Type")	1	U		DCID 10013 "CT Acquisition Type"
26	>	CONTAINS	NUM	EV (113824, DCM, "Exposure Time")	1	U		UNITS = EV (ms, UCUM, "ms")
27	>	CONTAINS	CONTAINER	EV (113829, DCM, "CT Dose")	1	U		
28	>>	CONTAINS	NUM	EV (113830, DCM, "Mean CTDIvol")	1	M		UNITS = EV (mGy, UCUM, "mGy")
29	>>	CONTAINS	CODE	EV (113835, DCM, "CTDIw Phantom Type")	1	M		DCID 4052 "Phantom Devices"
30	>>	CONTAINS	NUM	EV (113836, DCM, "CTDIfreeair Calculation Factor")	1	U		UNITS = EV (mGy/mA.s, UCUM, "mGy/mA.s")
31	>>	CONTAINS	NUM	EV (113837, DCM, "Mean CTDIfreeair")	1	U		UNITS = EV (mGy, UCUM, "mGy")
32	>>	CONTAINS	NUM	EV (113838, DCM, "DLP")	1	M		UNITS = EV (mGy.cm, UCUM, "mGy.cm")

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33	>>	CONTAINS	NUM	EV (113930, DCM, "Size Specific Dose Estimation")	1-n	U		UNITS = EV (mGy, UCUM, "mGy")
34	>>>	HAS CONCEPT MOD	CODE	EV (370129005, SCT, "Measurement Method")	1	M		DCID 10023 "Size Specific Dose Estimation Method for CT"
35	>>> >	INFERRED FROM	NUM	EV (113931, DCM, "Measured Lateral Dimension")	1	MC	IF row 34 equals (113934, DCM, "AAPM 204 Lateral Dimension") or (113936, DCM, "AAPM 204 Sum of Lateral and AP Dimension")	UNITS = EV (mm, UCUM, "mm")
36	>>> >	INFERRED FROM	NUM	EV (113932, DCM, "Measured AP Dimension")	1	MC	IF row 34 equals (113935, DCM, "AAPM 204 AP Dimension") or (113936, DCM, "AAPM 204 Sum of Lateral and AP Dimension")	UNITS = EV (mm, UCUM, "mm")
37	>>> >	INFERRED FROM	NUM	EV (113933, DCM, "Derived Effective Diameter")	1	MC	IF row 34 equals (113934, DCM, "AAPM 204 Lateral Dimension") or (113935, DCM, "AAPM 204 AP Dimension") or (113936, DCM, "AAPM 204 Sum of Lateral and AP Dimension") or (113937, DCM, "AAPM 204 Effective Diameter Estimated From Patient Age")	UNITS = EV (mm, UCUM, "mm")
38	>>> >	INFERRED FROM	NUM	EV (113980, DCM, "Water Equivalent Diameter")	1	MC	IF row 34 equals (113981, DCM, "Water Equivalent Diameter Representative Value")	UNITS = EV (mm, UCUM, "mm")
39	>>> >>	HAS CONCEPT MOD	CODE	EV (370129005, SCT, "Measurement Method")	1	M		DCID 10024 "Water Equivalent Diameter Method"
40	>>> >	INFERRED FROM	UIDREF	EV (113985, DCM, "Series or Instance used for Water Equivalent Diameter estimation")	1-n	MC	IF row 34 equals (113982, DCM, "Water Equivalent Diameter Integrated Across Scan Range") or (113984, DCM, "Water Equivalent Diameter From Localizer") or (row 34 equals (113983, DCM, "Water Equivalent Diameter From Raw Data") and the Raw Data is encoded in DICOM).	
41	>>> >	INFERRED FROM	NUM	EV (113986, DCM, "Z value of location of Water Equivalent Diameter estimation")	1	MC	IF row 34 equals (113981, DCM, "Water Equivalent Diameter Representative Value")	UNITS = EV (mm, UCUM, "mm")
42	>>	CONTAINS	INCLUDE	DTID 10015 "CT Dose Check Details"	1	U		

43	>	CONTAINS	TEXT	EV (113842, DCM, "X-Ray Modulation Type")	1	U		
44	>	CONTAINS	UIDREF	EV (112227, DCM, "Frame of Reference UID")	1	U		If present, shall be the same UID as in the images resulting from this irradiation event.
45	>	CONTAINS	TEXT	EV (121106, DCM, "Comment")	1	U		
46	>	CONTAINS	INCLUDE	DTID 1020 "Person Participant"	1-n	U		\$PersonProcedureRole = EV (113851, DCM, "Irradiation Administering")
47	>	CONTAINS	INCLUDE	DTID 1021 "Device Participant"	1	MC	Required if the irradiating device is not the recording device.	\$DeviceProcedureRole = EV (113859, DCM, "Irradiating Device")

Content Item Descriptions

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Row 3	This shall correspond to the start of the first irradiation in the Irradiation Event.
Row 4	This shall correspond to the end of the last irradiation in the Irradiation Event.
Row 5	Identification the X-Ray source. This designation shall not change for a given source throughout the entire RDSR. Irradiation event values that apply to multiple sources, e.g., CTDI on a dual-source CT scanner, could be described by an instance of this template where the Identification of X-Ray Source indicates multiple sources, e.g., "1 and 2." Irradiation event values that are not traditionally described across multiple sources, e.g., Dose (RP) on a biplane system, should not accumulate these values across both sources.
Row 8	Cone-beam CT is expected to use (113613, DCM, "Rotational Acquisition")
Row 15	Reference to Image instances created during this event, if any. The UID reference(s) provided here shall be the values at the time the images were initially created. (Note that image UIDs may be changed as the images are managed over a long term.)
Row 16	Dose applied by this irradiation event, relative to defined reference point. This value may be provided at the Irradiation Event level, but is redundant if the Output Measurement Position is at the same position as the Reference Point defined in TID 10041.
Rows 18, 19, 20	If an acquisition is a repeat because an earlier acquisition was unsatisfactory, this may be recorded along with a coded reason and the earlier acquisition's irradiation event UID. This is intended to help with subsequent analysis by providing a priori information about why the exam might be flagged as an outlier with higher dose exposure values than usual for the type of exam.
Rows 21, 22	If an acquisition is a rejected because it was unsatisfactory, this may be recorded along with a coded reason. This is intended to help with subsequent analysis by providing a priori information about why the exam might be flagged as an outlier with higher dose exposure values than usual for the type of exam.
Row 23	If a precise count of pulses is not available, an estimated number shall be provided, and the Row 24 Concept Modifier shall indicate "Estimated"
Row 25	Description of the method used during acquisition of the CT irradiation event
Row 26	DICOM attributes exist for both Exposure Time in Seconds and Exposure Time in ms. This row uses milliseconds (ms).
Row 27	CT Dose for one acquisition
Row 28	"Mean CTDI _{vol} " refers to the average value of the CTDI _{vol} applied within this acquisition. CTDI _{vol} is the volume CTDI _w , where CTDI _w is the weighted computed tomography dose index 100 as defined in IEC 60601-2-44. For Sequenced and Spiral scanning, CTDI _{vol} = CTDI _w / Pitch Factor. For Stationary and Free scanning, CTDI _{vol} = CTDI _w × Cumulative Exposure Time/ Exposure Time Per Rotation. According to IEC 60601-2-44 Ed 3 for Constant Angle Acquisition may be calculated as CTDI _{vol} = (CTDI _w / Current Time Product (mAs)) × X-Ray Tube Current (mA) x (Nominal Total Collimation Width (mm) / Table Speed (mm/s)). Note

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	<p>The ratio $CTDI_w / \text{Current Time Product}$ is evaluated independently of the Constant Angle Acquisition but with the same settings of tube voltage and Total Collimation Width as those of the Constant Angle Acquisition.</p> <p>See also $CTDI_{vol}$ (0018,9345) and Spiral Pitch Factor (0018,9311) in the "Enhanced Computed Tomography Image IOD" in PS3.3.</p>
Row 29	The type of phantom used for CTDI measurement according to IEC 60601-2-44 (e.g., Head 16 cm diameter PMMA, Body 32 cm diameter PMMA).
Row 30	The $CTDI_{free\ air}$ Calculation Factor is the $CTDI_{free\ air}$ per mAs, expressed in units of mGy/mAs. The $CTDI_{free\ air}$ Calculation Factor may be used in one method calculating Dose. For example, for this acquisition, Effective Dose = Mean X-Ray Tube Current \times Cumulative Exposure Time \times $CTDI_{free\ air}$ Calculation Factor \times (Effective Dose/ $CTDI_{free\ air}$).
Row 31	Mean $CTDI_{free\ air}$ is the mean CTDI for this acquisition, evaluated free-in-air according to IEC 60601-2-44. Mean $CTDI_{free\ air}$ = Mean X-Ray Tube Current \times Cumulative Exposure Time \times $CTDI_{free\ air}$ Calculation Factor. The $CTDI_{free\ air}$ may be used in one method of calculating Effective Dose.
Row 32	For Spiral scanning, $DLP = CTDI_{vol} \times \text{Scanning Length}$. For Sequenced scanning, $DLP = CTDI_{vol} \times \text{Nominal Total Collimation Width} \times \text{Cumulative Exposure Time} / \text{Exposure Time per Rotation}$. For Stationary and Free scanning, $DLP = CTDI_{vol} \times \text{Nominal Total Collimation Width}$ (according to IEC 60601-2-44).
Row 33	More than one Size Specific Dose Estimation may be included, for example if different computation methods are used.
Row 34	The methods of [AAPM Report 204] are listed in CID 10023 "Size Specific Dose Estimation Method for CT"; other methods may be used. The phantom size used for the calculation is available from the phantom type defined in Row 29.
Row 35	The condition specifies inclusion of the Measured Lateral Dimension if it was used in the calculation.
Row 36	The condition specifies inclusion of the Measured AP Dimension if it was used in the calculation.
Row 37	The Derived Effective Diameter is conditionally included, whether it was derived from measurements or estimated from age, but may not be used for other (non-AAPM Report 204) methods.
Row 38	A single value for Water Equivalent Diameter is encoded in Row 38 if the method uses a single value. It is required if the method uses a representative slice, but may also be present if the method used a Localizer or Raw Data at a single location rather than the entire scan range.
Row 39	The modifier is intended to specify the family of methods and not the specific technique (e.g., for AAPM 220 (113987, DCM, "AAPM 220") is used, not (113981, DCM, "Water Equivalent Diameter Representative Value"), etc.).
Row 40	If the method uses multiple slices across the scan range, the reconstructed image Series or (list of) Instances used is referenced; the values for Water Equivalent Diameter may or may not be recorded in the CT Image Module or CT Exposure Macro of those images. More than one Series may be referenced if the reconstructed images for this acquisition used for Water Equivalent Diameter estimation span multiple series. If the Water Equivalent Diameter was computed from raw views rather than reconstructed images, then the Raw Data is referenced, if it was encoded in DICOM (it is not required to be).
Row 41	This location is patient (not table or gantry) relative, to allow it to be defined in the Patient Coordinate System and hence related to the Image Position (Patient) in the reconstructed images. It is required if the method uses a representative slice, but may also be present if the method used a Localizer or Raw Data at a single location rather than the entire scan range.
Row 42	Record of details associated with using the NEMA Dose Check Standard (NEMA XR-25-2010).
Row 43	The type of exposure modulation. May use the value of Exposure Modulation Type (0018,9323) from CT Exposure Macro or from CT Image Module.
Row 46	People responsible for the administration of the radiation reported in the irradiation event. May include values that would appear in Performing Physicians' Name (0008,1050), Performing Physician Identification Sequence (0008,1052), Operators' Name (0008,1070) and/or Operator Identification Sequence (0008,1072).
Row 47	The device that produced the irradiation in this irradiation event. This is not required to be present if the information is the same as that already recorded in TID 1004 "Device Observer Identifying Attributes" encoded via the inclusion of TID 1002 "Observer Context" in TID 10040 Row 5.

276 **TID 10043 Irradiation Details**

278 This template describes the radiation dose characteristics independent of an irradiation event. The complete time period over the scope of accumulation and frame of reference are defined in this template.

280 **Table TID 10043**
Irradiation Details
Type: Extensible
Order: Non-Significant
Root: No

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (130505, DCM, "Irradiation Details")	1	M		
2	>	CONTAINS	DATETIME	DT (111526, DCM, "DateTime Started")	1	M		
3	>	CONTAINS	DATETIME	DT (111527, DCM, "DateTime Ended")	1	M		
4	>	CONTAINS	UIDREF	EV (112227, DCM, "Frame of Reference UID")	1	M		
5	>	CONTAINS	CODE	EV (130506, DCM, "RDSR Frame of Reference Origin")	1	M		DCID 10074 "RDSR Frame of Reference Origins"
6	>	CONTAINS	TEXT	EV (130507, DCM, "RDSR Frame of Reference Description")	1	U		
7	>	CONTAINS	INCLUDE	DTID 10044, "Radiation Source Characteristics"	1-n	M		
8	>	CONTAINS	INCLUDE	DTID 10045, "Radiation Technique"	1-n	M		
9	>	CONTAINS	INCLUDE	DTID 10046, "Filtration"	1-n	MC	IF filtration characteristics are known	
10	>	CONTAINS	INCLUDE	DTID 10047, "Attenuators"	1-n	MC	IF attenuator characteristics are known	
11	>	CONTAINS	INCLUDE	DTID 10048, "Radiation Output"	1-n	M		
12	>	CONTAINS	INCLUDE	DTID 10049, "Radiation Field Area"	1-n	M		
13	>	CONTAINS	INCLUDE	DTID 10050, "X-Ray Source Reference Coordinate System"	1-n	M		
14	>	CONTAINS	INCLUDE	DTID 10051, "Beam Position"	1-n	M		
15	>	CONTAINS	INCLUDE	DTID 10052, "Attenuator Position"	1-n	MC	IF Row 10 is present AND any attenuator position is known	
16	>	CONTAINS	INCLUDE	DTID 10053, "Patient Attenuation Characteristics"	1-n	U		
17	>	CONTAINS	INCLUDE	DTID 10054, "Procedure Characteristics"	1-n	U		

284 **Content Item Descriptions**

Row 2	The DateTime of the beginning of first instance of irradiation in the period defined by the scope of accumulation
Row 3	The DateTime of the end of the last instance of irradiation in the period defined by the scope of accumulation
Row 4	<p>FOR UID identifies the reference coordinate system (RCS) used for this RDSR. This RCS may be defined relative to a point in the room, a point on the equipment, a point on the patient support, etc. This RCS shall be a right-handed Cartesian coordinate system.</p> <p>All events within the scope of accumulation shall use the same RCS. Changes to the system following geometric calibration or service shall result in a new RCS, which will be identified by a new FOR UID and shall be put into a separate RDSR.</p> <p>Note: The images generated over this scope of accumulation will also have an RCS identified by an FOR UID. The FOR UID of the images may or may not be the same as the FOR UID for the RDSR RCS. If it is not the same, registration would be required to relate the two RCSs.</p>
Row 5	<p>It defines the component that is used to define the origin of the RDSR RCS.</p> <p>Allows secondary devices used during the same scope of accumulation to more easily make registration to other RCS post acquisition.</p>
Row 6	The textual description may include a description of the origin and orientation relative to the real-world entity (e.g., the gantry, patient support, rotational isocenter, etc.).
Row 7, 8, 9, 11, 12, 13, 14	The subtemplate shall be included at least once for each source if applicable conditions are met.
Row 10, 15	The subtemplate shall be included at least once if the conditions are met.
Row 16, 17	The subtemplate may be included multiple times to reflect changes across multiple sources or over time

286

TID 10044 Radiation Source Characteristics

288 This template describes a radiation source (e.g., focal spot size, anode material, etc.).

Table TID 10044
Radiation Source Characteristics
 Type: Extensible
 Order: Non-Significant
 Root: No

290

292

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (130508, DCM, "Radiation Source Characteristics")	1	M		
2	>	CONTAINS	DATETIME	DT (111526, DCM, "DateTime Started")	1	M		
3	>	CONTAINS	DATETIME	DT (111527, DCM, "DateTime Ended")	1	M		
4	>	CONTAINS	TEXT	EV (113832, DCM, "Identification of the X-Ray Source")	1	M		
5	>	CONTAINS	NUM	EV (113766, DCM, "Focal Spot Size")	1	MC	XOR Row 6	UNITS = EV (mm, UCUM, "mm")

6	>	CONTAINS	TABLE	EV (113766, DCM, "Focal Spot Size")	1	MC	XOR Row 5	NCOLUMNS = 2 COLUMN 1 = EV (111526, DCM, "DateTime Started") COLUMN 2 = EV (113766, DCM, "Focal Spot Size") COLUMN 2 UNITS = EV (mm, UCUM, "mm") COLUMN 1 VR = DT COLUMN 2 VR = FL
7	>	CONTAINS	CODE	EV (111632, DCM, "Anode Target Material")	1	UC	XOR Row 8	DCID 10016 "Anode Target Material"
8	>	CONTAINS	TABLE	EV (111632, DCM, "Anode Target Material")	1	UC	XOR Row 7	NCOLUMNS = 2 COLUMN 1 = EV (111526, DCM, "DateTime Started") COLUMN 2 = EV (111632, DCM, "Anode Target Material") COLUMN 2 VALUES = DCID 10016 "Anode Target Material" COLUMN 1 VR = DT COLUMN 2 VR = SQ
9	>	CONTAINS	CONTAINER	EV (130531, DCM, "Attenuator Characteristics")	1-n	U		
10	>>	CONTAINS	CODE	EV (113757, DCM, "X-Ray Filter Material")	1	MC	XOR Row 13	DCID 10067 "Radiation Attenuator Materials"
11	>>	CONTAINS	NUM	EV (130509, DCM, "X-Ray Filter Thickness")	1	MC	IFF Row 10 is present	UNITS = EV (mm, UCUM, "mm")
12	>>>	HAS PROPERTIES	CODE	EV (130510, DCM, "Reported Value Type")	1	U		DCID 10072 "Reported Value Types"
13	>>	CONTAINS	CODE	EV (128465, DCM, "Equivalent Attenuator Material")	1	MC	XOR Row 10	DCID 10067 "Radiation Attenuator Materials"
14	>>	CONTAINS	NUM	EV (128469, DCM, "Equivalent Attenuator Thickness")	1	MC	IFF Row 13 is present	UNITS = EV (mm, UCUM, "mm")
15	>>>	HAS PROPERTIES	CODE	EV (130510, DCM, "Reported Value Type")	1	U		DCID 10072 "Reported Value Types"

294 **Content Item Descriptions**

Row 2	The DateTime of the beginning of the time period over which the content items are applicable.
Row 3	The DateTime of the end of the time period over which the content items are applicable.
Row 4	Identification the X-Ray source. This designation shall not change for a given source throughout the entire RDSR. For systems with multiple X-Ray sources, each source shall be described with a separate instance of this template.
Row 9	Include the filtration effects of all housing and coolant components which are generally unchanged during a scope of accumulation. Multiple instances of the container may be included if there are multiple components of filtration present. The same component shall only be described once, using either the equivalent or actual material.
Row 10 and 11	Use Row 10 and 11 when the actual material is used to describe the filtration.

Row 13 and 14	Use Row 13 and 14 when an equivalent material is used to describe the filtration.
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296

TID 10045 Radiation Technique

298 This template describes the technique parameters (e.g., X-Ray tube potential, X-Ray tube current, pulse rate, etc.) of the radiation exposure during a period of time.

300

**Table TID 10045
 Radiation Technique
 Type: Extensible
 Order: Non-Significant
 Root: No**

302

304

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (130511, DCM, "Radiation Technique")	1	M		
2	>	CONTAINS	DATETIME	DT (111526, DCM, "DateTime Started")	1	M		
3	>	CONTAINS	DATETIME	DT (111527, DCM, "DateTime Ended")	1	M		
4	>	CONTAINS	TEXT	EV (113832, DCM, "Identification of the X-Ray Source")	1	M		
5	>	CONTAINS	NUM	EV (111634, DCM, "Half Value Layer")	1	UC	XOR Row 7	UNITS = EV (mm, UCUM, "mm")
6	>>	HAS PROPERTIES	CODE	EV (130510, DCM, "Reported Value Type")	1	U		DCID 10072 "Reported Value Types"
7	>	CONTAINS	TABLE	EV (111634, DCM, "Half Value Layer")	1	UC	XOR Row 5	NCOLUMNS = 2 COLUMN 1 = EV (111526, DCM, "DateTime Started") COLUMN 2 = EV (111634, DCM, "Half Value Layer") COLUMN 2 UNITS = EV (mm, UCUM, "mm") COLUMN 1 VR = DT COLUMN 2 VR = FL
8	>>	HAS PROPERTIES	CODE	EV (130510, DCM, "Reported Value Type")	1	U		DCID 10072 "Reported Value Types"
9	>	CONTAINS	NUM	EV (113733, DCM, "KVP")	1	MC	XOR Row 11	UNITS = EV (kV, UCUM, "kV")
10	>>	HAS PROPERTIES	CODE	EV (130510, DCM, "Reported Value Type")	1	U		DCID 10072 "Reported Value Types"
11	>	CONTAINS	TABLE	EV (113733, DCM, "KVP")	1	MC	XOR Row 9	NCOLUMNS = 2 COLUMN 1 = EV (111526, DCM, "DateTime Started") COLUMN 2 = EV (113733, DCM, "KVP") COLUMN 2 UNITS = EV (kV, UCUM, "kV") COLUMN 1 VR = DT COLUMN 2 VR = FL
12	>>	HAS PROPERTIES	CODE	EV (130510, DCM, "Reported Value Type")	1	U		DCID 10072 "Reported Value Types"

13	>	CONTAINS	NUM	EV (113734, DCM, "X-Ray Tube Current")	1	MC	XOR Row 15	UNITS = EV (mA, UCUM, "mA")
14	>>	HAS PROPERTIES	CODE	EV (130510, DCM, "Reported Value Type")	1	U		DCID 10072 "Reported Value Types"
15	>	CONTAINS	TABLE	EV (113734, DCM, "X-Ray Tube Current")	1	MC	XOR Row 13	NCOLUMNS = 2 COLUMN 1 = EV (111526, DCM, "DateTime Started") COLUMN 2 = EV (113734, DCM, "X-Ray Tube Current") COLUMN 2 UNITS = EV (mA, UCUM, "mA") COLUMN 1 VR = DT COLUMN 2 VR = FL
16	>>	HAS PROPERTIES	CODE	EV (130510, DCM, "Reported Value Type")	1	U		DCID 10072 "Reported Value Types"
17	>	CONTAINS	NUM	EV (113791, DCM, "Pulse Rate")	1	UC	XOR Row 19	UNITS = EV ({pulse}/s, UCUM, "pulse/s")
18	>>	HAS PROPERTIES	CODE	EV (130510, DCM, "Reported Value Type")	1	U		DCID 10072 "Reported Value Types"
19	>	CONTAINS	TABLE	EV (113791, DCM, "Pulse Rate")	1	UC	XOR Row 17	NCOLUMNS = 2 COLUMN 1 = EV (111526, DCM, "DateTime Started") COLUMN 2 = EV (113791, DCM, "Pulse Rate") COLUMN 2 UNITS = EV ({pulse}/s, UCUM, "pulse/s") COLUMN 1 VR = DT COLUMN 2 VR = FL
20	>>	HAS PROPERTIES	CODE	EV (130510, DCM, "Reported Value Type")	1	U		DCID 10072 "Reported Value Types"
21	>	CONTAINS	NUM	EV (113793, DCM, "Pulse Width")	1	UC	XOR Row 23	UNITS = EV (ms, UCUM, "ms")
22	>>	HAS PROPERTIES	CODE	EV (130510, DCM, "Reported Value Type")	1	U		DCID 10072 "Reported Value Types"
23	>	CONTAINS	TABLE	EV (113793, DCM, "Pulse Width")	1	UC	XOR Row 21	NCOLUMNS = 2 COLUMN 1 = EV (111526, DCM, "DateTime Started") COLUMN 2 = EV (113793, DCM, "Pulse Width") COLUMN 2 UNITS = EV (ms, UCUM, "ms") COLUMN 1 VR = DT COLUMN 2 VR = FL
24	>>	HAS PROPERTIES	CODE	EV (130510, DCM, "Reported Value Type")	1	U		DCID 10072 "Reported Value Types"

Content Item Descriptions

306

Row 2	The DateTime of the beginning of the time period over which the content items are applicable.
Row 3	The DateTime of the end of the time period over which the content items are applicable.
Row 4	Identification the X-Ray source. This designation shall not change for a given source throughout the entire RDSR. For systems with multiple X-Ray sources, each source shall be described with a separate instance of this template.

308 **TID 10046 Filtration**

310 This template describes the filtration applied to a radiation beam after it has exited the X-Ray tube. It does not include inherent filtration associated with the X-Ray tube itself.

312 Filters move with the associated X-Ray source (within an X-Ray tube). Attenuating material that does not move with an X-Ray source is referred to as an Attenuator and is described in TID 10047.

314 **Table TID 10046**
Filtration
Type: Extensible
Order: Non-Significant
Root: No

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (130512, DCM, "Filtration")	1	M		
2	>	CONTAINS	DATETIME	DT (111526, DCM, "DateTime Started")	1	M		
3	>	CONTAINS	DATETIME	DT (111527, DCM, "DateTime Ended")	1	M		
4	>	CONTAINS	TEXT	EV (113832, DCM, "Identification of the X-Ray Source")	1	M		
5	>	CONTAINS	INCLUDE	DTID 10053 "Attenuator Characteristics"	1-n	M		

318 **Content Item Descriptions**

Row 2	The DateTime of the beginning of the time period over which the content items are applicable.
Row 3	The DateTime of the end of the time period over which the content items are applicable.
Row 4	Identification the X-Ray source. This designation shall not change for a given source throughout the entire RDSR. It identifies the X-Ray source whose beam is being filtered. For systems with multiple X-Ray sources, each source shall be described with a separate instance of this template.
Row 5	Include for each X-Ray filter, excluding inherent filtration. Multiple instances may be included if there are multiple components of filtration present. The same component shall only be described once, using either equivalent or actual material.

320

322 **TID 10047 Attenuators**

324 This template describes the attenuators present during an exam. The attenuators are different from the filters in that filters are intended to modify the radiation (e.g., bowtie filters, spectral filters, etc.) while attenuators may modify the radiation, but this is not the intended function (e.g., patient support, table pad, etc.).

328 Attenuators do not move with the associated X-Ray source (within an X-Ray tube). Attenuating material that moves with an X-Ray source is referred to as a Filter and is described in TID 10046.

330 **Table TID 10047**
Attenuators
Type: Extensible

332

Order: Non-Significant
Root: No

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (130513, DCM, "Attenuators")	1	M		
2	>	CONTAINS	DATETIME	DT (111526, DCM, "DateTime Started")	1	M		
3	>	CONTAINS	DATETIME	DT (111527, DCM, "DateTime Ended")	1	M		
4	>	CONTAINS	INCLUDE	DTID 10053 "Attenuator Characteristics"	1-n	M		

334 **Content Item Descriptions**

Row 2	The DateTime of the beginning of the time period over which the content items are applicable.
Row 3	The DateTime of the end of the time period over which the content items are applicable.
Row 4	Include for each attenuator that is present during the specified period of time. Multiple instances may be included if there are multiple layers in an attenuator. The same component shall only be described once, using either equivalent or actual materials.

336

338 **TID 10048 Radiation Output**

The description of the radiation output at the output measurement point. If the output measurement point position (10051 Row 5), X-Ray source transformation matrix (10050 Row 5), or X-Ray source rotation angle (10050 Row 8) are updated, this TID must also be updated. The TID may also be updated following changes to other machine characteristics (e.g., tube potential).

344

Table TID 10048
Radiation Output

346

Type: Extensible
Order: Non-Significant
Root: No

348

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (130514, DCM, "Radiation Output")	1	M		
2	>	CONTAINS	DATETIME	DT (111526, DCM, "DateTime Started")	1	M		
3	>	CONTAINS	DATETIME	DT (111527, DCM, "DateTime Ended")	1	M		
4	>	CONTAINS	TEXT	EV (113832, DCM, "Identification of the X-Ray Source")	1	M		
5	>	CONTAINS	NUM	EV (130515, DCM, "Air Kerma at Output Measurement Point")	1	MC	XOR Row 6	UNITS = EV (mGy, UCUM, "mGy")

6	>	CONTAINS	TABLE	EV (130515, DCM, "Air Kerma at Output Measurement Point")	1	MC	XOR Row 5	NCOLUMNS = 2 COLUMN 1 = EV (111527, DCM, "DateTime Ended") COLUMN 2 = EV (130515, DCM, "Air Kerma at Output Measurement Point") COLUMN 2 UNITS = EV (mGy, UCUM, "mGy") COLUMN 1 VR = DT COLUMN 2 VR = FL
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350 **Content Item Descriptions**

Rows 2, 3	The DateTime of the start and end of the radiation output measurement or calculation. This radiation output measurement window shall not overlap with the radiation output measurement window of any other instance of this template within the same RDSR.
Row 4	Identification the X-Ray source. This designation shall not change for a given source throughout the entire RDSR. For systems with multiple X-Ray sources, each source shall be described with a separate instance of this template.
Row 5	The accumulated air kerma over the period of time specified by Row 2 and 3
Row 6	The table is encoded as a two-column table, consisting of multiple rows describing corresponding values of DateTime and accumulated air kerma over the period of time specified by Row 2 and 3. The number of rows in the table is not constrained. The DateTime value in the first row of the table shall not be before the DateTime value in Row 2, and the corresponding air kerma value shall indicate the accumulated air kerma between the DateTime in Row 2 and the specified DateTime of the first row. Each subsequent row describes the accumulated air kerma between the DateTime in the previous row and the current row. The final DateTime value shall not be after the end DateTime value specified in Row 3.

352

TID 10049 Radiation Field Area

354 This template contains a description of the radiation field area for a given X-Ray source, which accounts for collimation.

356

**Table TID 10049
 Radiation Field Area
 Type: Extensible
 Order: Non-Significant
 Root: No**

358

360

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (130516, DCM, "Radiation Field Area")	1	M		
2	>	CONTAINS	DATETIME	DT (111526, DCM, "DateTime Started")	1	M		
3	>	CONTAINS	DATETIME	DT (111527, DCM, "DateTime Ended")	1	M		
4	>	CONTAINS	TEXT	EV (113832, DCM, "Identification of the X-Ray Source")	1	M		
5	>	CONTAINS	COORD3D	EV (130517, DCM, "Radiation Field Outline")	1-n	M		GRAPHIC TYPE = {POLYGON, ELLIPSE}
6	>>	HAS PROPERTIES	CODE	EV (130518, DCM, "Value Timing")	1	U		DCID 10073 "Value Timings"

362 **Content Item Descriptions**

Row 2	The DateTime of the beginning of the time period over which the content items are applicable.
Row 3	The DateTime of the end of the time period over which the content items are applicable.
Row 4	Identification the X-Ray source. This designation shall not change for a given source throughout the entire RDSR.
Row 5	The Radiation Field Outline describes the area and shape of the radiation field. The points shall be coplanar and are defined in the X-Ray source reference coordinate system.

364

TID 10050 X-Ray Source Reference Coordinate System

366 This template describes the transformation between the X-Ray-source-related coordinate positions and the RDSR reference coordinate system.

368

**Table TID 10050
X-Ray Source Reference Coordinate System**

370

**Type: Extensible
Order: Non-Significant
Root: No**

372

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (130519, DCM, "X-Ray Source Reference Coordinate System")	1	M		
2	>	CONTAINS	DATETIME	DT (111526, DCM, "DateTime Started")	1	M		
3	>	CONTAINS	DATETIME	DT (111527, DCM, "DateTime Ended")	1	M		
4	>	CONTAINS	TEXT	EV (113832, DCM, "Identification of the X-Ray Source")	1	M		
5	>	CONTAINS	TABLE	EV (130520, DCM, "Transformation Matrix")	1	M		NCOLUMNS = 4 NROWS= 4 CELL VR = FD
6	>	CONTAINS	SCoord3D	EV (130521, DCM, "Center of Rotation")	1	MC	IFF Row 8 is present	GRAPHIC TYPE = {POINT}
7	>	CONTAINS	SCoord3D	EV (130522, DCM, "Rotation Plane Normal Point")	1	MC	IFF Row 8 is present	GRAPHIC TYPE = {POINT}
8	>	CONTAINS	TABLE	EV (130523, DCM, "Rotation Angle")	1	U		NCOLUMNS = 2 COLUMN 1 = EV (111526, DCM, "DateTime Started") COLUMN 2 = EV (130523, DCM, "Rotation Angle") COLUMN 2 UNITS = EV (deg, UCUM, "deg") COLUMN 1 VR = DT COLUMN 2 VR = FD

374 **Content Item Descriptions**

Row 2	The DateTime of the beginning of the time period over which the content items are applicable.
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Row 3	The DateTime of the end of the time period over which the content items are applicable.
Row 4	Identification the X-Ray source. This designation shall not change for a given source throughout the entire RDSR. For systems with multiple X-Ray sources, each source shall be described with a separate instance of this template.
Row 5	<p>A 4-by-4 matrix of dimensionless numbers of the form defined in PS3.3 Section C.20.2.1.1 Frame of Reference Transformation Matrix. The matrix describes the rigid transformation matrix (including translation and rotation) that transforms the X-Ray source reference coordinate system to the RDSR reference coordinate system. The translation described by this matrix indicates the position and orientation of the X-Ray source within the RDSR reference coordinate system. Like the RDSR RCS, the X-Ray source reference coordinate system shall be a right-handed Cartesian coordinate system.</p> <p>In the specific case of a source rotating about a fixed point within a plane, Row 6-8 may be specified to describe the rotation of a moving source without the need to encode multiple transformation matrices. For an RDSR that describes only a rotating source in a single plane, the source transformation matrix may be described only once, with all subsequent movements described by the values in Row 6-8. If Row 6-8 are used, the transformation matrix described in Row 5 corresponds to the position and orientation of the source at the beginning of the rotation.</p>
Row 6	<p>Position of the center of rotation of the X-Ray source in the X-Ray source reference coordinate system. Since the X-Ray source RCS uses the source as the origin, this value defines the vector from the source to the center of rotation.</p> <p>Its value shall be assumed to be the position at the initial angle of rotation. Zero degrees in Row 8 is the angle of the source about the center of rotation at its initial position.</p>
Row 7	Row 6 is combined with Row 7 to define the normal vector to the rotational plane. The Center of Rotation SCOOD3D value from Row 6 defines the origin of the vector. Row 7 defines the distal end of the vector. The orientation of the vector assumes the same x, y, and z axis orientations as the X-Ray source reference coordinate system. The positive rotation angle is clockwise as viewed from the center of rotation along this normal vector. This vector may or may not be a unit vector.
Row 8	<p>Two-column table specifying DateTime values and X-Ray source rotation angles. This table shall only be populated in the specific case when the X-Ray source is rotating about a fixed center of rotation within a plane. It allows encoding of a single value, i.e., angle, of a source in a specific motion (rotating around a fixed point), along with an accompanying DateTime value. The position of the source at the beginning of the rotation is defined as zero degrees.</p> <p>The first DateTime value shall not be before the start DateTime value in Row 2 of the template, and the final DateTime value shall not be after the end DateTime value specified in Row 3.</p>

376

TID 10051 Beam Position

378 This template describes the positions of objects and locations that are defined in the X-Ray source reference coordinate system (e.g., output measurement point, filter position, etc.).

380

**Table TID 10051
 Beam Position
 Type: Extensible
 Order: Non-Significant
 Root: No**

382

384

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (130524, DCM, "Beam Position")	1	M		
2	>	CONTAINS	DATETIME	DT (111526, DCM, "DateTime Started")	1	M		
3	>	CONTAINS	DATETIME	DT (111527, DCM, "DateTime Ended")	1	M		
4	>	CONTAINS	TEXT	EV (113832, DCM, "Identification of the X-Ray Source")	1	M		

5	>	CONTAINS	SCoord3D	EV (130525, DCM, "Output Measurement Point Position")	1	M		GRAPHIC TYPE = {POINT}
6	>>	HAS PROPERTIES	CODE	EV (130518, DCM, "Value Timing")	1	U		DCID 10073 "Value Timings"
7	>	CONTAINS	SCoord3D	EV (130526, DCM, "Reference Point Position")	1	MC	IF Reference Point Definition is provided in TID 10041	GRAPHIC TYPE = {POINT}
8	>>	HAS PROPERTIES	CODE	EV (130518, DCM, "Value Timing")	1	U		DCID 10073 "Value Timings"
9	>	CONTAINS	CONTAINER	EV (128472, DCM, "X-Ray Beam Attenuator Model")	1-n	MC	IF an X-Ray Filter is described in TID 10046 AND the position is known	
10	>>	CONTAINS	TEXT	EV (130527, DCM, "Identification of the Attenuator")	1	M		
11	>>	CONTAINS	IMAGE	EV (128470, DCM, "X-Ray Attenuator Model Data")	1	MC	XOR Row 12, 13	
12	>>	CONTAINS	COMPOSITE	EV (128470, DCM, "X-Ray Attenuator Model Data")	1	MC	XOR Row 11, 13	
13	>>	CONTAINS	UIDREF	EV (128470, DCM, "X-Ray Attenuator Model Data")	1	MC	XOR Row 11, 12	
14	>>	CONTAINS	TABLE	EV (130520, DCM, "Transformation Matrix")	1	M		NCOLUMNS = 4 NROWS = 4 CELL VR = FD

386 **Content Item Descriptions**

Row 2	The DateTime of the beginning of the time period over which the content items are applicable.
Row 3	The DateTime of the end of the time period over which the content items are applicable.
Row 4	Identification the X-Ray source. This designation shall not change for a given source throughout the entire RDSR. For systems with multiple X-Ray sources, each source shall be described with a separate instance of this template.
Row 5	The Output Measurement Point Position describes the position where the measure or machine estimate of radiation output occurs. It is described in the X-Ray source reference coordinate system. It may be the same position as the reference point position (the reference point may be defined in TID 10041).
Row 7	If a reference point is defined in TID 10041, its position in the X-Ray source reference coordinate system shall be described here.
Row 9	Provide the model and position of each X-Ray filter described in TID 10046, if known.
Row 10	Each X-Ray filter model and position description includes the identification of the X-Ray filter, which shall match the identification used in TID 10046.
Row 11, 12, 13	Reference to a three-dimensional model of the X-Ray filter
Row 14	A 4-by-4 matrix of dimensionless numbers of the form defined in PS3.3 Section C.20.2.1.1 Frame of Reference Transformation Matrix. The matrix describes the rigid transformation matrix (including translation and rotation) that transforms the reference coordinate system for the X-Ray filter to the X-Ray source reference coordinate system. The translation described by this matrix indicates the position and orientation of the X-Ray filter within the X-Ray source reference coordinate system. The RCS for the X-Ray filter shall be a right-handed Cartesian coordinate system. If the model data in Row 11, 12, or 13 was not originally in a right-handed Cartesian coordinate system, it must transformed prior to inclusion in this template.

TID 10052 Attenuator Position

390 This template describes the details of the attenuator positions.

392 **Table TID 10052**
Attenuator Position
 Type: Extensible
 394 Order: Non-Significant
 Root: No

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (130528, DCM, "Attenuator Position")	1	M		
2	>	CONTAINS	DATETIME	DT (111526, DCM, "DateTime Started")	1	M		
3	>	CONTAINS	DATETIME	DT (111527, DCM, "DateTime Ended")	1	M		
4	>	CONTAINS	CONTAINER	EV (128472, DCM, "X-Ray Beam Attenuator Model")	1-n	MC	IF an X-Ray Attenuator is described in TID 10047 AND the position is known	
5	>>	CONTAINS	TEXT	EV (130527, DCM, "Identification of the Attenuator")	1	M		
6	>>	CONTAINS	IMAGE	EV (128470, DCM, "X-Ray Attenuator Model Data")	1	MC	XOR Row 7, 8	
7	>>	CONTAINS	COMPOSITE	EV (128470, DCM, "X-Ray Attenuator Model Data")	1	MC	XOR Row 6, 8	
8	>>	CONTAINS	UIDREF	EV (128470, DCM, "X-Ray Attenuator Model Data")	1	MC	XOR Row 6, 7	
9	>>	CONTAINS	TABLE	EV (130520, DCM, "Transformation Matrix")	1	M		NCOLUMNS = 4 NROWS = 4 CELL VR = FD

396

Content Item Descriptions

398

Row 2	The DateTime of the beginning of the time period over which the content items are applicable.
Row 3	The DateTime of the end of the time period over which the content items are applicable.
Row 4	Provide the model and position of each X-Ray attenuator described in TID 10047, if known.
Row 5	Each X-Ray attenuator model and position description includes the identification of the X-Ray attenuator, which shall match the identification used in TID 10047.
Row 6, 7, 8	Reference to a three-dimensional model of the X-Ray attenuator
Row 9	A 4-by-4 matrix of dimensionless numbers of the form defined in PS3.3 Section C.20.2.1.1 Frame of Reference Transformation Matrix. The matrix describes the rigid transformation matrix (including translation and rotation) that transforms the reference coordinate system for the X-Ray attenuator to the RDSR reference coordinate system. The translation described by this matrix indicates the position and orientation of the X-Ray attenuator within the RDSR reference coordinate system. The RCS for the X-Ray attenuator shall be a right-handed Cartesian coordinate system. If the model data in Row 6, 7, 8 was not originally in a right-handed Cartesian coordinate system, it must be transformed prior to inclusion in this template.

400 **TID 10053 Patient Attenuation Characteristics**

402 This template describes the details of the patient attenuation characteristics that may be determined/used by the system (e.g., patient equivalent thickness, water equivalent diameter, etc.).

404 **Table TID 10053**
Patient Attenuation Characteristics
Type: Extensible
Order: Non-Significant
Root: No

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (130529, DCM, "Patient Attenuation Characteristics")	1	M		
2	>	CONTAINS	DATETIME	DT (111526, DCM, "DateTime Started")	1	M		
3	>	CONTAINS	DATETIME	DT (111527, DCM, "DateTime Ended")	1	M		
4	>	CONTAINS	TEXT	EV (113832, DCM, "Identification of the X-Ray Source")	1	M		
5	>	CONTAINS	NUM	EV (111638, DCM, "Patient Equivalent Thickness")	1	UC	XOR Row 6	UNITS = EV (mm, UCUM, "mm")
6	>	CONTAINS	TABLE	EV (111638, DCM, "Patient Equivalent Thickness")	1	UC	XOR Row 5	NCOLUMNS = 2 COLUMN 1 = EV (111526, DCM, "DateTime Started") COLUMN 2 = EV (111638, DCM, "Patient Equivalent Thickness") COLUMN 2 UNITS = EV (mm, UCUM, "mm") COLUMN 1 VR = DT COLUMN 2 VR = FL
7	>	CONTAINS	NUM	EV (113980, DCM, "Water Equivalent Diameter")	1	UC	XOR Row 8	UNITS = EV (mm, UCUM, "mm")
8	>	CONTAINS	TABLE	EV (113980, DCM, "Water Equivalent Diameter")	1	UC	XOR Row 7	NCOLUMNS = 2 COLUMN 1 = EV (111526, DCM, "DateTime Started") COLUMN 2 = EV (113980, DCM, "Water Equivalent Diameter") COLUMN 2 UNITS = EV (mm, UCUM, "mm") COLUMN 1 VR = DT COLUMN 2 VR = FL
9	>	CONTAINS	NUM	EV (113931, DCM, "Measured Lateral Dimension")	1	UC	XOR Row 10	UNITS = EV (mm, UCUM, "mm")
10	>	CONTAINS	TABLE	EV (113931, DCM, "Measured Lateral Dimension")	1	UC	XOR Row 9	NCOLUMNS = 2 COLUMN 1 = EV (111526, DCM, "DateTime Started") COLUMN 2 = EV (113931, DCM, "Measured Lateral Dimension") COLUMN 2 UNITS = EV (mm, UCUM, "mm") COLUMN 1 VR = DT COLUMN 2 VR = FL

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11	>	CONTAINS	NUM	EV (113932, DCM, "Measured AP Dimension")	1	UC	XOR Row 12	UNITS = EV (mm, UCUM, "mm")
12	>	CONTAINS	TABLE	EV (113932, DCM, "Measured AP Dimension")	1	UC	XOR Row 11	NCOLUMNS = 2 COLUMN 1 = EV (111526, DCM, "DateTime Started") COLUMN 2 = EV (113932, DCM, "Measured AP Dimension") COLUMN 2 UNITS = EV (mm, UCUM, "mm") COLUMN 1 VR = DT COLUMN 2 VR = FL
13	>	CONTAINS	NUM	EV (113933, DCM, "Derived Effective Diameter")	1	UC	XOR Row 14	UNITS = EV (mm, UCUM, "mm")
14	>	CONTAINS	TABLE	EV (113933, DCM, "Derived Effective Diameter")	1	UC	XOR Row 13	NCOLUMNS = 2 COLUMN 1 = EV (111526, DCM, "DateTime Started") COLUMN 2 = EV (113933, DCM, "Derived Effective Diameter") COLUMN 2 UNITS = EV (mm, UCUM, "mm") COLUMN 1 VR = DT COLUMN 2 VR = FL
15	>	CONTAINS	CODE	EV (129715009, SCT, "Breast composition")	1	UC	XOR Row 16	DCID 6000 "Overall Breast Composition"
16	>	CONTAINS	TABLE	EV (129715009, SCT, "Breast composition")	1	UC	XOR Row 15	NCOLUMNS = 2 COLUMN 1 = EV (111526, DCM, "DateTime Started") COLUMN 2 = EV (129715009, SCT, "Breast composition") COLUMN 2 VALUES = DCID 6000 "Overall Breast Composition" COLUMN 1 VR = DT COLUMN 2 VR = SQ

408

Content Item Descriptions

410

Row 2	The DateTime of the beginning of the time period over which the content items are applicable.
Row 3	The DateTime of the end of the time period over which the content items are applicable.
Row 4	Identification the X-Ray source. This designation shall not change for a given source throughout the entire RDSR. For systems with multiple X-Ray sources, each source shall be described with a separate instance of this template.
Row 5-16	Patient-specific measurements which may be determined by the imaging equipment during the scope of accumulation. If they are known, they may be reported here.

412

TID 10054 Procedure Characteristics

414 This template describes the details of the procedure characteristics (e.g., patient orientation, SID, etc.).

416
418
420

Table TID 10054
Procedure Characteristics
Type: Extensible
Order: Non-Significant
Root: No

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1			CONTAINER	EV (130530, DCM, "Procedure Characteristics")	1	M		
2	>	CONTAINS	DATETIME	DT (111526, DCM, "DateTime Started")	1	M		
3	>	CONTAINS	DATETIME	DT (111527, DCM, "DateTime Ended")	1	M		
4	>	CONTAINS	NUM	EV (113832, DCM, "Identification of the X-Ray Source")	1	M		UNITS = EV (1, UCUM, "no units")
5	>	CONTAINS	TEXT	EV (125203, DCM, "Acquisition Protocol")	1	U		
6	>	CONTAINS	CODE	EV (113745, DCM, "Patient Table Relationship")	1	U		DCID 21 "Patient Equipment Relationship"
7	>	CONTAINS	CODE	EV (113743, DCM, "Patient Orientation")	1	U		DCID 19 "Patient Orientation"
8	>>	HAS CONCEPT MOD	CODE	EV (113744, DCM, "Patient Orientation Modifier")	1	M		DCID 20 "Patient Orientation Modifier"
9	>	CONTAINS	CODE	EV (123014, DCM, "Target Region")	1	U		DCID 4016 "Anatomic Region for Intra-oral Radiography" DCID 4026 "Primary Anatomic Structure for Intra-oral and Craniofacial Radiography – Teeth" DCID 4028 "Craniofacial Anatomic Regions" DCID 4030 "CT, MR and PET Anatomy Imaged" DCID 4031 "Common Anatomic Regions"
10	>>	HAS CONCEPT MOD	CODE	EV (272741003, SCT, "Laterality")	1	UC	IF target region is bi-lateral	DCID 244 "Laterality"
11	>	CONTAINS	CODE	EV (111635, DCM, "X-Ray Grid")	1-n	U		DCID 10017 "X-Ray Grid"
12	>	CONTAINS	NUM	EV (113750, DCM, "Distance Source to Detector")	1	UC	XOR Row 13	UNITS = EV (mm, UCUM, "mm")
13	>	CONTAINS	TABLE	EV (113750, DCM, "Distance Source to Detector")	1	UC	XOR Row 12	NCOLUMNS = 2 COLUMN 1 = EV (111526, DCM, "DateTime Started") EV (113750, DCM, "Distance Source to Detector") COLUMN 2 UNITS = EV (mm, UCUM, "mm") COLUMN 1 VR = DT COLUMN 2 VR = FL

Content Item Descriptions

422

Row 2	The DateTime of the beginning of the time period over which the content items are applicable.
Row 3	The DateTime of the end of the time period over which the content items are applicable.
Row 4	Identification the X-Ray source. This designation shall not change for a given source throughout the entire RDSR. For systems with multiple X-Ray sources, each source shall be described with a separate instance of this template.

424 **TID 10055 Attenuator Characteristics**

426 This template describes an attenuator’s characteristics (e.g., material, thickness, shape, etc.). An attenuator may be either an X-Ray filter (e.g., a device used to modify the spectral or geometric characteristics of the x-ray beam) or a piece of equipment (e.g., a patient support)

428

Table TID 10055
Attenuator Characteristics
Type: Extensible
Order: Non-Significant
Root: No

430

432

	NL	Rel with Parent	VT	Concept Name	VM	Req Type	Condition	Value Set Constraint
1		CONTAINS	CONTAINER	EV (130531, DCM, "Attenuator Characteristics")	1	M		
2	>	CONTAINS	TEXT	EV (130527, DCM, "Identification of the Attenuator")	1	M		
3	>	CONTAINS	CODE	EV (128458, DCM, "Attenuator Category")	1	M		DCID 10066 "Attenuator Category"
4	>	CONTAINS	CODE	EV (113757, DCM, "X-Ray Filter Material")	1	MC	XOR Row 5	DCID 10067 "Radiation Attenuator Materials"
5	>	CONTAINS	CODE	EV (128465, DCM, "Equivalent Attenuator Material")	1	MC	XOR Row 4	DCID 10067 "Radiation Attenuator Materials"
6	>	CONTAINS	CODE	EV (113772, DCM, "X-Ray Filter Type")	1	M		DCID 10007 "X-Ray Filter Types"
7	>	CONTAINS	NUM	EV (113758, DCM, "X-Ray Filter Thickness Minimum")	1	MC	XOR Row 9	UNITS = EV (mm, UCUM, "mm")
8	>	CONTAINS	NUM	EV (113773, DCM, "X-Ray Filter Thickness Maximum")	1	MC	IFF Row 7 is present	UNITS = EV (mm, UCUM, "mm")
9	>	CONTAINS	NUM	EV (130509, DCM, "X-Ray Filter Thickness")	1	MC	XOR Row 7	UNITS = EV (mm, UCUM, "mm")

434 **Content Item Descriptions**

Row 2	An identifier for the attenuator to track the properties of the attenuators throughout the scope of accumulation. The identifier shall not change during the scope of accumulation and shall not be reused for multiple attenuators or filters.
Row 3	The coded description of the attenuator category
Row 4	The material used to construct the attenuator, which may or may not be a filter. This shall be the actual material, and not an equivalent material.

Row 5	An equivalent material used to describe the composition of the attenuator, which may or may not be a filter.
Row 6	The type of filter present in the beam, based on its physical shape. For an attenuator, choose a filter model that most closely matches the shape of the attenuator.
Row 7	The minimum thickness of the attenuator. For attenuators that are not uniformly thick, provide both the minimum and maximum thicknesses.
Row 8	The maximum thickness of the attenuator. For attenuators that are not uniformly thick, provide both the minimum and maximum thicknesses.
Row 9	The nominal thickness of the attenuator. For attenuators that are uniformly thick, a single value may be provided, rather than a minimum and maximum.

436

Item #12: Edit the following CIDs in Part 16 Annex B:

438 **CID 10067 Radiation Attenuator Materials**

Table CID 10067

Radiation Attenuator Materials

440

Type: Extensible Version: 2017040520210328

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-RT Concept ID	UMLS Concept Unique ID
<i>Include CID 10006 "X-Ray Filter Materials"</i>				
SCT	256501007	Carbon Fiber	F-61202	C0108411
UMLS	C0064329	Kevlar Aramid Fiber		C0064329
SCT	88014003	Beryllium	C-12300	C0005140

442

CID 4052 Phantom Devices

Table CID 4052

Dose Phantom Devices

444

Type: Extensible Version: 2006102320210328

446

Coding Scheme Designator	Code Value	Code Meaning
...
DCM	113692	NEMA XR21-2000 Phantom
DCM	130541	10 cm Dosimetry Phantom

448 **Item #12B: Add the following CIDs to Part 16 Annex B:**

CID 10072 Reported Value Types

Table CID 10072

Reported Value Types

450

Type: Extensible Version: 20210328

452

Coding Scheme Designator	Code Value	Code Meaning	SNOMED-RT ID	UMLS Concept Unique ID
--------------------------	------------	--------------	--------------	------------------------

Include CID 3488 "Min/Max/Mean"				
SCT	373099004	Median	R-00319	C1298795
SCT	373100007	Mode	R-0032E	C1298796
SCT	117362005	Nominal	G-D301	C1264625

454 Note: Nominal is an alternative to mean, median, max, min, etc. that expresses that the value does not represent one of the above characteristics. Nominal is not used as a modifier to one of the above characteristics.

456 **CID 10073 Value Timings**

458 **Table CID 10073
Value Timings**

Type: Extensible Version: 20210328

Coding Scheme Designator	Code Value	Code Meaning
DCM	130532	Duration of Time Period
DCM	130533	Beginning of Time Period
DCM	130534	End of Time Period
DCM	130535	Middle of Time Period

460

CID 10074 RDSR Frame of Reference Origins

Table CID 10074

RDSR Frame of Reference Origins

Type: Extensible Version: 20210328

Coding Scheme Designator	Code Value	Code Meaning
DCM	130536	Room Origin
DCM	130537	Equipment Origin
DCM	130538	Patient Support Origin
DCM	130539	Isocenter Origin
DCM	130540	Patient Coordinate System Origin

466 **Item #13: Edit the following Coded terms in Part 16 Annex D: Table D-1**

D DICOM Controlled Terminology Definitions (Normative)

468 **Table D-1. DICOM Controlled Terminology Definitions**

Code Value	Code Meaning	Definition	Notes
...			
113813	CT Dose Length Product Total	The total dose length product for the defined scope of accumulation	
...			
113832	Identification of the X-Ray Source	Identifies the particular X-Ray source (in a multi source CT system) for which the set of X-Ray source parameter values is reported.	
...			

470 **Item #14: Add the following Coded terms to Part 16 Annex D: Table D-1**

D DICOM Controlled Terminology Definitions (Normative)

472

Table D-1. DICOM Controlled Terminology Definitions

Supplement 214: Enhanced X-Ray Radiation Dose SR (including Cone-beam CT)

Code Value	Code Meaning	Definition	Notes
130500	Accumulated Dose Data	Description of dosimetric-related values that can be summarized for the entire scope of accumulation.	
130501	Irradiation Event Summary Data	Description of dosimetric-related values that can be summarized for a single irradiation event.	
130502	Reference Point Dosimetry	Description of the reference point definition and accumulated dose values at the reference point.	
130503	Is Rejected Acquisition	This acquisition of data (e.g., for constructing an image) was for some reason unsatisfactory.	
130504	Reason for Rejecting Acquisition	The reason that data (e.g., for constructing an image) was rejected.	
130505	Irradiation Details	Description of the radiation dose characteristics independent of an irradiation event.	
130506	RDSR Frame of Reference Origin	The component that is used to define the origin of the RDSR RCS.	
130507	RDSR Frame of Reference Description	The description of the RDSR reference coordinate system. It should include a description of where the origin is, as well as the orientation of the coordinate system.	
130508	Radiation Source Characteristics	Description of the radiation source characteristics	
130509	X-Ray Filter Thickness	The thickness of the X-Ray filter	
130510	Reported Value Type	Describes if a reported value is a mean, median, maximum, minimum, etc.	
130511	Radiation Technique	Description of radiation technique details	
130512	Filtration	Description of a filter	
130513	Attenuators	Description of attenuators	
130514	Radiation Output	Description of the output measurement point dose accumulation timing and values.	
130515	Air Kerma at Output Measurement Point	The air kerma (in mGy) accumulated at the output measurement point during a given period of time.	
130516	Radiation Field Area	Description of the radiation field area and corresponding timing and source index.	
130517	Radiation Field Outline	A list of three-dimensional coordinates that describe the perimeter of the radiation field. The points shall be coplanar and are limited to describing either polygons or ellipses.	
130518	Value Timing	Specifies when a value was determined within a period of time.	
130519	X-Ray Source Reference Coordinate System	Description of the X-Ray source coordinate reference system and the transformation matrix that relates it to the RDSR reference coordinate system	
130520	Transformation Matrix	A transformation matrix that relates one coordinate system to another	
130521	Center of Rotation	The point about which an object rotates	
130522	Rotation Plane Normal Point	A point defining a vector relative to the center of rotation that defines a normal vector of the rotation plane	
130523	Rotation Angle	The angle about the center of rotation for a rotating object	

130524	Beam Position	Description of component positions described in the X-Ray source reference coordinate system	
130525	Output Measurement Point Position	The three-dimensional coordinate of the output measurement position. The output measurement position is described in the X-Ray source reference coordinate system.	
130526	Reference Point Position	The three-dimensional coordinate of the reference point position. The reference point position is described in the X-Ray source reference coordinate system. The reference point may be at the same position as the output measurement point.	
130527	Identification of the Attenuator	Textual identification for each attenuator described. The identifier is used to link the description of the attenuator to its position described in the beam position or attenuator position template. The identifier shall not change during the scope of accumulation described in 10040, and shall not be repeated.	
130528	Attenuator Position	Description of positions and corresponding timing for attenuators	
130529	Patient Attenuation Characteristics	Description of various patient attenuation characteristics that may be known by the system and may change during the course of the scope of accumulation	
130530	Procedure Characteristics	Description of various procedure characteristics that may change during an exam and may be useful to aid in dosimetry or quality assurance	
130531	Attenuator Characteristics	Characteristics of an X-Ray attenuator used as either a filter or attenuating object in the X-Ray beam. Includes a description of actual or equivalent material, as well as thickness information.	
130532	Duration of Time Period	All the points in time throughout a defined period of time	
130533	Beginning of Time Period	The point in time at the beginning of a defined period of time	
130534	End of Time Period	The point in time at the end of a defined period of time	
130535	Middle of Time Period	The point in time at the middle of a defined period of time	
130536	Room Origin	The origin of the Frame of Reference is defined as part of the room in which the equipment is located	
130537	Equipment Origin	The origin of the Frame of Reference is defined as part of the equipment	
130538	Patient Support Origin	The origin of the Frame of Reference is defined as part of the patient support	
130539	Isocenter Origin	The origin of the Frame of Reference is defined as the isocenter of the imaging system	
130540	Patient Coordinate System Origin	The origin of the RDSR Frame of Reference is defined as the origin of the patient coordinate system in the images.	
130541	10 cm Dosimetry Phantom	A dosimetry phantom consisting of a 100 mm diameter polymethyl methacrylate (PMMA) cylinder. The phantom will be at least 140 mm in length. The phantom will be longer than the length of the sensitive volume of the radiation detector used for measurements. The phantom will have five holes just large enough to accept a radiation detector and will be parallel to the axis of symmetry: one hole at the center, and four holes with their centers 10 mm below the surface of the phantom at 90° intervals. For the holes not used during a measurement, properly fitting insert parts made of PMMA will be used.	

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Changes to NEMA Standards Publication PS 3.17-2020a

Digital Imaging and Communications in Medicine (DICOM)

484

Part 17: Explanatory Information

486 **Item #14: Add Enhanced X-Ray Radiation Dose Reporting Use Case Annex**

UUUU Radiation Dose Structured Reporting (Informative)

488 This Annex contains information of the use of Radiation Dose Structured Reports, excluding Radiopharmaceutical
490 RDSRs and Patient RDSRs.

UUUU.1 Cone Beam CT (CBCT) Enhanced RDSR in TID 10040

492 The following is a simple example of a CBCT acquisition. The device acquires data by rotating a source around a
table. There are simple assumptions about the filtration and attenuators present. Many optional entries, particularly
494 legacy dose values, are not included in the interest of making it as simple as possible.

This example could apply to C-arm CBCT acquisitions, dental CBCT, on board imagers in RT, and standard CT
496 scanners.

Table UUUU.1-1. Cone Beam CT (CBCT) Enhanced RDSR

498

Node	Code Meaning of Concept Name	Code or Example Value	TID
1	X-Ray Radiation Dose Report		TID 10040
1.1	Language of Content Item and Descendants	(en, IETF4646, "English")	TID 1204
1.2	Procedure reported	(702569007, SCT, "Cone Beam Acquisition")	TID 10040
1.2.1	Has Intent	(261004008, SCT, "Diagnostic Intent")	TID 10040
1.3	Observer Type	(121007, DCM, "Device")	TID 1002
1.4	Device Observer UID	2.999.1.2.3.4	TID 1004
1.5	Device Observer Manufacturer	Manufacturer X	TID 1004
1.6	Device Observer Model Name	Model Y	TID 1004
1.7	Device Observer Serial Number	123456789	TID 1004
1.8	Scope of Accumulation	(113014, DCM, "Study")	TID 10040
1.9	Accumulated Dose Data		TID 10041
1.9.1	Identification of the X-Ray Source	1	TID 10041
1.9.2	Reference Point Dosimetry		TID 10041

Node	Code Meaning of Concept Name	Code or Example Value	TID
1.9.2.1	Reference Point Definition	(113860, DCM, "15cm from Isocenter toward Source")	TID 10041
1.9.2.2	Dose (RP) Total	85 mGy	TID 10041
1.10	Irradiation Event Summary Data		TID 10042
1.10.1	Irradiation Event UID	2.999.2.3.4	TID 10042
1.10.2	DateTime Started	20200101120000	TID 10042
1.10.3	DateTime Ended	20200101120030	TID 10042
1.10.4	Identification of the X-Ray Source	1	TID 10042
1.10.5	Irradiation Event Types	(113613, DCM, "Rotational Acquisition")	TID 10042
1.11	Irradiation Details		TID 10043
1.11.1	DateTime Started	20200101120000	TID 10043
1.11.2	DateTime Ended	20200101120030	TID 10043
1.11.3	Frame of Reference UID	2.999.1.2.3	TID 10043
1.11.4	RDSR Frame of Reference Origin	(130537, DCM, "Equipment Origin")	TID 10043
1.11.5	RDSR Frame of Reference Description	Equipment origin located on left-most, rear-most corner of gantry support when viewing equipment from the front. Y-axis is anti-gravity direction. Z-axis is along table travel direction into the gantry. X-axis is cross product of y and z axes (+y x +z).	TID 10043
1.11.6	Radiation Source Characteristics		TID 10044
1.11.6.1	DateTime Started	20200101120000	TID 10044
1.11.6.2	DateTime Ended	20200101120030	TID 10044
1.11.6.3	Identification of the X-Ray Source	1	TID 10044
1.11.6.4	Focal Spot Size	1.2 mm	TID 10044
1.11.6.5	Anode Target Material	(26194003, SCT, "Tungsten")	TID 10044
1.11.6.6	Attenuator Characteristics		TID 10044
1.11.6.6.1	Equivalent Attenuator Material	(12503006, SCT, "Aluminum")	TID 10044

Node	Code Meaning of Concept Name	Code or Example Value	TID														
1.11.6.6.2	Equivalent Attenuator Thickness	2.5 mm	TID 10044														
1.11.6.6.2.1	Reported Value Type	(117362005, SCT, "Nominal")	TID 10044														
1.11.7	Radiation Technique		TID 10045														
1.11.7.1	DateTime Started	20200101120000	TID 10045														
1.11.7.2	DateTime Ended	20200101120030	TID 10045														
1.11.7.3	Identification of the X-Ray Source	1	TID 10045														
1.11.7.4	KVP	100 kV	TID 10045														
1.11.7.5	X-Ray Tube Current	<table border="1"> <thead> <tr> <th>DateTime Started</th> <th>X-Ray Tube Current (mA)</th> </tr> </thead> <tbody> <tr> <td>20200101120000</td> <td>100.0</td> </tr> <tr> <td>20200101120005</td> <td>150.0</td> </tr> <tr> <td>20200101120010</td> <td>200.0</td> </tr> <tr> <td>20200101120015</td> <td>150.0</td> </tr> <tr> <td>20200101120020</td> <td>100.0</td> </tr> <tr> <td>20200101120025</td> <td>150.0</td> </tr> </tbody> </table>	DateTime Started	X-Ray Tube Current (mA)	20200101120000	100.0	20200101120005	150.0	20200101120010	200.0	20200101120015	150.0	20200101120020	100.0	20200101120025	150.0	TID 10045
DateTime Started	X-Ray Tube Current (mA)																
20200101120000	100.0																
20200101120005	150.0																
20200101120010	200.0																
20200101120015	150.0																
20200101120020	100.0																
20200101120025	150.0																
1.11.8	Filtration		TID 10046														
1.11.8.1	DateTime Started	20200101120000	TID 10046														
1.11.8.2	DateTime Ended	20200101120030	TID 10046														
1.11.8.3	Identification of the X-Ray Source	1	TID 10046														
1.11.8.4	Attenuator Characteristics		TID 10055														
1.11.8.4.1	Identification of the Attenuator	1	TID 10055														
1.11.8.4.2	Attenuator Category	(113771, DCM, "X-Ray Filters")	TID 10055														
1.11.8.4.3	Filter Material	(66925006, SCT, "Copper")	TID 10055														
1.11.8.4.4	Filter Type	(113653, DCM, "Flat Filter")	TID 10055														
1.11.8.4.5	X-Ray Filter Thickness	0.3 mm	TID 10055														
1.11.9	Attenuators		TID 10047														
1.11.9.1	DateTime Started	20200101120000	TID eRSDRT07														

Node	Code Meaning of Concept Name	Code or Example Value	TID														
1.11.9.2	DateTime Ended	20200101120030	TID eRSDRT07														
1.11.9.4	Attenuator Characteristics		TID 10055														
1.11.9.4.1	Identification of the Attenuator	2	TID 10055														
1.11.9.4.2	Attenuator Category	(128459, DCM, "Table")	TID 10055														
1.11.9.4.3	Filter Material	(256501007, SCT, "Carbon Fiber")	TID 10055														
1.11.9.4.4	Filter Type	(113650, DCM, "Strip Filter")	TID 10055														
1.11.9.4.5	X-Ray Filter Thickness	30 mm	TID 10055														
1.11.10	Radiation Output		TID 10048														
1.11.10.1	DateTime Started	20200101120000	TID 10048														
1.11.10.2	DateTime Ended	20200101120030	TID 10048														
1.11.10.3	Identification of the X-Ray Source	1	TID 10048														
1.11.10.4	Air Kerma at Output Measurement Point	<table border="1"> <thead> <tr> <th>DateTime Ended</th> <th>Air Kerma at Output Measurement Point (mGy)</th> </tr> </thead> <tbody> <tr> <td>20200101120005</td> <td>10.0</td> </tr> <tr> <td>20200101120010</td> <td>15.0</td> </tr> <tr> <td>20200101120015</td> <td>20.0</td> </tr> <tr> <td>20200101120020</td> <td>15.0</td> </tr> <tr> <td>20200101120025</td> <td>10.0</td> </tr> <tr> <td>20200101120030</td> <td>15.0</td> </tr> </tbody> </table>	DateTime Ended	Air Kerma at Output Measurement Point (mGy)	20200101120005	10.0	20200101120010	15.0	20200101120015	20.0	20200101120020	15.0	20200101120025	10.0	20200101120030	15.0	TID 10048
DateTime Ended	Air Kerma at Output Measurement Point (mGy)																
20200101120005	10.0																
20200101120010	15.0																
20200101120015	20.0																
20200101120020	15.0																
20200101120025	10.0																
20200101120030	15.0																
1.11.11	Radiation Field Area		TID 10049														
1.11.11.1	DateTime Started	20200101120000	TID 10049														
1.11.11.2	DateTime Ended	20200101120030	TID 10049														
1.11.11.3	Identification of the X-Ray Source	1	TID 10049														
1.11.11.4	Radiation Field Outline	SCoord3D POLYGON	TID 10049														
1.11.12	X-Ray Source Reference Coordinate System		TID 10050														
1.11.12.1	DateTime Started	20200101120000	TID 10050														

Node	Code Meaning of Concept Name	Code or Example Value	TID																
1.11.12.2	DateTime Ended	20200101120030	TID 10050																
1.11.12.3	Identification of the X-Ray Source	1	TID 10050																
1.11.12.4	Transformation Matrix	<table border="1"> <tr> <td>1.0</td> <td>0.0</td> <td>0.0</td> <td>-40.0</td> </tr> <tr> <td>0.0</td> <td>1.0</td> <td>0.0</td> <td>20.0</td> </tr> <tr> <td>0.0</td> <td>0.0</td> <td>1.0</td> <td>-50.0</td> </tr> <tr> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>1.0</td> </tr> </table>	1.0	0.0	0.0	-40.0	0.0	1.0	0.0	20.0	0.0	0.0	1.0	-50.0	0.0	0.0	0.0	1.0	TID 10050
1.0	0.0	0.0	-40.0																
0.0	1.0	0.0	20.0																
0.0	0.0	1.0	-50.0																
0.0	0.0	0.0	1.0																
1.11.12.5	Center of Rotation	SCOORD3D POINT	TID 10050																
1.11.12.6	Rotation Plane Normal Point	SCOORD3D POINT	TID 10050																
1.11.12.7	Rotation Angle	<table border="1"> <thead> <tr> <th>DateTime Started</th> <th>Rotation Angle (deg)</th> </tr> </thead> <tbody> <tr> <td>20200101120005</td> <td>40.0</td> </tr> <tr> <td>20200101120010</td> <td>80.0</td> </tr> <tr> <td>20200101120015</td> <td>120.0</td> </tr> <tr> <td>20200101120020</td> <td>160.0</td> </tr> <tr> <td>20200101120025</td> <td>200.0</td> </tr> <tr> <td>20200101120030</td> <td>240.0</td> </tr> </tbody> </table>	DateTime Started	Rotation Angle (deg)	20200101120005	40.0	20200101120010	80.0	20200101120015	120.0	20200101120020	160.0	20200101120025	200.0	20200101120030	240.0	TID 10050		
DateTime Started	Rotation Angle (deg)																		
20200101120005	40.0																		
20200101120010	80.0																		
20200101120015	120.0																		
20200101120020	160.0																		
20200101120025	200.0																		
20200101120030	240.0																		
1.11.13	Beam Position		TID 10051																
1.11.13.1	DateTime Started	20200101120000	TID 10051																
1.11.13.2	DateTime Ended	20200101120030	TID 10051																
1.11.13.3	Identification of the X-Ray Source	1	TID 10051																
1.11.13.4	Output Measurement Point Position	SCOORD3D POINT	TID 10051																
1.11.13.5	Reference Point Position	SCOORD3D POINT	TID 10051																
1.11.13.6	X-Ray Beam Attenuator Model		TID 10051																
1.11.13.6.1	Identification of the Attenuator	1	TID 10051																
1.11.13.6.2	X-Ray Attenuator Model Data	2.999.3.4.5	TID 10051																

Node	Code Meaning of Concept Name	Code or Example Value	TID																
1.11.13.6.6	Transformation Matrix	<table border="1"> <tr> <td>1.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> </tr> <tr> <td>0.0</td> <td>1.0</td> <td>0.0</td> <td>5.0</td> </tr> <tr> <td>0.0</td> <td>0.0</td> <td>1.0</td> <td>0.0</td> </tr> <tr> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>1.0</td> </tr> </table>	1.0	0.0	0.0	0.0	0.0	1.0	0.0	5.0	0.0	0.0	1.0	0.0	0.0	0.0	0.0	1.0	TID 10051
1.0	0.0	0.0	0.0																
0.0	1.0	0.0	5.0																
0.0	0.0	1.0	0.0																
0.0	0.0	0.0	1.0																
1.11.14	Attenuator Position		TID 10052																
1.11.14.1	DateTime Started	20200101120000	TID 10052																
1.11.14.2	DateTime Ended	20200101120030	TID 10052																
1.11.14.3	X-Ray Beam Attenuator Model																		
1.11.14.3.1	Identification of the Attenuator	2	TID 10052																
1.11.14.3.2	X-Ray Attenuator Model Data	2.999.4.5.6	TID 10052																
1.11.14.3.3	Transformation Matrix	<table border="1"> <tr> <td>1.0</td> <td>0.0</td> <td>0.0</td> <td>-40.0</td> </tr> <tr> <td>0.0</td> <td>1.0</td> <td>0.0</td> <td>60.0</td> </tr> <tr> <td>0.0</td> <td>0.0</td> <td>1.0</td> <td>-45.0</td> </tr> <tr> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>1.0</td> </tr> </table>	1.0	0.0	0.0	-40.0	0.0	1.0	0.0	60.0	0.0	0.0	1.0	-45.0	0.0	0.0	0.0	1.0	TID 10052
1.0	0.0	0.0	-40.0																
0.0	1.0	0.0	60.0																
0.0	0.0	1.0	-45.0																
0.0	0.0	0.0	1.0																
1.11.15	Procedure Characteristics		TID 10054																
1.11.15.1	DateTime Started	20200101120000	TID 10054																
1.11.15.2	DateTime Ended	20200101120030	TID 10054																
1.11.15.3	Identification of the X-Ray Source	1	TID 10054																
1.11.15.4	Acquisition Protocol	CBCT Acquisition	TID 10054																
1.11.15.5	Patient Table Relationship	(102540008, SCT, "headfirst")	TID 10054																
1.11.15.6	Patient Orientation	(102538003, SCT, "recumbent")	TID 10054																
1.11.15.6.1	Patient Orientation Modifier	(40199007, SCT, "supine")	TID 10054																
1.11.15.7	Distance Source to Detector	1200 mm	TID 10054																
1.12	Source of Dose Information	(113856, DCM, "Automated Data Collection")	TID 10040																