Integrating the Healthcare Enterprise

IHE Radiation Oncology
Technical Framework Supplement

Treatment Delivery Record Content- Brachy (TDRC-Brachy)

Revision 1.1 – Trial implementation

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Please verify you have the most recent version of this document. See here for Trial Implementation and Final Text versions and here for Public Comment versions.

Foreword

This is a supplement to the IHE Radiation Oncology Technical Framework. Each supplement undergoes a process of public comment and trial implementation before being incorporated into the volumes of the Technical Frameworks.

This supplement is published on September 5, 2024 for trial implementation and may be available for testing at subsequent IHE Connectathons. The supplement may be amended based on the results of testing. Following successful testing it will be incorporated into the Radiation Oncology Technical Framework. Comments are invited and can be submitted at Radiation Oncology Public Comments.

This supplement describes changes to the existing technical framework documents.

"Boxed" instructions like the sample below indicate to the Volume Editor how to integrate the relevant section(s) into the relevant Technical Framework volume.

Amend Section X.X by the following:

Where the amendment adds text, make the added text **bold underline**. Where the amendment removes text, make the removed text ~~**bold strikethrough**~~. When entire new sections are added, introduce with editor's instructions to "add new text" or similar, which for readability are not bolded or underlined.

General information about IHE can be found at IHE.net.

Information about the IHE Radiation Oncology domain can be found at IHE Domains.

Information about the organization of IHE Technical Frameworks and Supplements and the process used to create them can be found at Profiles and IHE Process

The current version of the Radiation Oncology Technical Framework can be found at Radiation Oncology Technical Framework.

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Introduction to this Supplement

This profile defines the content of the treatment record being transferred from the Treatment Delivery Device, Treatment Management System or other RT Brachy Treatment Record storage or producer to an interested consumer. This content can be available as soon as patient delivery is completed, and other computation and information gathering, and formatting can be performed to support the creation of the RT Brachy Treatment Record.

This content profile is motivated by medical physicists working with brachytherapy planning systems, who face an increasing demand from patient-care, data-quality and research perspectives to increase the usefulness, exchangeability and availability of clinical data across the various treatment planning systems.

The main role of this profile is to address a solution for such interoperability using the DICOM RT objects provided in their 1st generation.

History of Changes

Date	Rev.	Author	Change Summary
NOV 2023	1.0	IHE RO Technical Committee	Initial public comment publication
SEP 2024	1.1	IHE RO Technical Committee	Initial trail implementation publication (updated based on public comments)

Open Issues and Questions

#	Open Issue Description
	None

Closed Issues

#	Closed Issue Description/Resolution
1	Profile name: Brachytherapy Workflow Profile. DONE: Changed to TDRC-Brachy
2	Content definition (based on different techniques)
3	Definition of the general workflow 2015-12-10; Various use case scenarios are described in X.4.2
4	Definition of the list of transactions (see Appendices A and B, X.1 Actors, Transactions …)
8	2018-11-21 WG-07 Brachy Subgroup: The use of DICOM Unified Worklist suggested in some use cases will not be covered in this Profile. The use case section shall state that the use case variations using worklist are included only for illustration of the clinical environment. The Technical Committee should look into eventually integrating Brachytherapy into TDW II, since the framework is basically the same. Alternatively, a separate TDW-style profiles could be written for Brachytherapy.

IHE Technical Frameworks General Introduction

The IHE Technical Frameworks General Introduction is shared by all of the IHE domain technical frameworks. Each technical framework volume contains links to this document where appropriate.

9 Copyright Licenses

IHE technical documents refer to, and make use of, a number of standards developed and published by several standards development organizations. Please refer to the IHE Technical Frameworks General Introduction, Section 9 - Copyright Licenses for copyright license information for frequently referenced base standards. Information pertaining to the use of IHE International copyrighted materials is also available there.

10 Trademark

IHE® and the IHE logo are trademarks of the Healthcare Information Management Systems Society in the United States and trademarks of IHE Europe in the European Community. Please refer to the IHE Technical Frameworks General Introduction, Section 10 - Trademark for information on their use.

IHE Technical Frameworks General Introduction Appendices

The IHE Technical Framework General Introduction Appendices are components shared by all of the IHE domain technical frameworks. Each technical framework volume contains links to these documents where appropriate.

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*Update the following appendices to the General Introduction as indicated below. Note that these are **not** appendices to this domain's Technical Framework (TF-1, TF-2, TF-3 or TF-4) but rather, they are appendices to the IHE Technical Frameworks General Introduction located here.*

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Appendix A – Actors

*Add the following **new or modified** actors to the IHE Technical Frameworks General Introduction Appendix A:*

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New (or modified) Actor Name	Description
No new actors	

Complete List of Existing Actors Utilized in this Profile

Existing Actor Name	Definition
Content Creator	The Content Consumer Actor views, imports, or performs other processing of content created by a Content Creator Actor.
Content Consumer	The Content Consumer Actor views, imports, or performs other processing of content created by a Content Creator Actor.

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Appendix B – Transactions

*Add the following **new or modified** transactions to the IHE Technical Frameworks General Introduction Appendix B:*

New (or modified) Transaction Name and Number	Definition
No new transactions	

Appendix D – Glossary

*Add the following **new or modified** glossary terms to the IHE Technical Frameworks General Introduction Appendix D:*

New (or modified) Glossary Term	Definition	Synonyms	Acronym/ Abbreviation
No new terms			

Volume 1 – Profiles

X Brachy Treatment Delivery– Record Content (TDRC-Brachy) Profile

The Brachytherapy Treatment Delivery Record Content (TDRC-Brachy) Profile specifies the content of the RT Brachy Treatment Record being transferred from the **Content Creator** to the **Content Consumer**

This profile will ensure that the treatment record transferred from the producer will contain all necessary information. It will especially address the following:

1. This profile will make the therapists' workflow easier and faster, because it incorporates all information needed for treatment delivery record keeping.
2. This will enable Therapists to concentrate more on finalizing the details of patient treatment rather dealing with technical issues.
3. Fewer uncertainties will also reduce the time physicists and therapists need to gather and review treatment delivery information.

TDRC-Brachy contributes to patient safety, because it will standardize the content which is reviewed to assess if delivery of treatment was accurate to the plan. The profile will not specify how to validate the treatment delivery parameters, but will ensure that they are available, and well-formatted. The applications involved are Treatment Management Systems, Treatment Delivery Systems and Quality Assurance Devices.

This profile is a content-focused profile. For further information on the context, see Section X.6 TDRC-Brachy Cross Profile Considerations

X.1 TDRC-Brachy Actors, Transactions, and Content Modules

Figure X.1-1 shows how this content profile is used in the exchanging of DICOM treatment records between actors that are identified as producers and actors that are identified as consumers.

The DICOM objects that are exchanged between producers and consumers have to implement the requirements listed in this profile in order to be IHE compliant.

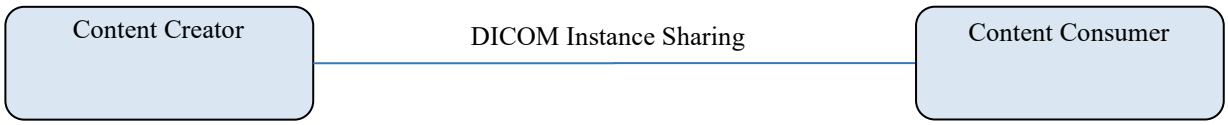

Figure X.1-1: TDRC-Brachy Actor Diagram

Table X.1-1 lists the content module(s) defined in the TDRC-Brachy Profile. To claim support with this profile, an actor shall support all required content modules (labeled “R”) and may support optional content modules (labeled “O”).

Table X.1-1: TDRC-Brachy Profile – Actors and Content Modules

Actors	Content Definitions	Optionality	Reference
Content Creator	RT Brachy Treatment Record	R	RO TF-3: 7.4.11.6.2
Content Consumer	RT Brachy Treatment Record	R	RO TF-3: 7.4.11.6.2

X.1.1 Actor Descriptions and Actor Profile Requirements

For Content Consumers, the display requirements for dwell time and total dose contributions are not sufficiently met by just presenting the DICOM data. It must be converted as described in the requirements below. An actor does not adhere to the profile unless the system provides the output in the prescribed format.

"Actors SHALL display total times and dwell times at the reference date and time of the delivery and not simple Control Point Values".

X.2 TDRC-Brachy Actor Options

Options that may be selected for each actor in this profile, if any, are listed in the Table X.2-1. Dependencies between options, when applicable, are specified in notes.

Table X.2-1: TDRC-Brachy – Actors and Options

Actor	Option Name	Reference
None		

X.3 TDRC-Brachy Required Actor Groupings

None

X.4 TDRC-Brachy Overview

X.4.1 Concepts

The Content Consumer receives the RT Brachy Treatment Record from a Content Producer, which holds the treatment record or prepares it for transmission.

X.4.2 Use Cases

X.4.2.1 Use Case #1 Brachytherapy Treatment Record Exchange

X.4.2.1.1 Use Case Description

A Brachytherapy Treatment Delivery Device (TDD) wishes to share a brachytherapy treatment record with a Treatment Management System (TMS)

X.4.2.1.1.1 Pre Conditions

Treatment Delivery Device has executed a treatment and created a DICOM RT Brachy Treatment Record

X.4.2.1.1.2 Main Flow

TDD shares the RT Brachy Treatment Record with a TMS

X.4.2.1.1.3 Post Conditions

TMS stores the RT Brachy Treatment Record and displays current treatment progress for the patient.

X.5 TDRC-Brachy Security Considerations

Not Applicable.

X.6 TDRC-Brachy Cross Profile Considerations

Not Applicable

Appendices to Volume 1

Not Applicable

Volume 2 – Transactions

None

Appendices to Volume 2

None

Volume 3 – Content Modules

7 Radiation Oncology DICOM Content Definition

DICOM Content Definitions constrain the use of instances of specific DICOM IODs (also referred to as DICOM objects). This typically means placing requirements on the creators of those instances, although requirements may also be placed on the receivers and users.

The most common such requirements are to:

- Make a module that is optional (U) in a DICOM IOD be required or conditional,
- Make an attribute that is optional (Type 3) in a DICOM Module be required or conditional,
- Require that an attribute that is optional (Type 3) in a DICOM Module be absent
- Constrain the content of an attribute to be empty
- Constrain the content of an attribute to be populated in a certain way, such as:
  - Constraining the value to be taken from a specific table
  - Constraining the value to be copied from a specific source
  - Constraining the value to encode certain information
- Require that an attribute be displayed/accessible to the operator

Reiterating DICOM requirements is kept to a minimum sufficient to provide context for the IHE requirements. Implementers are still required to be familiar with, and conform to, the underlying DICOM specification.

Content Definitions may be referenced from a Profile independent of transactions to constrain content without specifying the transport. Content Definitions may also be referenced from within a Transaction specification to constrain the content without duplicating the same constraint text across multiple related transactions.

For attributes that are optional, the creator is permitted but not required to include them, and the receiver is permitted but not required to ignore them.

7.1 Conventions

IOD Table

M / C / U	As defined in DICOM PS 3.3
R	The Module is defined as Conditional (C) or User Option (U) in DICOM. The Requirement is an IHE extension of the DICOM requirements, and the module shall be present.

RC	The Module is defined as Conditional (C) or User Option (U) in DICOM. The Requirement is an IHE extension of the DICOM requirements, and the module shall be present when the specified conditions apply.

Module Table

O	The attribute or its value is optional, i.e., in DICOM it is Type 2 or 3.
O+*	The attribute is optional, but additional constraints have been added. Note: The specification approach does not force a Type 2 or Type 3 value to become a Type 1 by stating O+.
R	The attribute is required and is not an IHE extension of the DICOM requirements, i.e., it is already Type 1 in DICOM, but additional constraints are placed by IHE, for example on the value set that may be used for the attribute.
R+	The Requirement is an IHE extension of the DICOM requirements, and the attribute shall be present, i.e., is Type 1, whereas the DICOM requirement may be Type 2 or 3.
RC+	The Requirement is an IHE extension of the DICOM requirements, and the attribute shall be present when the condition is satisfied, i.e., is Type 1C, whereas the DICOM requirement may be Type 2 or 3. If the condition is not fulfilled, the DICOM definitions apply. Note, that this means that the attribute may be present / have a value also in case the condition does not apply.
D	The requirements of DICOM apply unchanged, but the attribute needs to be displayed.
-	No IHE extension of the DICOM requirements is defined. The attribute is listed for better readability or similar purpose.
X+	The attribute information is required to be absent. DICOM Type 2 attributes shall be present with no value. DICOM Type 3 attributes shall be absent.

7.2 General Definitions

7.3 IOD Definitions

7.3.6 Treatment Record IODs

7.3.6.1 Technique Specific RT Treatment Record

This section is present only to convey the envisioned section numbering.

7.3.6.2 RT Treatment Record for General Use

This section is present only to convey the envisioned section numbering.

295 ### 7.3.6.3 RT Brachy Treatment Record

7.3.6.3.1 RT Brachy Treatment Record IOD

7.3.6.3.1.1 Referenced Standards

DICOM 2024b Edition. PS 3.3

7.3.6.3.1.2 IOD Definition

IE	Module	Reference	Usage	IHE-RO Usage
Patient	Patient	C.7.1.1	M	R See RO TF-3: 7.4.1.1.1
	Clinical Trial Subject	C.7.1.3	U	-
Study	General Study	C.7.2.1	M	R See RO TF-3: 7.4.1.2.1
	Patient Study	C.7.2.2	U	-
	Clinical Trial Study	C.7.2.3	U	-
Series	RT Series	C.8.8.1	M	R See RO TF-3: 7.4.1.4.1
	Clinical Trial Series	C.7.3.2	U	-
Equipment	General Equipment	C.7.5.1	M	R See RO TF-3: 7.4.1.5.1
Treatment Record	RT General Treatment Record	C.8.8.17	M	R See this module in RO TI IHE_RO_Suppl_TDRC Section 7.4.11.2.1.2
	RT Patient Setup	C.8.8.12	U	-
	RT Treatment Machine Record	C.8.8.18	M	-
	Measured Dose Reference Record	C.8.8.19	U	-
	Calculated Dose Reference Record	C.8.8.20	U	-
	RT Brachy Session Record	C.8.8.22	M	R Definitions see below Section 7.4.11.6.2
	RT Treatment Summary Record	C.8.8.23	U	-
	General Reference	C.12.4	U	-
	SOP Common	C.12.1	M	R See RO-TF-3: 7.4.1.6
	Common Instance Reference	C.12.2	U	-

7.4 Module Definitions

7.4.1 General Modules

This section is present only to convey the envisioned section numbering.

7.4.2 Workflow-Related Modules

This section is present only to convey the envisioned section numbering.

7.4.11 Treatment Records-Related Modules

7.4.11.6 RT Brachy Treatment Record Modules

7.4.11.6.1 Referenced Standards

DICOM 2024b Edition PS 3.3

7.4.11.6.2 RT Brachy Session Record Module Definition for HDR and PDR

Table 7.4.11.6.2-1: Module Definition for HDR and PDR Treatment Record

Attribute Name	Tag	Type	IHE-RO	Attribute Description
Referenced Fraction Group Number	(300C,0022)	3	R+	Identifier of Fraction Group within referenced RT Plan.
Number of Fractions Planned	(300A,0078)	2	R+	Total number of treatments (Fractions) planned for current Fraction Group.
Brachy Treatment Technique	(300A,0200)	1	D*	No need to display. Type of brachytherapy treatment technique. Enumerated Values: **INTRALUMENARY** **INTRACAVITARY** **INTERSTITIAL** **CONTACT** **INTRAVASCULAR**
Brachy Treatment Type	(300A,0202)	1	R+	Type of brachytherapy treatment. **HDR** or **PDR** only
Recorded Source Sequence	(3008,0100)	1	-	Sequence of Sources to be used within Application Setups. One or more Items shall be included in this Sequence.
>Source Number	(300A,0212)	1	D*	Identification number of the Source. The value of Source Number (300A,0212) shall be unique within the Recorded Source Sequence (3008,0100) in which it is created.

Attribute Name	Tag	Type	IHE-RO	Attribute Description
>Source Type	(300A,0214)	1	D*	Type of Source. **POINT** **LINE** **CYLINDER** **SPHERE**
>Source Model ID	(300A,021B)	3	D*	User-supplied identifier for the radioactive source model that was used for the source in the treatment plan of which this session record is based to. See Section C.8.8.15.15.
>Source Manufacturer	(300A,0216)	2	D*	Manufacturer of source.
>Source Serial Number	(3008,0105)	2	R+	
>Source Isotope Name	(300A,0226)	1	-	
>Source Isotope Half Life	(300A,0228)	1	D*	Half-life of Isotope (days).
>Source Strength Units	(300A,0229)	1C	-	Measurement unit of Source Strength. Required if the source is not a gamma-emitting (photon) source. May be present otherwise. Enumerated Values: **AIR_KERMA_RATE** Air Kerma Rate if Source is Gamma emitting Isotope. **DOSE_RATE_WATER** Dose Rate in Water if Source is Beta emitting Isotope.
>Reference Air Kerma Rate	(300A,022A)	1	-	Air Kerma Rate in air of Isotope specified at Source Strength Reference Date (300A,022C) and Source Strength Reference Time (300A,022E) (in $\mu Gy\ h^{-1}$ at 1 m). Value shall be zero for non-gamma sources.
>Source Strength	(300A,022B)	1C	-	Source Strength of Isotope at Source Strength Reference Date (300A,022C) and Source Strength Reference Time (300A,022E), in units specified in Source Strength Units (300A,0229). Required if the source is not a gamma-emitting (photon) source. See Section C.8.8.15.13.
>Source Strength Reference Date	(300A,022C)	1	-	Reference date for Reference Air Kerma Rate (300A,022A) or Source Strength (300A,022B) of Isotope.
>Source Strength Reference Time	(300A,022E)	1	-	Reference time for Air Kerma Rate (300A,022A) or Source Strength (300A,022B) of Isotope.

Attribute Name	Tag	Type	IHE-RO	Attribute Description
Treatment Session Application Setup Sequence	(3008,0110)	1	D*	Sequence of Application Setups for RT Treatment Record for current RT Plan. One or more Items shall be included in this Sequence.
>Current Fraction Number	(3008,0022)	2	R	Fraction number for this application setup.
>Application Setup Type	(300A,0232)	1	D*	Type of Application Setup. Defined Terms: **FLETCHER_SUIT** **DELCLOS** **BLOEDORN** **JOSLIN_FLYNN** **CHANDIGARH** **MANCHESTER** **HENSCHKE** **NASOPHARYNGEAL** **OESOPHAGEAL** **ENDOBRONCHIAL** **SYED_NEBLETT** **ENDORECTAL** **PERINEAL**
>Referenced Brachy Application Setup Number	(300C,000C)	3	D*	References application setup specified by Application Setup Number (300A,0234) in Application Setup Sequence (300A,0230) in RT Brachy Application Setups Module within referenced RT Plan.
>Application Setup Name	(300A,0236)	3	D*	User-defined name for Application Setup.
>Application Setup Manufacturer	(300A,0238)	3	D*	Manufacturer of Application Setup.
>Template Number	(300A,0240)	3	D*	Identification number of the Template.
>Template Type	(300A,0242)	3	D*	User-defined type for Template Device.
>Template Name	(300A,0244)	3	D*	User-defined name for Template Device.
>Application Setup Check	(3008,0116)	3	D*	Results of check-wire travel through all channels of current Application Setup. Enumerated Values: **PASSED** Passed check **FAILED** Failed check **UNKNOWN** Unknown status
>Referenced Verification Image Sequence	(300C,0040)	3	D*	Sequence of verification images obtained during delivery of current Application Setup. One or more Items are permitted in this Sequence See Note 1

Attribute Name	Tag	Type	IHE-RO	Attribute Description
>>Include Table 10-11 "SOP Instance Reference Macro Attributes"				
>Total Reference Air Kerma	(300A,0250)	1	-	Total Reference Air Kerma for current Application Setup, i.e., the sum of the products of the Air Kerma Rates of each Source in each Channel with its respective Channel Time (μGy at 1 m). Value shall be zero for non-gamma sources.
>Referenced Measured Dose Sequence	(3008,0080)	3	-	
>Referenced Calculated Dose Reference Sequence	(3008,0090)	3	R*	Sequence of doses estimated for each treatment delivery. One or more Items are permitted in this Sequence.
>>Referenced Dose Reference Number	(300C,0051)	1C	D*	Uniquely identifies Dose Reference specified by Dose Reference Number (300A,0012) in Dose Reference Sequence (300A,0010) in RT Prescription Module of referenced RT Plan. Required if Referenced Calculated Dose Reference Number (3008,0092) is not present. It shall not be present otherwise.
>>Referenced Calculated Dose Reference Number	(3008,0092)	1C	D*	Uniquely identifies Calculated Dose Reference specified by Calculated Dose Reference Number (3008,0072) within Calculated Dose Reference Sequence (3008,0070). Required if Referenced Dose Reference Number (300C,0051) is not present. It shall not be present otherwise.
>>Calculated Dose Reference Dose Value	(3008,0076)	1	-	Calculated Dose (Gy).
>Treatment Delivery Type	(300A,00CE)	2	R	Delivery Type of treatment. Defined Terms: **TREATMENT** normal patient treatment **CONTINUATION** continuation of interrupted treatment
>Treatment Termination Status	(3008,002A)	1	R	Conditions under which treatment was terminated. Enumerated Values: **NORMAL** treatment terminated normally **OPERATOR** operator terminated treatment **MACHINE** machine terminated treatment for other than NORMAL condition **UNKNOWN** status at termination unknown

Attribute Name	Tag	Type	IHE-RO	Attribute Description
>RT Treatment Termination Reason Code Sequence	(300A,0715)	3	R	Identifies the reason why the current treatment session has terminated. One or more items are permitted in this Sequence. The system must display the Code Meaning as a minimum. See Note 2.
>>*Include Table 8.8-1, "Code Sequence Macro Attributes"*			*DCID 9561 "Treatment Termination Reasons*"	
>Machine-Specific Treatment Termination Code Sequence	(300A,0716)	3	-	Machine-specific termination codes.
>>*Include Table 8.8-1, "Code Sequence Macro Attributes"*			*No baseline CID is defined*	
>Treatment Termination Description	(300A,0730)	3	R	A user-readable description for an abnormal termination.
>Treatment Verification Status	(3008,002C)	2	R+*	Conditions under which treatment was verified by a verification system. Shall be VERIFIED
>Recorded Brachy Accessory Device Sequence	(3008,0120)	3	-	Sequence of Brachy Accessory Devices associated with current Application Setup. One or more Items are permitted in this Sequence.
>>Referenced Brachy Accessory Device Number	(3008,0122)	2	-	Identification number of the Brachy Accessory Device. The value of Brachy Accessory Device Number (300A,0262) shall be unique within the Application Setup in which it is created.
>>Brachy Accessory Device ID	(300A,0263)	2	-	User or machine supplied identifier for Brachy Accessory Device.
>>Brachy Accessory Device Type	(300A,0264)	1	R	Type of Brachy Accessory Device. Defined Terms: **SHIELD** **DILATATION** **MOLD** **PLAQUE** **FLAB**
>>Brachy Accessory Device Name	(300A,0266)	3	D*	User-defined name for Brachy Accessory Device.
>Recorded Channel Sequence	(3008,0130)	1	D*	Sequence of Channels for current Application Setup. One or more Items shall be included in this Sequence.

Attribute Name	Tag	Type	IHE-RO	Attribute Description
>>Channel Number	(300A,0282)	1	D*	Identification number of the Channel. The value of Channel Number (300A,0282) shall be unique within the Application Setup in which it is created.
>>Referenced Channel Number	(0074,1406)	3	D*	The channel to be delivered, specified by the value of Channel Number (300A,0282) in referenced RT Plan.
>>Channel Length	(300A,0284)	2	-*	Length of Channel (mm). See RT Plan IOD.
>>Channel Effective Length	(300A,0271)	3	R+	Length of Channel (in mm) defined as the distance between the connector on the afterloader and the center of the distal-most possible position of the source. See Section C.8.8.15.16.
>>Channel Inner Length	(300A,0272)	2C	R+	The total physical inner length of channel (in mm). Specifies the distance between the connector on the afterloader and the end of the channel. Required if Channel Effective Length (300A,0271) is present. See Section C.8.8.15.16.1.
>>Afterloader Channel ID	(300A,0273)	3	R+	Identification of the Channel connection on the afterloader. See Section C.8.8.15.16.2.
>>Specified Channel Total Time	(3008,0132)	1	-	Total amount of time in seconds, scaled for the current source delivery strength and other delivery factors, specified to be delivered at the time of treatment between the first Control Point and the final Control Point for the current Channel. In the case of resuming a partially delivered treatment, the Specified Channel Total time will only include the remainder to be treated. See Section C.8.8.22.2.
>>Delivered Channel Total Time	(3008,0134)	1	-	Total amount of time in seconds actually delivered between Control Point 0 and final Control Point of the Brachy Control Point Delivered Sequence (3008,0160) for current Channel.
>>Source Movement Type	(300A,0288)	1	D*	Type of Source movement. Defined Terms: **STEPWISE** **FIXED** **OSCILLATING** **UNIDIRECTIONAL**

Attribute Name	Tag	Type	IHE-RO	Attribute Description
>>Specified Number of Pulses	(3008,0136)	1C	-	Number of Pulses specified per fraction for current Channel. Required if Brachy Treatment Type (300A,0202) is PDR. See Section C.8.8.22.1.
>>Delivered Number of Pulses	(3008,0138)	1C	-	Number of Pulses actually delivered per fraction for current Channel. Required if Brachy Treatment Type (300A,0202) is PDR. See Section C.8.8.22.1.
>>Specified Pulse Repetition Interval	(3008,013A)	1C	-	Pulse repetition interval (sec) specified for current Channel. Required if Brachy Treatment Type (300A,0202) is PDR. See Section C.8.8.22.1
>>Delivered Pulse Repetition Interval	(3008,013C)	1C	-	Pulse repetition interval (sec) actually delivered for current Channel. Required if Brachy Treatment Type (300A,0202) is PDR. See Section C.8.8.22.1.
>>Referenced Measured Dose Reference Sequence	(3008,0080)	3	D*	Sequence of doses measured during treatment delivery, summed over entire session. One or more Items are permitted in this Sequence.
>>>Referenced Dose Reference Number	(300C,0051)	1C		Uniquely references Dose Reference specified by Dose Reference Number (300A,0012) in Dose Reference Sequence (300A,0010) in RT Prescription Module of referenced RT Plan. Required if Referenced Measured Dose Reference Number (3008,0082) is not present. It shall not be present otherwise.
>>>Referenced Measured Dose Reference Number	(3008,0082)	1C		References Measured Dose Reference specified by Measured Dose Reference Number (3008,0064) in Measured Dose Reference Sequence (3008,0010). Required if Referenced Dose Reference Number (300C,0051) is not present. It shall not be present otherwise.
>>>Measured Dose Value	(3008,0016)	1	-	Measured Dose.
>>Referenced Calculated Dose Reference Sequence	(3008,0090)	3	D*	
>>>Referenced Dose Reference Number	(300C,0051)	1C	D*	Uniquely identifies Dose Reference specified by Dose Reference Number (300A,0012) in Dose Reference Sequence (300A,0010) in RT Prescription Module of referenced RT Plan. Required if Referenced Calculated Dose Reference Number (3008,0092) is not present. It shall not be present otherwise.

Attribute Name	Tag	Type	IHE-RO	Attribute Description
>>>Referenced Calculated Dose Reference Number	(3008,0092)	1C	D*	Uniquely identifies Calculated Dose Reference specified by Calculated Dose Reference Number (3008,0072) within Calculated Dose Reference Sequence (3008,0070). Required if Referenced Dose Reference Number (300C,0051) is not present. It shall not be present otherwise.
>>>Calculated Dose Reference Dose Value	(3008,0076)	1	D*	Calculated Dose (Gy).
>>Recorded Source Applicator Sequence	(3008,0140)	3	R+*	Only one entry in the sequence
>>>Referenced Source Applicator Number	(3008,0142)	2	R+*	Identification number of the Source Applicator. The value of Source Applicator Number (300A,0290) shall be unique within the Channel in which it is created.
>>>Source Applicator ID	(300A,0291)	2	R+	User or machine supplied identifier for Source Applicator.
>>>Source Applicator Type	(300A,0292)	1	D*	Type of Source Applicator. Defined Terms: **FLEXIBLE** **RIGID**
>>>Source Applicator Name	(300A,0294)	3	D*	User-defined name for Source Applicator.
>>>Source Applicator Length	(300A,0296)	1	D*	Length of Source Applicator (mm), defined as the distance between the connector of the applicator and the distal-most position of the source.
>>>Source Applicator Tip Length	(300A,0274)	2C	R*	Length of Source Applicator Tip (in mm), defined as the distance between the outer tip of the applicator and the center of the distal-most possible position of the source. Required if Channel Effective Length (300A,0271) is present. See Section C.8.8.15.16.
>>>Source Applicator Manufacturer	(300A,0298)	3	D*	Manufacturer of Source Applicator.
>>>Source Applicator Step Size	(300A,02A0)	1C	-	Distance of path along channel (mm) between adjacent (potential) dwell positions. Required if Source Movement Type (300A,0288) is STEPWISE.
>>Transfer Tube Number	(300A,02A2)	2	D*	Identification number of the Transfer Tube. The value of Transfer Tube Number (300A,02A2) shall be unique within the Channel in which it is created.

Attribute Name	Tag	Type	IHE-RO	Attribute Description
>>Transfer Tube Length	(300A,02A4)	2C	D*	Length of Transfer Tube of current afterloading Channel (mm). Required if value Transfer Tube Number (300A,02A2) is not zero length.
>>Recorded Channel Shield Sequence	(3008,0150)	3	D*	Sequence of Channel Shields associated with current Channel. One or more Items are permitted in this Sequence. See RT Plan IOD for description of Channel Shields.
>>>Referenced Channel Shield Number	(3008,0152)	2	D*	Identification number of the Channel Shield. The value of Channel Shield Number (300A,02B2) shall be unique within the Channel in which it is created.
>>>Channel Shield ID	(300A,02B3)	2	D*	User or machine supplied identifier for Channel Shield.
>>>Channel Shield Name	(300A,02B4)	3	D*	User-defined name for Channel Shield.
>>Referenced Source Number	(300C,000E)	1	D*	Uniquely identifies the referenced Source within the Recorded Source Sequence (3008,0100) for current Application Setup.
>>Safe Position Exit Date	(3008,0162)	1C	D*	Date on which the source(s) exited the safe. Required if Recorded Channel Sequence (3008,0130) is present and Brachy Treatment Type (300A,0202) is not MANUAL or PDR.
>>Safe Position Exit Time	(3008,0164)	1C	D*	Time on which the source(s) exited the safe. Required if Recorded Channel Sequence (3008,0130) is present and Brachy Treatment Type (300A,0202) is not MANUAL or PDR.
>>Safe Position Return Date	(3008,0166)	1C	D*	Date on which the source(s) returned to the safe. Required if Recorded Channel Sequence (3008,0130) is present and Brachy Treatment Type (300A,0202) is not MANUAL or PDR.
>>Safe Position Return Time	(3008,0168)	1C	D*	Time on which the source(s) returned to the safe. Required if Recorded Channel Sequence (3008,0130) is present and Brachy Treatment Type (300A,0202) is not MANUAL or PDR.
>>Number of Control Points	(300A,0110)	1	D*	Number of control points in Channel. For an N-segment Channel there will be 2N (stepwise movement) or N+1 (continuous movement) control points.

Attribute Name	Tag	Type	IHE-RO	Attribute Description
>>Brachy Control Point Delivered Sequence	(3008,0160)	1	-	Sequence of machine configurations describing this Channel. The number of Items in this Sequence shall equal the value of Number of Control Points (300A,0110). See RT Plan IOD and Section C.8.8.22.1 for description of Brachy Control Point Delivered Sequence.
>>>Referenced Control Point Index	(300C,00F0)	3	-	Index of current Control Point, starting at 0 for first Control Point.
>>>Treatment Control Point Date	(3008,0024)	1	-	Date when the delivery of radiation at this control point began. For the final control point this shall be the Date when the previous control point ended.
>>>Treatment Control Point Time	(3008,0025)	1	-	Time when the delivery of radiation at this control point began. For the final control point this shall be the Time when the previous control point ended. As described in section X.1.1, display the calculated dwell time spent at the treatment position defined by two control points at the same (3008, 0025) Control Point Relative Position. Also display the total dwell time for each channel (catheter).
>>>Control Point Relative Position	(300A,02D2)	1	-	Distance in mm between current Control Point Position and the center of the distal-most possible Source position in current Channel. See RT Plan IOD. Display only a single dwell position for the two matching control point locations that define a dwell location.
>>>Override Sequence	(3008,0060)	3	-	Sequence of parameters that were overridden during the administration of the treatment immediately prior to the current control point. One or more Items are permitted in this Sequence.
>>>>Override Parameter Pointer	(3008,0062)	2	-	Contains the Data Element Tag of the Attribute that was overridden.
>>>>Operators' Name	(0008,1070)	2	-	Name of operator who authorized override.
>>>>Operator Identification Sequence	(0008,1072)	3	-	Identification of the operator who authorized override. Only a single Item is permitted in this Sequence.
>>>>>*Include Table 10-1 "Person Identification Macro Attributes Description"*				

Attribute Name	Tag	Type	IHE-RO	Attribute Description
>>>>Override Reason	(3008,0066)	3		User-defined description of reason for override of parameter specified by Override Parameter Pointer (3008,0062).
>>Pulse Specific Brachy Control Point Delivered Sequence	(3008,0171)	3	RC*	Brachy Control Point Delivered Sequence for each PDR treatment pulse. Number of Items in the Sequence shall be equal to the Delivered Number of Pulses (3008,0138). **Required if Brachy Treatment Type (300A,0202) has a value of PDR.**
>>>Pulse Number	(3008,0172)	1		Identification Number of this delivered Pulse. The pulse numbers for a treatment start at 1 and increase monotonically by 1. A given SOP Instance might only contain some of the pulses of the given treatment.
>>>Safe Position Exit Date	(3008,0162)	1		Date on which the source(s) exited the safe.
>>>Safe Position Exit Time	(3008,0164)	1		Time at which the source(s) exited the safe.
>>>Safe Position Return Date	(3008,0166)	1		Date on which the source(s) returned to the safe.
>>>Safe Position Return Time	(3008,0168)	1		Time at which the source(s) returned to the safe.
>>>Brachy Pulse Control Point Delivered Sequence	(3008,0173)	1		List of control points for this pulse. See Section C.8.8.22.1.
>>>>Referenced Control Point Index	(300C,00F0)	3		Index of current Control Point, starting at 0 for first Control Point in this Sequence.
>>>>Treatment Control Point Date	(3008,0024)	1		Date when the delivery of radiation at this control point began. For the final control point, this shall be the Date when the previous control point ended.
>>>>Treatment Control Point Time	(3008,0025)	1		Time when the delivery of radiation at this control point began. As described in section X.1.1, display the calculated dwell time spent at the treatment position defined by two control points at the same (3008, 0025) Control Point Relative Position. For the final control point, this shall be the Time when the previous control point ended. Also display the total dwell time for each channel (catheter).

Attribute Name	Tag	Type	IHE-RO	Attribute Description
>>>>Control Point Relative Position	(300A,02D2)	1		Distance in mm between current Control Point Position and the center of the distal-most possible Source position in current Channel. Display only a single dwell position for the two matching control point locations that define a dwell location. See Section C.8.8.15.9.
>>>>Override Sequence	(3008,0060)	3		Parameters which were overridden during the administration of the treatment immediately prior to the current control point. One or more Items are permitted in this Sequence.
>>>>>Override Parameter Pointer	(3008,0062)	2		Data Element Tag of the Attribute that was overridden.
>>>>>Operators' Name	(0008,1070)	2		Name of operator who authorized override.
>>>>>Operator Identification Sequence	(0008,1072)	3		Identification of the operator who authorized override. Only a single Item is permitted in this Sequence.
>>>>>>Include Table 10-1 "Person Identification Macro Attributes Description"				
>>>>>Override Reason	(3008,0066)	3		User-defined description of reason for override.

Notes

1. The Referenced Verification Image Sequence (300C,0040) may contain either images taken specifically for verification of the brachy application setup or reference images used in place of verification images, as might be done in HDR treatment planning.

315 2. Treatment Termination Code (3008,002B) was previously part of this Module but has been retired. The RT Treatment Termination Reason Code Sequence (300A,0715) and Machine-Specific Treatment Termination Code Sequence (300A,0716) should be used for machine readable codes and Treatment Termination Description (300A,0730) for human readable text respectively.

Appendices to Volume 3

None

Volume 4 – National Extensions

4 National Extensions

Not applicable.