DICOM Correction Proposal

STATUS	Final Text
Date of Last Update	2017/04/18
Person Assigned	Ulrich Busch (ulrich.busch@varian.com)
Submitter Name	Ulrich Busch (ulrich.busch@varian.com)
Submission Date	2016/08/30

Correction Number CP-1659
Log Summary: Add Dose Reference UID To Fraction Scheme
Name of Standard PS 3.3 2017a
Rationale for Correction: The Beam Dose (300A,0084) in the Fraction Scheme Module serves as the Dose Value used to calculate the dose contributions by the coefficients in the Referenced Dose Reference Sequence (300C,0050) of a control point. A Dose Reference can be identified uniquely and across various RT Plan SOP Instances by the Dose Reference UID (300A,0013). However, there is no way to declare, that the Beam Dose (300A,0084) represents the dose for a specific item in the Dose Reference Sequence (300A,0010) and identifies this item as the primary target for the current Beam. This can be indirectly concluded in some cases, e.g. when the Dose Reference Sequence (300A,0010) contains only one Dose Reference Type (300A,0020) of type TARGET, or by parsing all Cumulative Dose Reference Coefficients (300A,010C) and searching for those, which have the value of 1.0, or to compare Beam Dose Specification Point (300A,0082) coordinates with those of the Dose References. None of those methods are always applicable or reliable. Therefore the Dose Reference UID (300A,0013) is added to the Referenced Beam Sequence (300C,0004) to support an unambiguous identification of the primary target Dose Reference of the current Beam.
Correction Wording:

In PS 3.6, C.8.8.21 RT Beams Session Record Module, add the following new attribute:

C.8.8.13 RT Fraction Scheme Module

The RT Fraction Scheme Module contains attributes that describe a single or multiple scheme of dose descriptions. Each sequence item contains dose specification information, fractionation patterns, and either beam or brachytherapy application setup specifications. The design of the RT Fraction Scheme Module allows a beam or brachytherapy application setup to be used in multiple fraction schemes.

Table C.8-49. RT Fraction Scheme Module Attributes

Attribute Name	Tag	Type	Attribute Description
Fraction Group Sequence	(300A,0070)	1	Sequence of Fraction Groups in current Fraction Scheme. One or more Items shall be included in this Sequence.
>Fraction Group Number	(300A,0071)	1	Identification number of the Fraction Group. The value of Fraction Group Number (300A,0071) shall be unique within the

Attribute Name	Tag	Type	Attribute Description
			RT Plan in which it is created.
>Fraction Group Description	(300A,0072)	3	The user defined description for the fraction group.
>Referenced Dose Sequence	(300C,0080)	3	Related instances of RT Dose (for grids, isodose curves and named/unnamed point doses). One or more Items are permitted in this Sequence. See Note 1.
>>Include Table 10-11 "SOP Instance Reference Macro Attributes"			
>Referenced Dose Reference Sequence	(300C,0050)	3	Sequence of Dose References for the current Fraction Group. One or more Items are permitted in this Sequence.
>>Referenced Dose Reference Number	(300C,0051)	1	Uniquely identifies Dose Reference specified by Dose Reference Number (300A,0012) within Dose Reference Sequence (300A,0010) in RT Prescription Module.
>>Constraint Weight	(300A,0021)	3	Relative importance of satisfying constraint, where high values represent more important constraints.
>>Delivery Warning Dose	(300A,0022)	3	The dose (in Gy) that when reached or exceeded should cause some action to be taken.
>>Delivery Maximum Dose	(300A,0023)	3	The maximum dose (in Gy) that can be delivered to the dose reference.
>>Target Minimum Dose	(300A,0025)	3	Minimum permitted dose (in Gy) to Dose Reference if Dose Reference Type (300A,0020) of referenced Dose Reference is TARGET.
>>Target Prescription Dose	(300A,0026)	3	Prescribed dose (in Gy) to Dose Reference if Dose Reference Type (300A,0020) of referenced Dose Reference is TARGET.
>>Target Maximum Dose	(300A,0027)	3	Maximum permitted dose (in Gy) to Dose Reference if Dose Reference Type (300A,0020) of referenced Dose Reference is TARGET.
>>Target Underdose Volume Fraction	(300A,0028)	3	Maximum permitted fraction (in percent) of Target to receive less than the Target Prescription Dose (300A,0027) if Dose Reference Type (300A,0020) of referenced Dose Reference is TARGET and Dose Reference Structure Type (300A,0014) of referenced Dose Reference is VOLUME.
>>Organ at Risk Full-volume Dose	(300A,002A)	3	Maximum dose (in Gy) to entire Dose Reference if Dose Reference Type (300A,0020) of referenced Dose Reference is ORGAN_AT_RISK and Dose Reference Structure Type (300A,0014) of referenced Dose Reference is VOLUME.
>>Organ at Risk Limit Dose	(300A,002B)	3	Maximum permitted dose (in Gy) to any part of Dose Reference if Dose Reference Type (300A,0020) of referenced Dose Reference is ORGAN_AT_RISK and Dose Reference Structure Type (300A,0014) of referenced Dose Reference is VOLUME.
>>Organ at Risk Maximum Dose	(300A,002C)	3	Maximum dose (in Gy) to non-overdosed part of Dose Reference if Dose Reference Type (300A,0020) of referenced

Attribute Name	Tag	Type	Attribute Description
			Dose Reference is ORGAN_AT_RISK and Dose Reference Structure Type (300A,0014) of referenced Dose Reference is VOLUME.
>>Organ at Risk Overdose Volume Fraction	(300A,002D)	3	Maximum permitted fraction (in percent) of Organ at Risk to receive more than the Organ at Risk Maximum Dose if Dose Reference Type (300A,0020) of referenced Dose Reference is ORGAN_AT_RISK and Dose Reference Structure Type (300A,0014) of referenced Dose Reference is VOLUME.
>Number of Fractions Planned	(300A,0078)	2	Total number of treatments (Fractions) prescribed for current Fraction Group.
>Number of Fraction Pattern Digits Per Day	(300A,0079)	3	Number of digits in Fraction Pattern (300A,007B) used to represent one day. See Note 2.
>Repeat Fraction Cycle Length	(300A,007A)	3	Number of weeks needed to describe treatment pattern. See Note 2.
>Fraction Pattern	(300A,007B)	3	String of 0's (no treatment) and 1's (treatment) describing treatment pattern. Length of string is 7 x Number of Fraction Pattern Digits Per Day x Repeat Fraction Cycle Length. Pattern shall start on a Monday. See Note 2.
>Beam Dose Meaning	(300A,008B)	3	Indicates the meaning of Beam Dose (300A,0084). Enumerated Values: **BEAM_LEVEL** Beam Dose value is individually calculated for this Beam **FRACTION_LEVEL** Dose is calculated on the Fraction level, and the value of Beam Dose (300A,0084) is assigned to the Beam to carry a nominally distributed dose only.
>Number of Beams	(300A,0080)	1	Number of Beams in current Fraction Group. If Number of Beams is greater then zero, Number of Brachy Application Setups (300A,00A0) shall equal zero.
>Referenced Beam Sequence	(300C,0004)	1C	Sequence of treatment beams in current Fraction Group. One or more Items shall be included in this Sequence. Required if Number of Beams (300A,0080) is greater than zero.
>>Referenced Beam Number	(300C,0006)	1	Uniquely identifies Beam specified by Beam Number (300A,00C0) within Beam Sequence (300A,00B0) in RT Beams Module or within Ion Beam Sequence (300A,03A2) in RT Ion Beams Module.
>>Beam Dose Specification Point	(300A,0082)	3	Coordinates (x,y,z) of point at which Beam Dose is specified in the patient based coordinate system described in Section C.7.6.2.1.1 (mm). See Note 3.
>>Referenced Dose Reference UID	**(300A,0083)**	**3**	**Identifies the Dose Reference specified by Dose Reference UID (300A,0013) in the Dose Reference Sequence (300A,0010) in the RT Prescription Module which specifies the primary target for the current Beam.** **If present shall have a value that is present in the Dose Reference Sequence.**

Attribute Name	Tag	Type	Attribute Description
>>Beam Dose	(300A,0084)	3	Dose (in Gy) at Beam Dose Specification Point (300A,0082) due to current Beam for one treatment fraction.
>>Beam Dose Type	(300A,0090)	1C	Type of Dose of the Beam Dose (300A,0084). Enumerated Values: **PHYSICAL** **EFFECTIVE** Shall not have the same value as Alternate Beam Dose Type (300A,0092). Required if Alternate Beam Dose (300A,0091) is present. May be present otherwise.
>>Alternate Beam Dose	(300A,0091)	3	Alternate Dose (in Gy) at Beam Dose Specification Point (300A,0082) according to the Alternate Beam Dose Type (300A,0092).
>>Alternate Beam Dose Type	(300A,0092)	1C	Type of Dose of the Alternate Beam Dose (300A,0091). Enumerated Values: **PHYSICAL** **EFFECTIVE** Shall not have the same value as Beam Dose Type (300A,0090). Required if Alternate Beam Dose (300A,0091) is present.
>>Beam Dose Verification Control Point Sequence	(300A,008C)	3	Sequence of Items containing Beam Dose Verification Control Points. Two or more Items may be included in this Sequence.
…			

In PS 3.6, Section 6, add the following new attribute:

(300A,0083)	**Referenced Dose Reference UID**	**ReferencedDoseReferenceUID**	**UI**	**1**