DICOM Correction Proposal

STATUS	Letter Ballot
Date of Last Update	2016/11/09
Person Assigned	Andrew Casertano
Submitter Name	Andrew Casertano
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Correction Number CP-1455
Log Summary: Add Dose Area Product to CT Image IOD
Name of Standard PS3.3
Rationale for Correction: Since the development of the CT Storage SOP Class, dental practices & industry, regulatory compliance and the DICOM Standard itself have evolved considerably. In particular, dental stakeholders require the ability to capture dose information in a standardized way during or after acquisition. At the present time, IEC 60601-2-63:2012 *Particular requirements for the basic safety and essential performance of dental extra-oral X-ray equipment* requires that Dose Area Product (DAP) be recorded. This CP adds Dose Area Product (DAP) attribute to both the CT Image IOD and the Enhanced CT Image IODs. Since the CTDI Phantom Type Code Sequence (0018,9346) is not used, no changes are made to CID 4052 "Phantom Devices".
Correction Wording:

C.8.2.1 CT Image Module

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Table C.8-3. CT Image Module Attributes

Attribute Name	Tag	Type	Attribute Description
...	...	...	...
Exposure Modulation Type	(0018,9323)	3	A label describing the type of exposure modulation used for the purpose of limiting the dose. Defined Terms: **NONE**
Estimated Dose Saving	(0018,9324)	3	A percent value of dose saving due to the use of Exposure Modulation Type (0018,9323). A negative

Attribute Name	Tag	Type	Attribute Description
			percent value of dose savings reflects an increase of exposure.
CTDIvol	(0018,9345)	3	Computed Tomography Dose Index ($CTDI_{vol}$), in mGy according to IEC 60601-2-44, Ed.2.1 (Clause 29.1.103.4), The Volume $CTDI_{vol}$. It describes the average dose for this image for the selected CT conditions of operation.
CTDI Phantom Type Code Sequence	(0018,9346)	3	The type of phantom used for CTDI measurement according to IEC 60601-2-44. Only a single Item is permitted in this Sequence.
>Include Table 8.8-1 "Code Sequence Macro Attributes"			*Defined CID 4052 "Phantom Devices".*
Water Equivalent Diameter	(0018,1271)	3	The diameter, in mm, of a cylinder of water having the same X-Ray attenuation as the patient for this reconstructed slice (e.g., as described in [AAPM Report 220]).
Water Equivalent Diameter Method Code Sequence	(0018,1272)	1C	The method of calculation of Water Equivalent Diameter (0018,1271). Required if Water Equivalent Diameter (0018,1271) is present. Only a single Item is permitted in this Sequence.
>Include Table 8.8-1 "Code Sequence Macro Attributes"			*Defined CID 10024 "Water Equivalent Diameter Method".*
Image and Fluoroscopy Area Dose Product	**(0018,115E)**	**3**	**X-Ray dose, measured in dGy*cm*cm, to which the patient was exposed for the acquisition of the entire Irradiation Event from which this image was reconstructed.** **Notes** **1. All of the images reconstructed from the same Irradiation Event will have the same value for this Attribute, which is the total for the Irradiation Event, which is repeated in each image, regardless of whether or not the Irradiation Event UID (0008,3010) is sent with a value in the C.7.6.1 General Image Module. I.e., the values for each image should not be summed. The sum of the area dose products of all encoded Irradiation Events may not result in the total area dose product to which the patient was exposed.** **2. This may be an estimated value based**

Attribute Name	Tag	Type	Attribute Description
			on assumptions about the patient's body size and habitus. **3. This value is required by IEC 60601-2-63:2012 *Particular requirements for the basic safety and essential performance of dental extra-oral X-ray equipment.***
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C.8.15.3.8 CT Exposure Macro

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Table C.8-124. CT Exposure Macro Attributes

Attribute Name	Tag	Type	Attribute Description
CT Exposure Sequence	(0018,9321)	1	Contains the attributes defining exposure information. Only a single Item shall be included in this Sequence.
...	...	...	...
>Estimated Dose Saving	(0018,9324)	2C	A percent value of dose saving due to the use of Exposure Modulation Type (0018,9323). A negative percent value of dose savings reflects an increase of exposure. Required if Frame Type (0008,9007) Value 1 of this frame is ORIGINAL and Exposure Modulation Type (0018,9323) is not equal to NONE. Otherwise may be present if Frame Type (0008,9007) Value 1 of this frame is DERIVED and Exposure Modulation Type (0018,9323) is not equal to NONE.
>CTDIvol	(0018,9345)	2C	Computed Tomography Dose Index ($CTDI_{vol}$), in mGy according to IEC 60601-2-44, Ed.2.1 (Clause 29.1.103.4), The Volume $CTDI_{vol}$. It describes the average dose for this frame for the selected CT conditions of operation. Required if Frame Type (0008,9007) Value 1 of this frame is ORIGINAL. May be present otherwise.
>CTDI Phantom Type Code Sequence	(0018,9346)	3	The type of phantom used for CTDI measurement according to IEC 60601-2-44. Only a single Item is permitted in this Sequence.

Attribute Name	Tag	Type	Attribute Description
>>Include Table 8.8-1 "Code Sequence Macro Attributes"			*Defined CID 4052 "Phantom Devices".*
>Water Equivalent Diameter	(0018,1271)	3	The diameter, in mm, of a cylinder of water having the same X-Ray attenuation as the patient for this reconstructed slice (e.g., as described in [AAPM Report 220]).
>Water Equivalent Diameter Method Code Sequence	(0018,1272)	1C	The method of calculation of Water Equivalent Diameter (0018,1271). Required if Water Equivalent Diameter (0018,1271) is present. Only a single Item is permitted in this Sequence.
>>Include Table 8.8-1 "Code Sequence Macro Attributes"			*Defined CID 10024 "Water Equivalent Diameter Method".*
>Image and Fluoroscopy Area Dose Product	**(0018,115E)**	**3**	**X-Ray dose, measured in dGy*cm*cm, to which the patient was exposed for the acquisition of the entire Irradiation Event from which this image and frame was reconstructed.** **Notes** **1. All of the images and frames reconstructed from the same Irradiation Event will have the same value for this Attribute, which is the total for the Irradiation Event, which is repeated in each image or frame, regardless of whether or not the Irradiation Event UID (0008,3010) is sent with a value in the C.7.6.16.2.18 Irradiation Event Identification Macro. I.e., the values for each image or frame should not be summed. The sum of the area dose products for each Irradiation Event may not result in the total area dose product to which the patient was exposed.** **2. This may be an estimated value based on assumptions about the patient's body size and habitus.** **3. This value is required by IEC 60601-2-63:2012 *Particular requirements for the basic safety and essential performance of dental extra-oral X-ray equipment.***

For reference unchanged, other uses of (0018,115E) in XA and XRF IODs:

Table C.4-16. Radiation Dose Module Attributes

Attribute Name	Tag	Attribute Description
...	...	...
Image and Fluoroscopy Area Dose Product	(0018,115E)	Total area-dose-product to which the patient was exposed, accumulated over the complete Performed Procedure Step and measured in dGy*cm*cm, including fluoroscopy. Note 1. The sum of the area dose product of all images of a Series or a Study may not result in the total area dose product to which the patient was exposed. 2. This may be an estimated value based on assumptions about the patient's body size and habitus.
...	...	...

Table C.8-27. X-Ray Acquisition Module Attributes

Attribute Name	Tag	Type	Attribute Description
...	...	...	...
Image and Fluoroscopy Area Dose Product	(0018,115E)	3	X-Ray dose, measured in dGy*cm*cm, to which the patient was exposed for the acquisition of this image plus any non-digitally recorded fluoroscopy that may have been performed to prepare for the acquisition of this image. Note The sum of the area dose product of all images of a Series or a Study may not result in the total area dose product to which the patient was exposed.

Table C.8-33. X-Ray Acquisition Dose Module Attributes

Attribute Name	Tag	Type	Attribute Description
...	...	...	...
Image and Fluoroscopy Area Dose Product	(0018,115E)	3	X-Ray dose, measured in dGy*cm*cm, to which the patient was exposed for the acquisition of this image plus any non-digitally recorded fluoroscopy that may have been performed to prepare for the acquisition of this image. Note 1. The sum of the area dose product of all images of a Series or a Study may not result in the total area dose product to which the patient was exposed. 2. This may be an estimated value based on assumptions about the patient's body size and habitus.
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