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## **Digital Imaging and Communications in Medicine (DICOM)**

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### *Supplement 185: Content Assessment Results IOD*

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## Table of Contents

4	Table of Contents .....	2
	Foreword.....	3
6	Scope and Field of Application.....	3
	Part 2 Addendum .....	3
8	Part 3 Addendum .....	4
	10.XY EXTENDED SELECTOR ATTRIBUTE MACRO.....	4
10	10.XX.... ATTRIBUTE VALUE CONSTRAINT MACRO.....	5
	10.XX.1 .... Constraint Type .....	7
12	10.XX.2 .... Modifiable Constraint Flag.....	7
	10.XZ.... ATTRIBUTE VALUE MACRO .....	8
14	A.1.2 IOD Entity-Relationship Model .....	11
	A.1.2.X Content Assessment Result IE .....	11
16	A.X..... CONTENT ASSESSMENT RESULTS IOD .....	11
	A.X.1 ..... Content Assessment Results IOD Description.....	11
18	A.X.2 ..... Content Assessment Results IOD Entity-Relationship Model.....	11
	A.X.3 ..... Content Assessment Results IOD Module Table .....	11
20	A.X.4 ..... Content Assessment Results IOD Content Constraints .....	12
	A.X.4.1 ..... Modality .....	12
22	C.7.3.1.1 General Series Attribute Descriptions .....	12
	C.7.3.1.1.1 Modality .....	12
24	C.x.y..... Content Assessment Results Module.....	12
	F.4 ..... BASIC DIRECTORY IOD INFORMATION MODEL.....	17
26	F.5.X ..... Content Assessment Results Directory Record Definition.....	19
	Part 4 Addendum .....	19
28	B.5.1.x ..... Content Assessment Results Storage SOP Classes.....	20
	Part 6 Addendum .....	20
30	ANNEX A     REGISTRY OF DICOM UNIQUE IDENTIFIERS (UID) (NORMATIVE) .	22
	Part 16 Addendum .....	23
32	CID YYY1     CONTENT ASSESSMENT TYPES.....	23
	CID YYY2     RT CONTENT ASSESSMENT TYPES .....	23
34	CID YYY3     BASIS OF ASSESSMENT.....	23
	Part 17 Addendum .....	24
36	XYZ ..... CONTENT ASSESSMENT (INFORMATVE) .....	24
	XYZ.1 RT PLAN TREATMENT ASSESSMENT USE CASE .....	24
38		

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**Foreword**

4 This Supplement specifies a new IOD to encode the results of an assessment by a person or device of  
 6 the content of a DICOM SOP Instance. An assessment might be performed when the content of the SOP  
 Instance could cause serious delays in clinical workflow, or outright harm to a patient, if the values are not  
 consistent and safe. DICOM itself does not define the criteria for such assessments or the clinical  
 workflow implications.

8 This document is an extension to the following parts of the published DICOM Standard:

- PS 3.2 Conformance
- 10 PS 3.3 Information Object Definitions
- PS 3.4 Service Class Specifications
- 12 PS 3.6 Data Dictionary
- PS 3.16 Content Mapping Resource

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**Scope and Field of Application**

16 This Supplement specifies the IOD representing content assessment by a person or device. It stems  
 from the development of the Quality Assurance with Plan Veto profile in IHE-RO. While the profile  
 originated from use cases to assess RT Plan, the IOD is generalized to allow for reporting of assessment  
 18 results of any DICOM SOP Instance.

**Part 2 Addendum**

20

**Add new SOP Classes to PS3.2 Table A.1-2 UID Values:**

22

UID Value	UID Name	Category
1.2.840.10008.5.1.4.1.1.xx.y.z	Content Assessment Results Storage	Transfer

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**Part 3 Addendum**

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**Add the following column in PS3.3 Section A.1.4, Table A.1-1 COMPOSITE INFORMATION OBJECT MODULES OVERVIEW – RADIOTHERAPY**

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<b>IODs Modules</b>	<b>Content Assessment Results</b>
Patient	<u><b>M</b></u>
Clinical Trial Subject	<u><b>U</b></u>
General Study	<u><b>M</b></u>
Patient Study	<u><b>U</b></u>
Clinical Trial Study	<u><b>U</b></u>
General Series	<u><b>M</b></u>
Clinical Trial Series	<u><b>U</b></u>
General Equipment	<u><b>M</b></u>
Enhanced General Equipment	<u><b>M</b></u>
Common Instance Reference	<u><b>M</b></u>
<u><b>Content Assessment Results</b></u>	<u><b>M</b></u>
SOP Common	<u><b>M</b></u>

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**In PS3.3, Section A.1.2, Figure A.1-1, include Content Assessment Result IE**

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**In PS3.3, add new section 10.XY**

**10.XY EXTENDED SELECTOR ATTRIBUTE MACRO**

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Table 10.XY-1 extends the Selector Attribute Macro including some mandatory attributes.

**Table 10.XY-1. Extended Selector Attribute Macro Attributes**

<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>
-----------------------	------------	-------------	------------------------------

Attribute Name	Tag	Type	Attribute Description
Selector Attribute Name	(gggg,ee18)	1	Name of the Selector Attribute (0072,0026). For standard data elements, this shall be the value in the Name column of PS3.6 Table 6-1.
Selector Attribute Keyword	(gggg,ee19)	3	Keyword of the Selector Attribute (0072,0026). For standard data elements, this shall be the value in the Keyword column of PS3.6 Table 6-1.
Selector Attribute VR	(0072,0050)	1	Value Representation of the Selector Attribute (0072,0026). For standard data elements, this shall be the value in the VR column of PS3.6 Table 6-1.
Include Table 10-20 'Selector Attribute Macro Attributes'			

2 **In PS3.3, add new section 10.XX**

**10.XX ATTRIBUTE VALUE CONSTRAINT MACRO**

4 Table 10.XX-1 allows an Attribute to be identified and to have constraints placed on acceptable values for that Attribute. An Attribute being constrained is referred to in the macro as a Selector Attribute.

- 6 Notes:
- 1. This Macro does not handle mutual constraints between multiple Attributes. For example constraining the ratio between two Attributes to a specific value is not possible unless there is a third Attribute that encodes that ratio so the third Attribute could then be constrained.
  - 2. The SOP Instance containing this macro defines the purpose of the constraints which may include constraining attribute values in other SOP Instances.

**Table 10.XX-1**

**ATTRIBUTE VALUE CONSTRAINT MACRO ATTRIBUTES**

Attribute Name	Tag	Type	Attribute Description
<i>Include Table 10.XY-1 'Extended Selector Attribute Macro Attributes'</i>			
Constraint Type	(yym0,m0x2)	1	Describes how the value(s) specified in the Constraint Value Sequence (yym0,m0x4) shall be used to determine the acceptability of a given value for the Attribute identified by Selector Attribute (0072,0026) See 10.XX.1. Enumerated Values: RANGE_INCL RANGE_EXCL GREATER_OR_EQUAL LESS_OR_EQUAL GREATER_THAN LESS_THAN EQUAL MEMBER_OF

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Attribute Name	Tag	Type	Attribute Description
			NOT_MEMBER_OF UNCONSTRAINED
Modifiable Constraint Flag	(yym0,m0x6)	1C	Whether this constraint may be encoded in a derived instance with a different value. See 10.XX.2. Required if the constraint may not be modified, may be present otherwise. Enumerated Values: YES – the constraint may be modified. NO – the constraint may not be modified.
Constraint Value Sequence	(yym0,m0x4)	1C	Contains the value(s) used to constrain the contents of the Selector Attribute (0072,0026). Required if Constraint Type (yym0,m0x2) is not UNCONSTRAINED.  If the Constraint Type (yym0,m0x2) is GREATER_OR_EQUAL, LESS_OR_EQUAL, GREATER_THAN, LESS_THAN, or EQUAL, only a single Item shall be included in this Sequence.  If the Constraint Type (yym0,m0x2) is RANGE_INCL or RANGE_EXCL, exactly two Items shall be included in this Sequence, the first of which is less than or equal to the second.  If the Constraint Type (yym0,m0x2) is MEMBER_OF or NOT_MEMBER_OF, one or more Items shall be included in this Sequence.
<i>&gt;Include Table 10.XZ-1 "Attribute Value Macro Attributes"</i>			<i>&lt;An item in this sequence may only contain a single valued attribute, or a subsequence with a single item&gt;</i>
Recommended Default Value Sequence	(yym0,m0x5)	3	Contains a default value for the contents of the Selector Attribute (0072,0026). Only a single Item is permitted in this Sequence.
<i>&gt;Include Table 10.XZ-1 "Attribute Value Macro Attributes"</i>			
Measurement Units Code Sequence	(0040,08EA)	3	Units of measurement for the values in the Item(s) in the Constraint Value Sequence (yym0,m0x4) and the Recommended Default Value Sequence (yym0,m0x5). Only a single Item is permitted in this Sequence.
<i>&gt;Include Table 8.8-1 'Code Sequence Macro Attributes'</i>			<i>Baseline CID 82 "Units of Measurement".</i>
Specification Selection Guidance	(yym0,m0x3)	3	Brief guidance that a human operator may consider when selecting an appropriate value for

Attribute Name	Tag	Type	Attribute Description
			the Selector Attribute (0072,0026) within the constraints defined.

2 **10.XX.1 Constraint Type**

3 The use of the specified value(s) in the provided Specified Value Attribute shall depend on the value of  
 4 Constraint Type (yym0,m0x2) as follows:

- 6 RANGE\_INCL the value of the Selector Attribute (0072,0026) is constrained to lie  
between the specified values, or be equal to one of the specified values
- 8 RANGE\_EXCL the value of the Selector Attribute (0072,0026) is constrained to lie  
outside (i.e. not between) the specified values
- 10 GREATER\_OR\_EQUAL the value of the Selector Attribute (0072,0026) is constrained to be  
greater than or equal to the specified value
- 12 LESS\_OR\_EQUAL the value of the Selector Attribute (0072,0026) is constrained to be less  
than or equal to the specified value
- 14 GREATER\_THAN the value of the Selector Attribute (0072,0026) is constrained to be  
greater than the specified value
- 16 LESS\_THAN the value of the Selector Attribute (0072,0026) is constrained to be less  
than the specified value
- 18 EQUAL the value of the Selector Attribute (0072,0026) is constrained to be equal  
to the specified value
- 20 MEMBER\_OF the value of the Selector Attribute (0072,0026) is constrained to be equal  
to one of the specified values
- 22 NOT\_MEMBER\_OF the value of the Selector Attribute (0072,0026) is constrained to be not  
equal to any of the specified values
- 24 UNCONSTRAINED the value of the Selector Attribute (0072,0026) is not constrained beyond  
the capabilities of the device

26 RANGE\_INCL, RANGE\_EXCL, GREATER\_OR\_EQUAL, LESS\_OR\_EQUAL, GREATER\_THAN or  
 28 LESS\_THAN shall only be specified if the Selector Attribute (0072,0026) is a numeric, date, datetime or  
time.

30 **10.XX.2 Modifiable Constraint Flag**

31 Situations will exist in which new instances can be derived from existing instances with different  
 constraints on a given attribute, in effect "modifying" the constraint.

32 This flag may be used by devices that need to express limits on which constraints are modifiable in  
 derived instances. For example, a CT device that creates a Defined Procedure Protocol, may indicate  
 34 that the Acquisition Element Name (yym8,m8x9), or the CTDIvol Notification Trigger (0018,m5x1)  
 constraints may be modified, but the Spiral Pitch Factor (0018,9311) constraint may not since the latter  
 36 depends on correlated changes by the device to other attributes.

Note: This is independent of the changes that an operator makes to a Protocol at the time of execution.

38

**In PS3.3, add new section 10.XZ**

**10.XZ ATTRIBUTE VALUE MACRO**

2 Table 10.XZ-1 includes an Attribute to store a value of a specified VR.

**Table 10.XZ-1**

**ATTRIBUTE VALUE MACRO ATTRIBUTES**

4

<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>
Selector AE Value	(yym0,m0x8)	1C	The value(s) of the attribute identified by Selector Attribute (0072,0026). Required if Selector Attribute VR (0072,0050) is present and the value is AE.
Selector AS Value	(yym0,m0x9)	1C	The value(s) of the attribute identified by Selector Attribute (0072,0026). Required if Selector Attribute VR (0072,0050) is present and the value is AS.
Selector AT Value	(0072,0060)	1C	The value(s) of the attribute identified by Selector Attribute (0072,0026). Required if Selector Attribute VR (0072,0050) is present and the value is AT.
Selector CS Value	(0072,0062)	1C	The value(s) of the attribute identified by Selector Attribute (0072,0026). Required if Selector Attribute VR (0072,0050) is present and the value is CS.
Selector DA Value	(yym0,m0xa)	1C	The value(s) of the attribute identified by Selector Attribute (0072,0026). Required if Selector Attribute VR (0072,0050) is present and the value is DA.
Selector DS Value	(0072,0072)	1C	The value(s) of the attribute identified by Selector Attribute (0072,0026). Required if Selector Attribute VR (0072,0050) is present and the value is DS. The value is interpreted by its semantics of representing a floating point value, not by its literal string; leading and trailing spaces, leading 0's, and explicit + may be present and do not affect the semantics of the value. Some leniency will be required by the application in precision when matching this selector value to an attribute value.
Selector DT Value	(yym0,m0xb)	1C	The value(s) of the attribute identified by Selector Attribute (0072,0026). Required if Selector Attribute VR (0072,0050) is present and the value is DT.
Selector FD Value	(0072,0074)	1C	The value(s) of the attribute identified by Selector Attribute (0072,0026). Required if Selector Attribute VR (0072,0050) is present and the value is FD.

<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>
Selector FL Value	(0072,0076)	1C	The value(s) of the attribute identified by Selector Attribute (0072,0026). Required if Selector Attribute VR (0072,0050) is present and the value is FL.
Selector IS Value	(0072,0064)	1C	The value(s) of the attribute identified by Selector Attribute (0072,0026). Required if Selector Attribute VR (0072,0050) is present and the value is IS.
Selector LO Value	(0072,0066)	1C	The value(s) of the attribute identified by Selector Attribute (0072,0026). Required if Selector Attribute VR (0072,0050) is present and the value is LO.
Selector LT Value	(0072,0068)	1C	The value of the attribute identified by Selector Attribute (0072,0026). Required if Selector Attribute VR (0072,0050) is present and the value is LT.
Selector OB Value	(yym0,m0xc)	1C	The value(s) of the attribute identified by Selector Attribute (0072,0026). Required if Selector Attribute VR (0072,0050) is present and the value is OB.
Selector OF Value	(yym0,m0xd)	1C	The value(s) of the attribute identified by Selector Attribute (0072,0026). Required if Selector Attribute VR (0072,0050) is present and the value is OF.
Selector OW Value	(yym0,m0xe)	1C	The value(s) of the attribute identified by Selector Attribute (0072,0026). Required if Selector Attribute VR (0072,0050) is present and the value is OW.
Selector PN Value	(0072,006A)	1C	The value(s) of the attribute identified by Selector Attribute (0072,0026). Required if Selector Attribute VR (0072,0050) is present and the value is PN.
Selector SH Value	(0072,006C)	1C	The value(s) of the attribute identified by Selector Attribute (0072,0026). Required if Selector Attribute VR (0072,0050) is present and the value is SH.
Selector SL Value	(0072,007C)	1C	The value(s) of the attribute identified by Selector Attribute (0072,0026). Required if Selector Attribute VR (0072,0050) is present and the value is SL.
Selector SS Value	(0072,007E)	1C	The value(s) of the attribute identified by Selector Attribute (0072,0026).

Attribute Name	Tag	Type	Attribute Description
			Required if Selector Attribute VR (0072,0050) is present and the value is SS.
Selector ST Value	(0072,006E)	1C	The value of the attribute identified by Selector Attribute (0072,0026). Required if Selector Attribute VR (0072,0050) is present and the value is ST.
Selector TM Value	(yym0,m0qa)	1C	The value(s) of the attribute identified by Selector Attribute (0072,0026). Required if Selector Attribute VR (0072,0050) is present and the value is TM.
Selector UC Value	(yym0,m0qd)	1C	The value(s) of the attribute identified by Selector Attribute (0072,0026). Required if Selector Attribute VR (0072,0050) is present and the value is UC.
Selector UI Value	(yym0,m0qb)	1C	The value(s) of the attribute identified by Selector Attribute (0072,0026). Required if Selector Attribute VR (0072,0050) is present and the value is UI.
Selector UL Value	(0072,0078)	1C	The value(s) of the attribute identified by Selector Attribute (0072,0026). Required if Selector Attribute VR (0072,0050) is present and the value is UL.
Selector UN Value	(yym0,m0qc)	1C	The value(s) of the attribute identified by Selector Attribute (0072,0026). Required if Selector Attribute VR (0072,0050) is present and the value is UN.
Selector UR Value	(yym0,m0za)	1C	The value(s) of the attribute identified by Selector Attribute (0072,0026). Required if Selector Attribute VR (0072,0050) is present and the value is UR.
Selector US Value	(0072,007A)	1C	The value(s) of the attribute identified by Selector Attribute (0072,0026). Required if Selector Attribute VR (0072,0050) is present and the value is US.
Selector UT Value	(0072,0070)	1C	The value of the attribute identified by Selector Attribute (0072,0026). Required if Selector Attribute VR (0072,0050) is present and the value is UT.
Selector Code Sequence Value	(0072,0080)	1C	The value(s) of the attribute identified by Selector Attribute (0072,0026). One or more Items shall be included in this sequence. See Section C.23.1.1.3.2. Required if Selector Attribute VR (0072,0050) is present

Attribute Name	Tag	Type	Attribute Description
			and the value is SQ, and Selector Attribute (0072,0026) is a code sequence.
>Include Table 8.8-1 "Code Sequence Macro Attributes"			No Baseline CID is defined.

2

**In PS3.3 add the following IOD to Annex A:**

4 **A.1.2 IOD Entity-Relationship Model**

6 ...

**A.1.2.X Content Assessment Result IE**

8 The Content Assessment Result IE contains the results of an assessment of the content of a SOP instance.

10 An assessment is part of a process within a clinical workflow, conducted by users or devices, which have the role of assessing the validity and suitability of the content in question, based on subjective or objective  
 12 criteria. The specific nature of such a process is outside of the scope of this standard.

14 **A.X CONTENT ASSESSMENT RESULTS IOD**

**A.X.1 Content Assessment Results IOD Description**

16 This IOD represents the results of an assessment of the content of one or more SOP Instance(s). The  
 18 assessment may be performed automatically without human intervention. There is no provision for  
 encoding verification or approval by a human, although a human may be involved in determining whether  
 20 the contents meet certain criteria. This IOD is not intended to communicate approval to proceed with the  
 clinical workflow.

22 The Content Assessment Results SOP Instance is not required to be part of the same study as the  
 assessed SOP Instances.

**A.X.2 Content Assessment Results IOD Entity-Relationship Model**

24 The Content Assessment Results IOD uses the E-R Model in Section A.1.2, with only the Content  
 Assessment Results IE below the Series IE. The Frame of Reference IE is not a component of this IOD.

26 **A.X.3 Content Assessment Results IOD Module Table**

**Table A.X.3-1. Content Assessment Results IOD Modules**

28

IE	Module	Reference	Usage
Patient	Patient	C.7.1.1	M
	Clinical Trial Subject	C.7.1.3	U

IE	Module	Reference	Usage
Study	General Study	C.7.2.1	M
	Patient Study	C.7.2.2	U
	Clinical Trial Study	C.7.2.3	U
Series	General Series	C.7.3.1	M
	Clinical Trial Series	C.7.3.2	U
Equipment	General Equipment	C.7.5.1	M
	Enhanced General Equipment	C.7.5.2	M
Content Assessment Results	Content Assessment Results	C.8.8.x	M
	SOP Common	C.12.1	M
	Common Instance Reference	C.12.2	M

2 **A.X.4 Content Assessment Results IOD Content Constraints**

**A.X.4.1 Modality**

4 The value of Modality (0008,0060) shall be ASMT.

6 **In PS3.3 add the following modality to Annex C, section C.7.3.1.1.1 Modality:**

**C.7.3.1.1 General Series Attribute Descriptions**

8 **C.7.3.1.1.1 Modality**

Defined Terms:

10 ...

**ASMT**

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**Content Assessment Results**

14 ...

**In PS3.3 add the following Module:**

16

**C.x.y Content Assessment Results Module**

18 This Module describes the results of the assessment of a SOP Instance.

20 The type of observations that are included in the results is up to the implementation. Although all observations with the Observation Type (gggg,ee08) with value MAJOR are included, inclusion of other observation is on the discretion of the implementation.

2

**Table C.8.8.x-1 Content Assessment Results Module Attributes**

<b>Attribute Name</b>	<b>Tag</b>	<b>Type</b>	<b>Attribute Description</b>
Assessment Label	(gggg,ee23)	1	A label that is used to identify this Assessment.
Assessment Type Code Sequence	(gggg,ee21)	1	Type of Assessment that was performed. Only a single item shall be included in this Sequence.
<i>&gt;Include Table 8.8-1 'Code Sequence Macro Attributes'</i>			<i>Baseline CID YYYY1</i>
Assessment Set ID	(gggg,ee16)	3	Identifies the set of assessments to which this assessment result belongs.
Assessment Requester Sequence	(gggg,ee17)	2	The person or device that made the assessment request. Only a single item shall be included in this Sequence.
<i>&gt;Include C.17.2.4 Identified Person or Device Macro (Editorial Note: This Macro will be extended by CP 1418 to add a device identification code needed for this supplement)</i>			
Assessed SOP Instance Sequence	(gggg,ee04)	1	The SOP Instances that were assessed. One or more Items shall be included in this Sequence.
<i>&gt;Include Table C.17-3 'Hierarchical SOP Instance Reference Macro Attributes'</i>			
<i>&gt;Referenced Comparison SOP Instance Sequence</i>	(gggg,ee05)	1C	SOP Instance(s) used by the assessor to compare to the assessed SOP Instances. Required if the assessor used comparison SOP Instances. One or more Items shall be included in this Sequence.
<i>&gt;&gt;Include Table C.17-3 'Hierarchical SOP Instance Reference Macro Attributes'</i>			
Assessment Summary	(gggg,ee01)	1	Summary of the assessment result. The relationship between the values of Observation Type (gggg,ee08) found and the Assessment Summary value is implementation dependent. Enumerated Values: PASSED The assessment has passed. E.g. no observation of major or moderate concern was made. INCONCLUSIVE

Attribute Name	Tag	Type	Attribute Description
			<p>The object(s) have not definitively passed or failed. E.g. observations of moderate concern were made.</p> <p><b>FAILED</b></p> <p>The object(s) have failed the assessment. E.g. observations of major concern were made.</p>
Assessment Summary Description	(gggg,ee03)	3	Human-readable summary description of the assessment result.
Pertinent Resources Sequence	(0038,0101)	3	<p>List of Resources that contain information considered pertinent for the assessment.</p> <p>Note: This may include specifications for the assessment process and criteria for determining the Observation Type (gggg,ee08).</p> <p>One or more items may be present in this Sequence.</p>
>Retrieve URI	(0040,E010)	1	Retrieval access path to resource. Includes fully specified scheme, authority, path, and query in accordance with [RFC 3986].
>Resource Description	(0038,0102)	3	Description or title of the resource
Number of Assessment Observations	(gggg,ee06)	1	Number of Observations made during the assessment.
Assessment Observations Sequence	(gggg,ee07)	1C	<p>Observations made during the assessment.</p> <p>Required if Number of Assessment Observations (gggg,ee06) is not zero.</p> <p>The number of Items included in the Sequence shall equal the value of Number of Assessment Observations (gggg,ee06).</p>
>Observation Type	(gggg,ee08)	1	<p>The type of this observation regarding the quality or effectiveness of the assessed SOP Instance of this observation.</p> <p>Enumerated Values:</p> <p><b>MAJOR</b></p> <p>The observation represents a major concern. Further use of the assessed object(s) is not advised.</p> <p><b>MODERATE</b></p> <p>The observation represents a</p>

Attribute Name	Tag	Type	Attribute Description
			<p>moderate concern. Intervention by an authorized person is advised prior to any use of the assessed object(s).</p> <p><b>MINOR</b> The observation represents a minor concern, that does not inhibit further use of the assessed object(s).</p> <p><b>CONSISTENT</b> The observation was consistent with the assessment criteria.</p>
>Observation Basis Code Sequence	(gggg,ee22)	1	<p>Basis on which the Observation was performed.</p> <p>Only a single item shall be included in this Sequence.</p>
>>Include Table 8.8-1 'Code Sequence Macro Attributes'			Baseline CID YYY3
>Observation Description	(gggg,ee0A)	1	Human-readable description of the Observation.
>Structured Constraint Observation Sequence	(gggg,ee0C)	2	<p>Structured Constraint(s) that were used to make this observation and description of conformance or violation.</p> <p>Zero or more Items shall be included in this Sequence.</p>
>>Include Table 10.XX-1 'Attribute Value Constraint Macro Attributes'			
>>Assessed Attribute Value Sequence	(gggg,ee10)	1	<p>The value of the attribute in the assessed SOP Instance.</p> <p>One or more Items shall be included in this Sequence.</p>
>>>Include Table 10.XZ-1 'Attribute Value Macro Attributes'			

2

4

**In PS3.3, make the following additions to Annex F, Table F.3.3:**

6

**Table F.3-3. Directory Information Module Attributes**

Attribute Name	Tag	Type	Attribute Description
...			
>Directory Record	(0004,1430)	1	Defines a specialized type of Directory Record by reference

<p>Type</p>		<p>to its position in the Media Storage Directory Information Model (see Section F.4).</p> <p>Enumerated Values:</p> <p>PATIENT</p> <p>STUDY</p> <p>SERIES</p> <p>IMAGE</p> <p>RT DOSE</p> <p>RT STRUCTURE SET</p> <p>RT PLAN</p> <p>RT TREAT RECORD</p> <p>PRESENTATION</p> <p>WAVEFORM</p> <p>SR DOCUMENT</p> <p>KEY OBJECT DOC</p> <p>SPECTROSCOPY</p> <p>RAW DATA</p> <p>REGISTRATION</p> <p>FIDUCIAL</p> <p>HANGING PROTOCOL</p> <p>ENCAP DOC</p> <p>HL7 STRUC DOC</p> <p>VALUE MAP</p> <p>STEREOMETRIC</p> <p>PALETTE</p> <p>IMPLANT</p> <p>IMPLANT GROUP</p> <p>IMPLANT ASSY</p> <p>MEASUREMENT</p> <p>SURFACE</p> <p>SURFACE SCAN</p> <p><b><u>ASSESSMENT</u></b></p> <p>PRIVATE</p> <p>Privately defined record hierarchy position. Type shall be defined by Private Record UID (0004,1432).</p> <p>Note</p> <p>Enumerated Values PRINT QUEUE, FILM SESSION, FILM BOX, and IMAGE BOX were previously defined in DICOM for this Attribute. They are now retired. See PS3.3-1998.</p> <p>Enumerated Values OVERLAY, MODALITY LUT, VOI LUT, CURVE, TOPIC, VISIT, RESULTS, INTERPRETATION, STUDY COMPONENT and STORED PRINT were previously defined in DICOM for this Attribute. They are now retired. See <a href="#">PS3.3-2004</a>.</p>
-------------	--	---

			Enumerated Value MRDR was previously defined in DICOM for this Attribute, to allow indirect reference to a File by multiple Directory Records. It is now retired. FSUs and FSRs are unlikely to be capable of supporting this mechanism. See PS3.3-2004.
--	--	--	--

2 **In PS3.3, make the following additions to PS3.3, Annex F, Table F.4-1**

4 **F.4 BASIC DIRECTORY IOD INFORMATION MODEL**

4

**Table F.4-1  
RELATIONSHIP BETWEEN DIRECTORY RECORDS**

6

Directory Record Type	Section	Directory Record Types which may be included in the next lower-level directory Entity
(Root Directory Entity)	□	PATIENT, HANGING PROTOCOL, PALETTE, PRIVATE
PATIENT	F.5.1	STUDY, HL7 STRUC DOC, PRIVATE
STUDY	F.5.2	SERIES, PRIVATE
SERIES	F.5.3	IMAGE, RT DOSE, RT STRUCTURE SET, RT PLAN, RT TREAT RECORD, PRESENTATION, WAVEFORM, SR DOCUMENT, KEY OBJECT DOC, SPECTROSCOPY, RAW DATA, REGISTRATION, FIDUCIAL, ENCAP DOC, VALUE MAP, STEREOMETRIC, PLAN, MEASUREMENT, SURFACE, <u>ASSESSMENT</u> , PRIVATE
IMAGE	F.5.4	PRIVATE
RT DOSE	F.5.19	PRIVATE
RT STRUCTURE SET	F.5.20	PRIVATE
RT PLAN	F.5.21	PRIVATE
RT TREAT RECORD	F.5.22	PRIVATE
PRESENTATION	F.5.23	PRIVATE
WAVEFORM	F.5.24	PRIVATE
SR DOCUMENT	F.5.25	PRIVATE
KEY OBJECT DOC	F.5.26	PRIVATE
SPECTROSCOPY	F.5.27	PRIVATE
RAW DATA	F.5.28	PRIVATE
REGISTRATION	F.5.29	PRIVATE
FIDUCIAL	F.5.30	PRIVATE
HANGING PROTOCOL	F.5.31	PRIVATE
ENCAP DOC	F.5.32	PRIVATE
HL7 STRUC DOC	F.5.33	PRIVATE
VALUE MAP	F.5.34	PRIVATE
STEREOMETRIC	F.5.35	PRIVATE

PALETTE	F.5.36	PRIVATE
<b><u>ASSESSMENT</u></b>	<b><u>F.5.X</u></b>	<b><u>PRIVATE</u></b>
PRIVATE	F.6.1	PRIVATE, (any of the above as privately defined)

2

**In PS 3.3, Annex F.5 Definition of Specific Directory Records, Figure F.4-1, Basic Directory IOD Information Model, make the following additions:**

**Add "Content Assessments Result DR" box at the bottom.**

4

**Set Multiplicity to 0-n**

6

**In PS3.3, Annex F.5, add the following Section F.5.X:**

**F.5.X Content Assessment Results Directory Record Definition**

8

The Directory Record is based on the specification of Section F.3. It is identified by a Directory Record Type of Value "ASSESSMENT". Table F.5-X lists the set of keys with their associated Types for such a Directory Record Type. The description of these keys may be found in the Modules related to the Content Assessment Results IOD. This Directory Record shall be used to reference a Content Assessment Results SOP Instance. This type of Directory Record may reference a Lower-Level Directory Entity that includes one or more Directory Records as defined in Table F.4-1.

10

12

14

**Table F.5-X  
CONTENT ASSESSMENT RESULTS KEYS**

Key	Tag	Type	Attribute Description
Specific Character Set	(0008,0005)	1C	Required if an extended or replacement character set is used in one of the keys.
Instance Number	(0020,0013)	1	
Instance Creation Date	(0008,0012)	1	
Instance Creation Time	(0008,0013)	2	
<i>Any other Attribute of the Content Assessment Results IE Modules</i>		3	

16

Note:

18

Because Referenced SOP Instance UID in File (0004,1511) may be used as a "pseudo" Directory Record Key (See Table F.3-3), it is not duplicated in this list of keys.

20

**Part 4 Addendum**

22

**Add the following to PS3.4, Appendix B.5, Table B.5-1**

24

**Table B.5-1. Standard SOP Classes**

SOP Class Name	SOP Class UID	IOD Specification (defined in PS3.3)
Content Assessment Results Storage	1.2.840.10008.5.1.4.1.1.xx.y.z	Content Assessment Results IOD

2 **Add the following Section B.5.1.x to PS3.4, Annex B.5.1:**

**B.5.1.x Content Assessment Results Storage SOP Classes**

4 An Application that performs assessments resulting in Content Assessment Results SOP Instances is  
 6 required to document the criteria for setting the Observation Type (gggg,ee08) in its DICOM Conformance Statement.

**Add the following to PS3.4, Appendix I.4, Table I.4-1**

8 **Table I.4-1 Media Storage Standard SOP Classes**

SOP Class Name	SOP Class UID	IOD Specification (defined in PS3.3)
Content Assessment Results Storage	1.2.840.10008.5.1.4.1.1.xx.y.z	Content Assessment Results IOD

10

**Part 6 Addendum**

12 **Add the following Data Elements to PS3.6:**

14 **Table 6-1. Registry of DICOM Data Elements**

Tag	Name	Keyword	VR	VM
(gggg,ee01)	Assessment Summary	AssessmentSummary	CS	1
(gggg,ee03)	Assessment Summary Description	AssessmentSummaryDescription	UT	1
(gggg,ee04)	Assessed SOP Instance Sequence	AssessedSOPInstanceSequence	SQ	1
(gggg,ee05)	Referenced Comparison SOP Instance Sequence	ReferencedComparisonSOPInstanceSequence	SQ	1
(gggg,ee06)	Number of Assessment Observations	NumberOfAssessmentObservations	UL	1

Tag	Name	Keyword	VR	VM
		ations		
(gggg,ee07)	Assessment Observations Sequence	AssessmentObservationsSequence	SQ	1
(gggg,ee08)	Observation Type	ObservationType	CS	1
(gggg,ee0A)	Observation Description	ObservationDescription	UT	1
(gggg,ee0C)	Structured Constraint Observation Sequence	StructuredConstraintObservationSequence	SQ	1
(gggg,ee10)	Assessed Attribute Value Sequence	AssessedAttributeValueSequence	SQ	1
(gggg,ee16)	Assessment Set ID	AssessmentSetID	LO	1
(gggg,ee17)	Assessment Requester Sequence	AssessmentRequesterSequence	SQ	1
(gggg,ee18)	Selector Attribute Name	SelectorAttributeName	LO	1
(gggg,ee19)	Selector Attribute Keyword	SelectorAttributeKeyword	LO	1
(gggg,ee21)	Assessment Type Code Sequence	AssessmentTypeCodeSequence	SQ	1
(gggg,ee22)	Observation Basis Code Sequence	ObservationBasisCodeSequence	SQ	1
(gggg,ee23)	Assessment Label	AssessmentLabel	LO	1
(yym0,m0x2)	Constraint Type	ConstraintType	CS	1
(yym0,m0x3)	Specification Selection Guidance	SpecificationSelectionGuidance	UT	1
(yym0,m0x4)	Constraint Value Sequence	ConstraintValueSequence	SQ	1
(yym0,m0x5)	Recommended Default Value Sequence	RecommendedDefaultValueSequence	SQ	1
(yym0,m0x6)	Modifiable Constraint Flag	ModifiableConstraintFlag	CS	1
(yym0,m0x8)	Selector AE Value	SelectorAEValue	AE	1
(yym0,m0x9)	Selector AS Value	SelectorASValue	AS	1
(yym0,m0xa)	Selector DA Value	SelectorDAValue	DA	1
(yym0,m0xb)	Selector DT Value	SelectorDTValue	DT	1
(yym0,m0xc)	Selector OB Value	SelectorOBValue	OB	1
(yym0,m0xd)	Selector OF Value	SelectorOFValue	OF	1
(yym0,m0xe)	Selector OW Value	SelectorOWValue	OW	1
(yym0,m0qa)	Selector TM Value	SelectorTMValue	TM	1

Tag	Name	Keyword	VR	VM
(yym0,m0qd)	Selector UC Value	SelectorUCValue	UC	1
(yym0,m0qb)	Selector UI Value	SelectorUIValue	UI	1
(yym0,m0qc)	Selector UN Value	SelectorUNValue	UN	1
(yym0,m0za)	Selector UR Value	SelectorURValue	UR	1

2 Add the following to PS3.6 Annex A:

4 **ANNEX A      REGISTRY OF DICOM UNIQUE IDENTIFIERS (UID) (NORMATIVE)**

UID Value	UID Name	UID Type	Part
1.2.840.10008.5.1.4.1.1.xx.y.z	Content Assessment Results Storage	SOP Class	PS 3.4

6 **Table A-3  
CONTEXT GROUP UID VALUES**

Context UID	Context Identifier	Context Group Name
1.2.840.10008.6.1.FFF.1	YYY1	Content Assessment Types
1.2.840.10008.6.1.FFF.2	YYY2	RT Content Assessment Types
1.2.840.10008.6.1.FFF.3	YYY3	Basis of Assessment

8

2

**Part 16 Addendum**

**In PS3.16 add the following CID tables to Annex B:**

4

**CID YYY1          CONTENT ASSESSMENT TYPES**

6

**Context ID YYY1**

**Content Assessment Types**

8

**Type: Extensible          Version: yyyyymmdd**

<b>Coding Scheme Designator (0008,0102)</b>	<b>Code Value (0008,0100)</b>	<b>Code Meaning (0008,0104)</b>
<i>Include CID YYY2 'RT Content Assessment Type'</i>		

10

**CID YYY2          RT CONTENT ASSESSMENT TYPES**

12

**Context ID YYY2**

**RT Content Assessment Types**

14

**Type: Extensible          Version: yyyyymmdd**

<b>Coding Scheme Designator (0008,0102)</b>	<b>Code Value (0008,0100)</b>	<b>Code Meaning (0008,0104)</b>
DCM	XYZ001	RT Pre-Treatment Dose Check
DCM	XYZ002	RT Pre-Treatment Consistency Check

16

**CID YYY3          BASIS OF ASSESSMENT**

18

**Context ID YYY3**

**Basis of Assessment**

20

**Type: Extensible          Version: yyyyymmdd**

<b>Coding Scheme Designator (0008,0102)</b>	<b>Code Value (0008,0100)</b>	<b>Code Meaning (0008,0104)</b>
DCM	XYZ003	Assessment By Comparison

DCM	XYZ004	Assessment By Rules
-----	--------	---------------------

2 In PS3.16, Annex D, add the following codes to Table D-1:

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

Code Value	Code Meaning	Definition	Notes
...			
<u>XYZ001</u>	<u>RT Pre-Treatment Dose Check</u>	<u>An assessment of the dose delivery parameters performed before treatment.</u>	
<u>XYZ002</u>	<u>RT Pre-Treatment Consistency Check</u>	<u>An assessment of consistency with a previously quality-assured treatment plan performed before treatment.</u>	
<u>XYZ003</u>	<u>Assessment By Comparison</u>	<u>The basis of the assessment was a comparison object.</u>	
<u>XYZ004</u>	<u>Assessment By Rules</u>	<u>The basis of the assessment was a set of rules on expected values, ranges and relationships.</u>	

6 **Part 17 Addendum**

8 In PS3.17, add the following section:

10 **XYZ CONTENT ASSESSMENT (INFORMATVE)**

The following use cases exemplify the use of Content Assessment Results IOD.

12 **XYZ.1 RT PLAN TREATMENT ASSESSMENT USE CASE**

14 A RT Plan SOP Instance is sent from a Treatment Planning System (TPS) to a Quality Assurance (QA) Application and to the Treatment Management System (TMS). The TMS de-composes the content for internal storage. At the time of treatment the TMS re-composes the Instance and sends it to the operator console of the linear accelerator. However, during re-composition an error occurs and one jaw specification is omitted from the recomposed Instance and the Beam Dose in the Fraction Scheme Module is set to 0.0.

18 The operator console requests the QA Application to perform an assessment to compare the copy of the Instance received from the operator console with the copy of the Instance received earlier from the TPS.  
 20 The QA Application retrieves the Instance from the operator console. The QA Application also performs an assessment by re-calculation of the dosimetric parameters in the assessed plan. Although the Beam

- 2 Meterset in the assessed plan (from the operator console) is the same as the Beam Meterset in the comparison plan (from the TPS), the Beam Meterset re-calculated by the QA Application is different due to the missing jaw. Further on it is detected, that all Beam Dose values have the value 0.0.
- 4 Beam Meterset for the current treatment device in this example is expressed in Monitor Units.

**Table XYZ-1. Content Assessment Results Module Example of a RT Plan Treatment Assessment**

6

Nesting	Attribute Name	Tag	VR	Value
	Assessment Label	(gggg,ee23)	LO	Pre-Treatment Assessment of Fraction 7
	Assessment Type Code Sequence	(gggg,ee21)	SQ	
%item				
	>Code Value	(0008,0100)	SH	XYZ001
	>Coding Scheme Designator	(0008,0102)	SH	DCM
	>Code Meaning	(0008,0104)	LO	RT Pre-Treatment Consistency Check
%enditem				
%endsq	(Assessment Type Code Sequence)			
	Assessment Set ID	(gggg,ee16)	LO	ID12345
	Assessment Requester Sequence	(gggg,ee17)	SQ	
%item				
	>Observer Type	(0040,A084)	CS	DEV
	>Station Name	(0008,1010)	SH	CONSOLE 1
	>Device UID	(0018,1002)	UI	1.2.3.4.5.6.7.8.9.10
	>Manufacturer	(0008,0070)	LO	Fancy Linac Inc.
	>Manufacturer's Model Name	(0008,1090)	LO	Linear Accelerator Console
	>Institution Name	(0008,0080)	LO	RT Clinic 1
	>Institution Code Sequence	(0008,0082)	SQ	
%item				
	>>Code Value	(0080,0100)	SH	Clinic1
	>>Coding Scheme Designator	(0008,0102)	SH	99MyCounty

<b>Nesting</b>	<b>Attribute Name</b>	<b>Tag</b>	<b>VR</b>	<b>Value</b>
	>>Code Meaning	(0008,0104)	LO	RT Clinic 1
%enditem				
%endsq	(>Institution Code Sequence)			
%enditem				
%endsq	(Assessment Requester Sequence)			
	Assessed SOP Instance Sequence	(gggg,ee04)	SQ	
%item				
	>Study Instance UID	(0020,000D)	UI	1.2.3.4.5.100
	>Referenced Series Sequence	(0008,1115)	SQ	
%item				
	>>Series Instance UID	(0020,000E)	UI	1.2.3.4.5.200
	>>Retrieve AE Title	(0008,0054)	AE	CONSOLE 1
	>>Referenced SOP Sequence	(0008,1199)	SQ	
%item				
	>>>Referenced SOP Class UID	(0008,1150)	UI	1.2.840.10008.5.1.4.1.1.481.5 (RT Plan Storage)
	>>>Referenced SOP Instance UID	(0008,1155)	UI	1.2.3.4.5.300
%endsq	(>>Referenced SOP Sequence)			
%enditem				
%endsq	(>Referenced Series Sequence)			
	>Referenced Comparison SOP Instance Sequence	(gggg,ee05)	SQ	
%item				
	>>Study Instance UID	(0020,000D)	UI	1.2.3.4.5.100
	>>Referenced Series Sequence	(0008,1115)	SQ	
%item				

<b>Nesting</b>	<b>Attribute Name</b>	<b>Tag</b>	<b>VR</b>	<b>Value</b>
	>>>Series Instance UID	(0020,000E)	UI	1.2.3.4.5.200
	>>>Retrieve AE Title	(0008,0054)	AE	TPS 1
	>>>Referenced SOP Sequence	(0008,1199)	SQ	
%item				
	>>>>Referenced SOP Class UID	(0008,1150)	UI	1.2.840.10008.5.1.4.1.1.481.5 (RT Plan Storage)
	>>>>Referenced SOP Instance UID	(0008,1155)	UI	1.2.3.4.5.300
%enditem				
%endsq	(>>>Referenced SOP Sequence)			
%enditem				
%endsq	(>>Referenced Series Sequence)			
%enditem				
%endsq	(>Referenced Comparison SOP Instance Sequence)			
%enditem				
%endsq	(Assessed SOP Instance Sequence)			
	Assessment Summary	(gggg,ee01)	CS	FAILED
	Assessment Summary Description	(gggg,ee03)	UT	Plan Checker result: Failed! The assessed RT Plan does not match the reference RT Plan it is compared to. One or more relevant attributes are not equal. Monitor Unit values and Beam Doses have unreasonable values.
	Number of Assessment Observations	(gggg,ee06)	UL	3
	Assessment Observations Sequence	(gggg,ee07)	SQ	
%item				
	>Observation Type	(gggg,ee08)	CS	MAJOR
	>Observation Basis Code Sequence	(gggg,ee22)	SQ	
%item				

<b>Nesting</b>	<b>Attribute Name</b>	<b>Tag</b>	<b>VR</b>	<b>Value</b>
	>>Code Value	(0008,0100)	SH	XYZ003
	>>Coding Scheme Designator	(0008,0102)	SH	DCM
	>>Code Meaning	(0008,0104)	LO	Assessment By Comparison
%enditem				
%endsq	(>Assessment Basis Code Sequence)			
	>Observation Description	(gggg,ee0A)	UT	Attribute value of Leaf Jaw Positions is not equal.
	>Structured Constraint Observation Sequence	(gggg,ee0C)	SQ	
%item				
	>>Selector Attribute Name	(gggg,ee18) (1*)	LO	Leaf Jaw Positions
	>>Selector Attribute VR	(0072,0050)	CS	DS
	>>Selector Attribute	(0072,0026)	AT	300A011C
	>>Selector Value Number	(0072,0028))	US	1
	>>Selector Sequence Pointer	(0072,0052)	AT	300A00B0\300A0111\300A011A
	>>Selector Sequence Pointer Items	(0074,1057)	IS	1\2\2
	>>Constraint Type	(yym0,m0x2)	CS	EQUAL
	>>Constraint Value Sequence	(yym0,m0x4)	SQ	
%item				
	>>>Selector DS Value	(0072,0072)	DS	-75.000\75.000
%enditem				
%endsq	(>>Constraint Value Sequence)			
	>>Assessed Attribute Value Sequence	(gggg,ee10)	SQ	
%item				
	>>>Selector DS Value	(0072,0072)	DS	-75.000
%enditem				

<b>Nesting</b>	<b>Attribute Name</b>	<b>Tag</b>	<b>VR</b>	<b>Value</b>
%endsq	(>>Assessed Attribute Value Sequence)			
%enditem				
%endsq	(>Constraint Observation Sequence)			
%enditem				
%item				
	>Observation Type	(gggg,ee08)	CS	MAJOR
	>Observation Basis Code Sequence	(gggg,ee22)	SQ	
%item				
	>>Code Value	(0008,0100)	SH	XYZ004
	>>Coding Scheme Designator	(0008,0102)	SH	DCM
	>>Code Meaning	(0008,0104)	LO	Assessment By Quality Rules
%enditem				
%endsq	(>Assessment Basis Code Sequence)			
	>Observation Description	(gggg,ee0A)	UT	Monitor Units re-calculation failed. The re-calculation of the beam meterset resulted in a different value (76MU) than the value in the assessed RT Plan. This value is outside the tolerance of reasonable differences acceptable on re-calculation.
	>Structured Constraint Observation Sequence	(gggg,ee0C)	SQ	
%item				
	>>Selector Attribute Name	(gggg,ee18)	LO	Beam Meterset
	>>Selector Attribute VR	(0072,0050)	CS	DS
	>>Selector Attribute	(0072,0026)	AT	300A0086
	>>Selector Value Number	(0072,0028))	US	1
	>>Selector Sequence Pointer	(0072,0052)	AT	300A0070\300C0004
	>>Selector Sequence Pointer Items	(0074,1057)	IS	1\1
	>>Constraint Type	(yym0,m0x2)	CS	RANGE_INCL

<b>Nesting</b>	<b>Attribute Name</b>	<b>Tag</b>	<b>VR</b>	<b>Value</b>
	>>Constraint Value Sequence	(yym0,m0x4)	SQ	
%item				
	>>>Selector DS Value	(0072,0072)	DS	68
%enditem				
%item				
	>>>Selector DS Value	(0072,0072)	DS	84
%enditem				
%endsq	(>>Constraint Value Sequence)			
	>>Assessed Attribute Value Sequence	(gggg,ee10)	SQ	
%item				
	>>>Selector DS Value	(0072,0072)	DS	108
%enditem				
%endsq	(>>Assessed Attribute Value Sequence)			
%enditem				
%endsq	(>Constraint Observation Sequence)			
%enditem				
%item				
	>Observation Type	(gggg,ee08)	CS	MODERATE
	>Observation Basis Code Sequence	(gggg,ee22)	SQ	
%item				
	>>Code Value	(0008,0100)	SH	XYZ004
	>>Coding Scheme Designator	(0008,0102)	SH	DCM
	>>Code Meaning	(0008,0104)	LO	Assessment By Quality Rules
%enditem				
%endsq	(>Observation Basis Code Sequence)			
	>Observation Description	(gggg,ee0A)	UT	The Beam Dose value of all Beams is zero,

<b>Nesting</b>	<b>Attribute Name</b>	<b>Tag</b>	<b>VR</b>	<b>Value</b>
				but Beam Meterset is non-zero.
%enditem				
%endsq	(Assessment Observations Sequence)			