Supplement: Dental Forensic Data

This is a Supplement to the *ANSI/NIST-ITL 1-2011* standard. It is focused upon forensic dental and oral data, incorporated into a new record type – Record **Type-12**. It is primarily focused upon the use of such data in the identification of human remains, such as in a Disaster Victim Identification (DVI) scenario, or when an unknown human deceased is encountered by law enforcement. It may also be relevant in cases of living persons unable to identify themselves.

The Supplement also includes modifications to **Type-10** Face, other body part, or scar, mark, tattoo (SMT) image record to allow transmission of images of suspected pattern injuries of intraoral origin and / or suspect latent images of perioral or intraoral origin on, or potentially from, a human body. (For images of, or data about, non-human or inanimate objects, use a **Type-21** record as described below.) The **Type-10** image record can contain images of any human body part. This Supplement also extends the **Type-10** record capabilities to include x-rays and other diagnostic images or a body, including the oral cavity. For example, the images of the teeth of a suspected human biter would be contained in an instance of a **Type-10** record, but the images of the teeth of a non-human suspected biter (such as a dog) would be included in a **Type-21** record.

Dental and oral data in a **Type-12** record may be used in cases involving pattern injuries of possible intraoral origin and/or latent image of possible perioral origin[1]. The transmission of such dental and oral data concerning a comparison to a pattern injury does not imply that the pattern injury or latent image has been confirmed to be of intraoral or perioral origin by any agency or organization.

Record **Type-21**, Associated Context record, which exists in *ANSI/NIST-ITL 1-2011*, may be used to transmit images (including x-rays) and other examination data (such as spectroscopic examinations) on non-human objects or animals. Data concerning casts and molds of impressions in skin or objects, and the locations of those casts and molds may also be transmitted in a Record **Type-21**, including their physical storage location and identification markers (such as barcode information, etc.). There are no changes required to the **Type-21** record required, so there is no description of that record type in this Supplement. The user should take full advantage of **Field 21.020 Comment / COM** to enter text descriptions of the images or objects described in a **Type-21** record.

Note that a **Type-20** record is used for an original image that may have been processed to provide a **Type-10** or **Type-21** record. An example is a family photograph that has been cropped to provide the image of the subject of the transaction. The original family photograph would be entered in a **Type-20** record, which also contains the capability to specify the contour of the part of the original image that had been segmented for use in the **Type-10** (in this example).

Part 1 of this Supplement expands the capabilities of the standard by including a new Record **Type-12**. This new record type is designed to accommodate oral biometric and forensic odontology data based upon the *ANSI/ADA Standard No. 1058 - Forensic Dental Data Set* and *ANSI/ADA Standard No. 1067*. It facilitates the exchange of data to agencies that may use different data storage and/or matching systems.

[1] Each candidate's data would be contained in a separate transaction.

This supplement addresses several types of dental and oral forensic information that may be contained in a **Type-12** record. It should be noted that in this Supplement, the term 'current data' refers to the available data for the individual in his/her current state, and does not mean a specific point in time. 'Prior data' refers to data collected when that individual was in a different, previous state/condition than the current condition.

- Disaster Victim Identification and Unknown Deceased Identification
  - Prior data (antemortem)
  - Current data (postmortem)

- Person Unable to Identify Themselves
  - Prior data (antemortem)
  - Current data (antemortem)

In the first case (which is the most common use of **Type-12** record), separate **Type-12** records are generated for the prior (antemortem) and for the current data (postmortem). Likewise, separate **Type-12** records are created for prior and current data for persons unable to identify themselves. Data elements are included in the **Type-12** record to clearly distinguish the timeframe of the data collection from the subject of the transaction. In order to minimize confusion the word *antemortem* is used in this document instead of prior data and *postmortem* is used instead of current data in those cases where identification *only* concerns a decedent,

Part 2 of this Supplement extends the **Type-10** record in the *ANSI/NIST-ITL 1-2011* standard to handle images of the oral region (including radiographic images), pattern injuries on an individual of possible intraoral origin and latent images of possible perioral origin on an individual (such as lipstick from a kiss). Descriptions of the pattern injuries and latent prints of possible perioral origin are also included in the **Type-10** record. The **Type-10** record has the capability to describe the lips (and other facial features) using feature points (**Field 10.029 2D facial feature points / FFP**) and contours (**Field 10.033 Feature contours / FEC**).

The **Type-10** record is updated to allow for the transmission of more types of images. It had been able to handle black and white as well as color images. That capability is extended to include x-rays, sonograms, MRI images, Cone-beam images, CAT scan images and other diagnostic imaging types. This change has implications for other record types, such as **Type-20** [2] as described in Section 2 of this document. If used, a **Type-20** record contains the original source image that was the basis for creating the biometric sample in a **Type-10** (for a human) or in a **Type-21** record (for an animal).

Part 3 of this Supplement updates additional portions of the *ANSI/NIST-ITL 1-2011* standard to reflect the changes in Parts 1 and 2, including

Section 3	**Normative References**
Section 4	**Terms and Definitions**
Section 5.3	**Record Types**
Annex B	**Traditional Encoding**

[2] The new image types in a **Type-20** record should be listed in **Field 20.014** as **Acquisition source type / AQT** = 31 (Other). The **acquisition special characteristics / AQSC** data element in **Field 20.014** should be used to describe the type of imagery (radiograph / sonogram, etc.)

Annex C **NIEM-conformant Encoding Rules**
Annex G **Mapping to the NIEM IEPD**

In addition, a sample XML representation of the new Type-12 record is included in **Part 3.**

Note: As a new record type, encoding should be done in XML, as opposed to Traditional encoding.

Acknowledgements

This document was prepared by a joint group comprised of the Forensic Dental Working Group of ANSI/NIST-ITL, co-chaired by Pedro Janices and Dra. Virginia Kanneman of the Argentine National Office of Information Technologies; and by the American Dental Association Standards Committee on Dental Informatics Working Group 10.12 Forensic Odontology Informatics, chaired by Dr. Kenneth Aschheim. The editor was Brad Wing.

There has been extensive coordination with the American Academy of Forensic Sciences (AAFS), the American Association for Identification (IAI), the American Board of Forensic Odontologists (ABFO), the American Dental Association (ADA), the Federal Bureau of Investigation (FBI): NGI, BCOE and NCIC components, INTERPOL, Miami Dade Medical Examiner Department, the National Institute of Standards and Technology (NIST), the New York City Office of the Chief Medical Examiner, NamUs, Plass Data, the Scientific Working Group for Disaster Victim Identification (SWGDVI), and WinID.

The following individuals made substantial contributions to this document: Dr. Kenneth Aschheim, Dr. Robert Dorion, Pedro Janices, Dr. Virginia Kanneman, René Pape, Sharon Stanford, Jennifer Stathakis, Cathy Wimer, Brad Wing.

Other persons who have also played a very important role in ensuring that this Supplement was developed include Lynn Clelland, Winnie Furnari, Cynthia Johnston, Fred Jaco, Dr. Elias Kontanis, Dr. William Silver, Justin Smith, and Dr. Jason Wiersema.

The editor of the ANSI/NIST-ITL standard would especially like to thank Dr. Aschheim for his work on this standard as well as ensuring that modifications to the *ANSI/ADA Standard No. 1058 - Forensic Dental Data Set* were made to reflect the needs and requirements of ANSI/NIST-ITL -- and to Sr. Janices and Dra. Kanneman for proposing this Supplement and guiding it through the ANSI/NIST-ITL process.

Part 1

Part 1 defines the new Type-12 record added to the *ANSI/NIST-ITL 1-2011* standard. It is used to convey dental and oral data that may be useful in verifying or establishing the identity of an individual.

Section 8.12 of the *ANSI/NIST-ITL 1-2011* standard is updated as follows:

The Type-12 record shall contain and be used to exchange information that may be used to identify or confirm the identity of persons using dental biometrics and forensic odontological procedures. It is consistent with the *ANSI/ADA Standard No. 1058 - Forensic Dental Data Set* of the American Dental Association (ADA) and uses the tooth numbering system stated in ANSI/ADA *Designation System for Teeth and Areas of the Oral Cavity, Standard 3950*.

For identification of unknown deceased, as noted by the ADA in Section **6** of *Standard No. 1058*: "The antemortem forensic data set should consist of:

- familial data set
- dental history data set
- tooth data set
- mouth data set
- visual image data set
- radiographic image data set

The postmortem forensic dental data set should consist of 4 components:

- tooth data set
- mouth data set
- visual image data set
- radiographic image data set"

For living persons unable to identify themselves, the same sets of data apply but the first group should be viewed as 'prior' and the second grouping as 'current.'

For cases involving the transmission of dental and oral data about an individual for potential law enforcement purposes, the most current data on that individual should be supplied in a Type-12 record (and images, if available in a Type-10 record).

It is important to emphasize that lack of specification of *ANSI/ADA Standard No. 1058 - Forensic Dental Codes* in a transaction using this ANSI/NIST-ITL standard does NOT mean that a condition is NOT present, but simply that the sender did not convey the information.

Note that the visual image data set and the radiographic image data set are contained in Record Type-10. The familial data set information is handled in a Type-2 record, according to the specifications of the Application Profile, such as the FBI's EBTS, or INTERPOL's INT-I.

Table Dental Supplement 1

Type-12 record layout[3]

Field Number	Mnemonic	Content Description	Cond code	Character			Value Constraints	Occurrence	
				Type	Min #	Max #		Min #	Max #
12.001		**RECORD HEADER**	M	encoding specific: see **Annex C; NIEM-conformant encoding rules**			encoding specific: see **Annex C; NIEM-conformant encoding rules**	1	1
12.002	**IDC**	**INFORMATION DESIGNATION CHARACTER**	M	N	1	2	0 ≤ IDC ≤ 99 integer	1	1
12.003	**FDS**	**FORENSIC DENTAL SETTING**	O					0	1
	FACC	forensic analyst category code	M↑	A	1	1	FACC = M,D,A,T, or O	1	1
	FOPC	forensic organization primary contact information	O↑	U	1	1000	none	0	1
	FSCC	forensic source country code	O↑	AN	2	3	Value from *ISO-3166-1*	0	1
12.004	**SRC**	**SOURCE AGENCY IDENTIFICATION ID**	M	U	1	*	none	1	1
12.005	**CON**	**CAPTURE ORGANIZATION NAME**	O	U	1	*	none	0	1
12.006	**DSI**	**DENTAL SUBJECT INFORMATION**	M					1	1
	DSC	subject status code	M	N	1	1	DSC = 0 or 1 or 2	1	1
	DLCD	subject - last contact date	O	**See Section 7.7.2.3 Local Date;** see **Annex C; NIEM-conformant encoding rules**			**See Section 7.7.2.3 Local Date;** see **Annex C; NIEM-conformant encoding rules**	0	1
	DRLC	subject - range of last contact date estimate	D	AN	**3**	**15**	Time measure indicator followed by 2 digits. May be concatenated, with larger time units first. Units: Y year, M month, D day, h hour, m minute	0	1
	DPBD	subject - person birth date	O	**See Section 7.7.2.3 Local Date;** see **Annex C; NIEM-conformant encoding rules**			**See Section 7.7.2.3 Local Date;** see **Annex C; NIEM-conformant encoding rules**	0	1

[3] For a description of the codes used in this table, see **Section 8 Record type specifications** in the Standard.

Field Number	Mnemonic	Content Description	Cond code	Character			Value Constraints	Occurrence	
				Type	Min #	Max #		Min #	Max #
	DRBD	subject - range of birth date estimate	D	AN	3	15	Time measure indicator followed by 2 digits. May be concatenated, with larger time units first. Units: Y year, M month, D day, h hour, m minute	0	1
	DPET	subject - person ethnicity text	O	U	1	50	none	0	1
	DRAC	subject - DNA records availability code	O	N	1	1	DRAC = 0, 1 or 2 integer	0	1
	DCLD	subject collection location description	O	U	1	*	none	0	1
	DEDD	subject - estimated date of death	O	**See Section 7.7.2.3 Local Date;** see **Annex C; NIEM-conformant encoding rules**			**See Section 7.7.2.3 Local Date;** see **Annex C; NIEM-conformant encoding rules**	0	1
	DRDE	subject - range of death date estimate	D	AN	3	15	Time measure indicator followed by 2 digits. May be concatenated, with larger time units first. Units: Y year, M month, D day, h hour, m minute	0	1
	DTER	subject – death time estimate rationale text	D	U	1	*	none	0	1
	DEAT	subject – death age estimate text	D	U	1	*	none	0	1
12.007	**ODES**	**ORIGINAL DENTAL ENCODING SYSTEM INFORMATION**	D					1	1
	OSNC	original system name code	M↑	A	4	6	OSNC = EDR, FastID, NamUs, NCIC, NEMA, PLASS, UDIM, WinID, Other or None	1	1
	OSVT	original system version text	D	U	1	*	None	0	1
	OTPC	original tooth permanence category code	M↑	N	1	1	OTPC = 0, 1, 2 or 3	1	1
	ORDG	original restoration data granularity code	M↑	N	2	2	ORDG = 11,21,31,41,51 or 99	1	1

Field Number	Mnemonic	Content Description	Cond code	Character			Value Constraints	Occurrence	
				Type	Min #	Max #		Min #	Max #
12.008	**TDES**	**TRANSMITTAL DENTAL ENCODING SYSTEM INFORMATION**	D					0	1
	TSNC	transmittal system name code	M↑	A	4	6	TSNC= FastID, NCIC, PLASS, UDIM, WinID, or OTHER	1	1
	TSVT	transmittal system version text	D	U	1	100	None	0	1
	TTPC	transmittal tooth permanence category code	M↑	N	1	1	TTPC = 0, 1, 2 or 3	1	1
	TRDG	transmittal restoration data granularity code	M↑	N	2	2	TRDG 11,21,31,41,51 or 99	1	1
12.009	**HDD**	**DENTAL HISTORY DATA DETAIL**	O					0	1
		Subfields: Repeating sets of information items	M↑					1	*
	HARC	dental history ADA reference code text	M↑	NS	3	30	Valid code from *ANSI/ADA Standard No. 1058*, Section 8 (integers and periods are in the codes)	1	1
	HADT	dental history additional descriptive text	D	U	1	*	none	0	1
12.010	**TDD**	**TOOTH DATA DETAIL**	D					0	1
		Subfields: Repeating sets of information items	M↑					1	*
	TCD	tooth data date of recording	M↑	**See Section 7.7.2.3 Local Date;** see **Annex C; NIEM-conformant encoding rules**			**See Section 7.7.2.3 Local Date;** see **Annex C; NIEM-conformant encoding rules**	1	1
	TCDR	tooth data date of recording estimated accuracy range	O↑	AN	**3**	**15**	Time measure indicator followed by 2 digits. May be concatenated, with larger time units first. Units: Y year, M month, D day, h hour, m minute	0	1

Field Number	Mnemonic	Content Description	Cond code	Character			Value Constraints	Occurrence	
				Type	Min #	Max #		Min #	Max #
	TID	tooth ID	M↑	N	2	2	Tooth numbers chosen from *ANSI/ADA Standard No. 3950*	1	1
	TOET	tooth – original system- data code	D	U	1	*	none	0	1
	TARC	tooth data– ADA reference code text	M	NS	3	30	Valid codes from *ANSI/ADA Standard No. 1058*, Section 9 (integers, and periods are in the codes)	1	1
	TTET	transmitted tooth encoding text	D	U	1	*	none	0	1
	TICC	tooth ID certainty code	O↑	N	1	1	TICC = 0, 1 or 2	0	1
	TADT	tooth additional descriptive text	D	U	1	*	none	0	1
12.011	**MDD**	**MOUTH DATA DETAIL**	O					0	1
		Subfields: Repeating sets of information items	M↑					1	*
	MCD	mouth data of recording date	M↑	**See Section 7.7.2.3 Local Date;** see **Annex C; NIEM-conformant encoding rules**			**See Section 7.7.2.3 Local Date;** see **Annex C; NIEM-conformant encoding rules**	1	1
	MCDR	mouth data date of recording date estimated accuracy range	O↑	AN	**3**	**15**	Time measure indicator followed by 2 digits. May be concatenated, with larger time units first. Units: Y year, M month, D day, h hour, m minute	0	1
	MARC	mouth data ADA reference code text	M↑	ANS	3	30	Valid code from *ANSI/ADA Standard No. 1058*, Section 10 (integers and periods are in the codes)	1	1
	MADT	mouth additional descriptive text	D	U	1	*	none	0	1
12.012	**STI**	**DENTAL STUDY AND TOOTH IMPRINTS**	O					0	1

Field Number	Mnemonic	Content Description	Cond code	Character			Value Constraints	Occurrence	
				Type	Min #	Max #		Min #	Max #
	SARC	dental study and tooth imprints ADA reference code text	M↑	ANS	3	30	Valid code from *ANSI/ADA Standard No. 1058*, Section 7.5.1.1, 7.5.1.2 or 7.5.1.3 (integers and periods are in the codes)	1	1
	SADT	dental study and tooth imprints additional descriptive text	M↑	U	1	*	none	1	1
12.013 – 12.019		RESERVED FOR FUTURE USE only by ANSI/NIST-ITL	Not to be used						
12.020	**COM**	**COMMENT**	O	U	1	126	none	0	1
12.021 – 12.199		RESERVED FOR FUTURE USE only by ANSI/NIST-ITL	Not to be used						
12.200 – 12.900	**UDF**	**USER-DEFINE FIELDS**	O	user-defined			user-defined	user-defined	
12.901 – 12.992		RESERVED FOR FUTURE USE only by ANSI/NIST-ITL	Not to be used						
12.993	**SAN**	**SOURCE AGENCY NAME**	O	U	1	125	none	0	1
12.994		RESERVED FOR FUTURE USE only by ANSI/NIST-ITL	Not to be used						
12.995	**ASC**	**ASSOCIATED CONTEXT**	O					0	1
		Subfields: Repeating sets of information items	M↑					1	255
	CAN	associated context number	M↑	N	1	3	1 ≤ CAN ≤ 255 integer	1	1
	ASP	associated segment position	O↑	N	1	2	1 ≤ ASP ≤ 99 positive integer	0	1
12.996	**HAS**	**HASH**	O	H	64	64	none	0	1
12.997		RESERVED FOR FUTURE USE only by ANSI/NIST-ITL	Not to be used						
12.998	**GEO**	**GEOGRAPHIC SAMPLE ACQUISITION LOCATION**	O					0	1
	UTE	universal time entry	O↑	encoding specific: See Section **7.7.2.2** and **Annex C NIEM-conformant encoding rules**			encoding specific: See Section **7.7.2.2** and **Annex C NIEM-conformant encoding rules**	0	1
	LTD	latitude degree value	D	NS	1	9	-90 ≤ LTD ≤ 90	0	1

Field Number	Mnemonic	Content Description	Cond code	Character			Value Constraints	Occurrence	
				Type	Min #	Max #		Min #	Max #
	LTM	latitude minute value	D	NS	1	8	0 ≤ LTM < 60	0	1
	LTS	latitude second value	D	NS	1	8	0 < LTS < 60	0	1
	LGD	longitude degree value	D	NS	1	10	-180 ≤ LGD ≤ 180	0	1
	LGM	longitude minute value	D	NS	1	8	0 ≤ LGM < 60	0	1
	LGS	longitude second value	D	NS	1	8	0 < LGS < 60	0	1
	ELE	elevation	O	NS	1	8	-422.000 < ELE < 8848.000 real number	0	1
	GDC	geodetic datum code	O	AN	3	6	value from **Table 6**	0	1
	GCM	geographic coordinate universal transverse Mercator zone	O	AN	2	3	one or two integers followed by a single letter	0	1
	GCE	geographic coordinate universal transverse Mercator easting	D	N	1	6	integer	0	1
	GCN	geographic coordinate universal transverse Mercator northing	D	N	1	8	integer	0	1
	GRT	geographic reference text	O	U	1	150	none	0	1
	OSI	geographic coordinate other system identifier	O	U	1	10	none	0	1
	OCV	geographic coordinate other system value	D	U	1	126	none	0	1
12.999	**DATA**	**DENTALCHART DATA**	D	B	1	*	none	0	1

8.12.1 Field 12.001: Record header

The content of this mandatory field is dependent upon the encoding used. See the relevant annex of this standard for details. See **Section 7.1.**

8.12.2 Field 12.002: Information designation character / IDC

This mandatory field shall contain the **IDC** assigned to this Type-12 record as listed in the information item **IDC** for this record in **Field 1.003 Transaction content / CNT** See **Section 7.3.1**

8.12.3 Field 12.003: Forensic dental setting / FDS

This optional field is used to describe the forensic setting that carried out the analysis of the dental and oral data to identify or confirm the identity of the subject. This field is not used when data is gathered and transmitted without forensic analysis. The field is comprised of the following information items:

- The first information item is the **forensic analyst category code / FACC**. It is mandatory if this field is used. It contains a single letter describing the head of the team that processed the forensic data:

M	Medical examiner
D	Dental professional / Forensic odontologist
A	Forensic anthropologist
T	Technician
O	Other

- The second information item is the **forensic organization primary contact information/ FOPC** for the forensic analysis. This is an optional item. It should include the name, telephone number, and e-mail address of the person responsible for the analysis.

- The third information item is optional. It is the **forensic source country code / FSCC.** This is the code of the location where the forensic analysis was performed, not the code of the location from which the forensic data or sample were sent for analysis.

  FSCC is coded according to *ISO-3166-1*.

8.12.4 Field 12.004: Source agency Identification ID / SRC

This is a mandatory field. See **Section 7.6** for details. The **SRC** is a code for a particular agency that is assigned by the implementation domain (such as NORAM, which is maintained by the FBI). It is often not a readable name. The source agency name may be entered in **Field 12.993: Source agency name / SAN**.

This field denotes the agency that prepared this record. It is not necessarily the agency that is transmitting this transaction (which is designated in **Field 1.008: Originating agency identifier / ORI**). It also need not be the agency that gathered the biometric samples and/or metadata. That organization (if different) is specified in **Field 12.005: Capture organization name / CON**.

Note that changes and additions or subtractions to/from the original Type-12 record may be noted in **Field 98.900: Audit log / ALF**. Thus, when an agency updates a Type-12 record, **Field 12.004** is updated to reflect this new agency name and the previous value for **Field 12.004** is recorded in **Field 98.900.**

8.12.5 Field 12.005: Capture organization name / CON

This field is optional. Note that this can be different from the agency entered in **Field 12.004: Source agency identification ID/ SRC** and **Field 12.993 Source agency name / SAN**. **SRC** and **SAN** describe the agency that created the record. Since the record may have been forwarded by another agency to the final destination, **Field 1.008: Originating agency identifier / ORI** is used to indicate the transmitting organization. See **Section 7.6** for details about **SRC, SAN**, and **ORI**. For example,

- At a disaster recovery scene, *Local Response Team A* may have collected the data in the field. It would be entered in **CON**.

- The data administration organization (such as *Disaster Recovery – Operation X*) would create the actual *ANSI/NIST-ITL 1-2011* conformant record. Such an organization's code would be entered in **Field 12.004: Source agency identification ID/ SRC** (for example *NA54-X*) and its name in **Field 12.993 Source agency name / SAN** (for example *New Artichoke Regional Disaster Recovery Bureau).*

- In many implementation domains, there are a limited number of transmission organizations that can send data. Therefore, the agency listed in **SRC** may send the transaction to another location that has access rights to the final destination. This intermediary may add information to the transaction, as well. The final transmitting organization code is listed in **Field 1.008: Originating agency identifier / ORI.** Its name may be entered in **Originating agency name /OAN** in **Field 1.017: Agency names / ANM.**

8.12.6 Field 12.006: Dental subject information / DSI

This field is mandatory. The first information item is mandatory. This field contains information that would not typically be contained in **Type-2** records but are very important for identification of unknown deceased or persons unable to identify themselves. Here, the term 'subject' refers to the person (alive or dead) to whom the information applies.

- The first information item is the **subject status code / DSC**. It is an integer with one of the following values:

  0 = status of individual unknown
  1 = data obtained from a living person (for unknown deceased = antemortem)
  2 = data obtained from a decedent (for unknown deceased = postmortem)

*Note that separate **Type-12** records shall exist for antemortem and postmortem information.*

- The second information item, **subject – last contact date / DLCD,** is an optional

information item. This is particularly useful in missing person's cases. See **Section 7.7.2.3** for the format.

- The third information item, **subject – range of last contact date estimate / DRLC** is entered in the format $\mathbf{Y}^{yy}\mathbf{M}^{mm}\mathbf{D}^{dd}\mathbf{h}^{hh}\mathbf{m}^{mm}$. The bold letters are entered with Y indicating years, M indicating months, D indicating days, h indicating hours and m indicating minutes. Not all levels of time need be entered – only the relevant one(s).

- The fourth information item, **subject – person birth date / DPBD,** is an optional information item. This is particularly useful in missing person's cases. See **Section 7.7.2.3** for the format.

- The fifth information item, **subject – range of birth date estimate / DRBD** is entered in the format $\mathbf{Y}^{yy}\mathbf{M}^{mm}\mathbf{D}^{dd}\mathbf{h}^{hh}\mathbf{m}^{mm}$. The bold letters are entered with Y indicating years, M indicating months, D indicating days, h indicating hours and m indicating minutes. Not all levels of time need be entered – only the relevant one(s).

- The sixth information item, **subject – person ethnicity text / DPET**, is an optional string of 50 Unicode characters used to describe the ethnic group to which the subject belongs. This is not selected from a fixed list, since terminology that is useful in one area may not be relevant in another. For instance, in certain locations, if tribal membership (e.g. Zulu, Hopi) is known, it may be entered in this information item. In the United States, 'Hispanic' is a common term that may assist in identification, but that term would be meaningless (or simply cause confusion) in Guatemala or Argentina. Likewise, 'aboriginal' describes specific peoples in Australia but it is not a term commonly in use in the United States.

- The seventh information item is optional and indicates if DNA records are available for the subject. It is **subject DNA records available code / DRAC**. This need not be specified if a Type-18 record is contained in the transaction, but it is highly suggested to do so. Allowed values are:

  0 = Unknown
  1 = Yes
  2 = No

- The eighth optional information item is the **subject collection location description / DCLD**. It is an optional string of Unicode characters. An example is "Lower jaw recovered 4.3 meters from the tip of the left wing of the airplane, in grid 4.3. Separated from skull. Four teeth found within 20 centimeters of the lower jaw." This may be a more descriptive entry than that of **Field 12.998**, **Geographic sample acquisition location / GEO**, which is typically the geographic location specified in GPS coordinates or with reference to a fixed landmark.

- The ninth item is optional but shall only appear if the subject is deceased and the data sample was collected postmortem. (**DSC** = 2). It is the **subject – estimated death date / DEDD**. See **Section 7.7.2.4 (Local Date and Time)** for the format.

- The tenth item is optional but shall only appear if **DEDD** is present in the field. It is **subject – range of death date estimate / DRDE**. This is the amount of time (plus and minus) of which **DEDD** is the center point during which the death could have taken place. It is entered in the format $\mathbf{Y}^{yy}\mathbf{M}^{mm}\mathbf{D}^{dd}\mathbf{h}^{hh}\mathbf{m}^{mm}$. The bold letters are entered with Y indicating years, M indicating months, D indicating days, h indicating hours and m indicating minutes. Not all levels of time need be entered – only the relevant one(s). Thus, with **DEDD** set at **201203150000 DRDE** could have a value of **D**05, meaning that the death could have occurred from March 10 through March 20. The letters do not need to be in bold case in the actual data.

- The eleventh item is optional but shall only appear if **DRDE** is present in the field. It is **subject- death time estimate rationale text / DTER.** It is entered in Unicode. A typical entry may be "Using the Glaister equation[4], the time of death was able to be estimated to be approximately 20 hours before the measurements were taken at 18:15 on May 2. Thus, the time of death was approximately 10 PM on May 1."

- The twelfth item is optional but shall appear only if **DRDE** is present in the field. It is **subject – death age estimate text/ DEAT**. It is entered in UNICODE and a typical entry may be "DCIA {dental cementum increment analysis} was performed on the left mandibular second premolar. The tooth was embedded in epoxy, sectioned, and mounted to a glass slide ground and polished and examined under 10, 20 and 40X magnification under polarized light. Subject estimate to be 23.5 to 24.5 years based on DCIA."[5]

8.12.7 Field 12.007: Original dental encoding system information / ODES

This field is used to describe the data collection schema that was used for the original recordation of dental information. It is a mandatory field if **Field 12.010 Tooth data detail / TDD** appears in this record. Otherwise this field shall not be present in the record. **ODES** need not be a forensic data system or a system capable of formulating an ANSI/NIST-ITL conformant record or transaction. The purpose of this field is to specify the rules and definitions that were used to specify the original data collection.

---

[4] See Silver W.E., Souviron R.R, Dental Autopsy, CRC Press, 2009 p.9:" *Algor mortis* occurs as body temperature changes after death occurs. There is usually decline in temperature until the body reaches the ambient temperature. According to the seasons and the geographical area, the ambient temperature may vary widely and should be a consideration. Using the Glaister equation: 36.9ºC (98.6ºF) minus the rectal temperature divided by 1.5 will give the approximate hours elapsed since death. Then, as decomposition occurs, the temperature of the body tends to increase. The rate of decomposition will depend upon local conditions, for example, sun, water, or ice." This book also describes *Livor mortis* and *Rigor mortis* in estimating time of death.

[5] From: Wedel V, Found G, Nusse G *A 37-Year-Old Case Identification Using Novel and Collaborative Methods*, Journal of Forensic Identification, Vol. 63. No. 1 p. 10

- The first information item is mandatory. It is the **original system name code / OSNC.** The code is selected from the following list:

EDR	Electronic Dental Record System
FastID	Interface for completing the INTERPOL Disaster Victim Identification forms[6]
NamUs	The National Missing and Unidentified Persons System[7]
NCIC	The National Dental Image Repository of the National Crime Information Center (NCIC) run by the Federal Bureau of Investigation (FBI).[8]
PLASS	The DVI System International marketed by Plass Data Software A/S[9]
UDIM	The Unified Dental Identification Module (UDIM) of the Unified Victim Identification System (UVIS)[10]
WinID	Dental Identification System[11]
Other	The coding system is not listed but is formally documented
None	The *ANSI/ADA Standard No. 1058 – Forensic Dental Codes* are selected and entered directly.

- The second information item is the **original system version text / OSVT**. This item is optional unless 'Other' or 'EDR' is specified for **OSNC**. It specifies version of the data system that was used in the original coding (such as '2012 version' for UVIS/UDIM). When **OSCN** is set to 'Other' or 'EDR', this information item is mandatory and specifies the official brand name of the software utilized, and optionally the version number if known. If information of the location of documentation for the software is available such as a URL / URI it can also be included with a text beginning with the word "URL: ".

- The third information item is the **original tooth permanence category code / OTPC.** It is mandatory. It is used to designate the way that permanent and deciduous teeth are coded according the system used to enter the data. Possible values are:

0 = Specified by tooth number (e.g. FastID, PLASS). For systems such as WinID and UDIM, which internally list the tooth number with a permanent tooth number but use a deciduous indicator, those two pieces of information shall be combined together to assign the tooth number according to *ANSI/ADA Standard No. 3950* prior to inclusion in this record.

1 = Unable to determine if the teeth are permanent or deciduous at the tooth level but the system does allow a marker to indicate that deciduous teeth are present in the dentition (e.g. NCIC). The permanent tooth number shall be used.

2 = Coding system incapable of distinguishing deciduous from permanent teeth

---

6 Information is available at http://dvi-training.info/HTML/index.html

7 Information is available at http://namus.gov/

8 Information is available at http://www.fbi.gov/about-us/cjis/ncic/ncic

9 Information is available at http://www.plass.dk/dok/dvi/DVIBrochure.pdf

10 Information is available at http://www.nyc.gov/html/ocme/downloads/pdf/Special%20Operations/UVIS%20Information%20Guide_20090917.pdf

11 Information is available at http://winid.com/index.htm

(e.g. NamUs). The permanent tooth number shall be used.

3 = Unknown whether the coding is capable of indicating deciduous and permanent teeth and / or whether the coding was performed using that capability. The permanent tooth number shall be used.

- The fourth information item is the **original restoration data granularity code / ORDG**. It is mandatory. This index indicates the type and level of restoration and surface information coded in **Field 12.010 Tooth data detail / TDD**. The following values may be entered.

  11 = The system is capable of sp**ecifying individual restorations with the restore**d surface information and material composition coded separately for each restoration on the tooth; however, the submission of restorations with materials specified for each restoration is optional.

  21 = The system is capable of specifying individual restorations with the restored surface coded separately; however, all of the individual material compositions are combined into a single code for the tooth. Material specification is optional. Unknown material composition may be implicit or explicitly coded.

  31 = The system is capable of coding individual restorations with restored surfaces into a single code. All the materials utilized in all the restorations are combined into a single code when materials are represented. The codes are specified by tooth.

  41 = The presence of restorations without surface information is combined to a single code for the tooth. All materials utilized in all the restorations are combined to a single code for the tooth, when materials are represented.

  51 = Only the presence of restorations without surface or material information is included in the coding.

  99 = The level of detail contained in **Field 12.010** concerning restorations, materials and/or surfaces is unknown.

Values 1-10, 12-20, 32-40, 42-50 and 52 through 98 are reserved for future use[12].

8.12.08 Field 12.008: Transmittal dental encoding system information / TDES

This field is mandatory only if the record creation data reference / encoding system is different from the original system and **Field 12.010 Tooth data detail / TDD** appears in this record. This field is used to describe the encoding system that is associated with this record.[13]

[12] In 2013, the granularity codes for some major systems are: 11=Plass, FastID, any EHR that utilized the ADA Code on Dental Procedures and Nomenclature (CDT) Coding system; 21=None; 31=WinID, UDIM; 41=NCIC; 51=NamUs

[13] An example would be if data were sent form a source that used PLASS encoding to an agency that prepared the data for

If there is a chain of systems involved in creating the record, it is highly recommended that **Field 12.902: Annotation Information / ANN** be used to log the steps involved from origin to present state. Note that if the record creation organization wishes to transmit the information that was received from an intermediate organization (before modification), **Field 98.900: Audit log / ALF** allows for this possibility.[14]

- The first information item is mandatory. It is the **transmittal system name code / TSNC.** This system shall be capable of formatting an *ANSI/NIST-ITL 1-2011* conformant record and/or transmission. The code is selected from the following list:

EDR	Electronic Dental Record System
FastID	Interface for completing the INTERPOL Disaster Victim Identification forms[15]
NamUs	The National Missing and Unidentified Persons System[16]
NCIC	The National Dental Image Repository of the National Crime Information Center (NCIC) run by the Federal Bureau of Investigation (FBI).[17]
PLASS	The DVI System International marketed by Plass Data Software A/S[18]
UDIM	The Unified Dental Identification Module (UDIM) of the Unified Victim Identification System (UVIS)[19]
WinID	Dental Identification System[20]
Other	The coding system is not listed but is formally documented
None	The *ANSI/ADA Standard No. 1058 – Forensic Dental Codes* are selected and entered directly.

  - The second information item is the **transmittal system version text / TSVT**. This item is optional unless 'Other' is specified for **TSNC**. It specifies the version of the system that was used in the transmitted coding (such as '2012 version' for UVIS/UDIM When **TSNC** is set to 'Other' or 'EDR', this information item is mandatory and specifies the official brand name of the software utilized, and optionally the version number if known. If information of the location of documentation for the software is available such as a URL / URI it can also be included with a text beginning with the word "URL:".

- The third information item is the **transmittal tooth permanence category code / TTPC.** It is mandatory. It is used to designate the way that permanent and deciduous teeth are coded

---

entry into WinID, transmitting an updated record to WinID. The original encoding can in this way be examined should there be a question about the meaning of the WinID code that was actually transmitted for a particular tooth.

[14] In **Field 98.900 EVT** would be coded Modified; **EVR** is "New record creation reference system"; **IID** is "IDC,12.009,NA,TCN" where IDC is the **IDC** specified in **Field 12.002** of this record; **AGT** is the new record creation organization; **OLD** is the value for **TCN** that was of the intermediate record creation coding system**.** Another subfield in **Field 98.900** may be created for each of the other information items in **Field 12.009** that is changed.

[15] Information is available at http://dvi-training.info/HTML/index.html

[16] Information is available at http://namus.gov/

[17] Information is available at http://www.fbi.gov/about-us/cjis/ncic/ncic

[18] Information is available at http://www.plass.dk/dok/dvi/DVIBrochure.pdf

[19] Information is available at http://www.nyc.gov/html/ocme/downloads/pdf/Special%20Operations/UVIS%20Information%20Guide_20090917.pdf

[20] Information is available at http://winid.com/index.htm

according the system used to enter the data. Possible values are:

0 = Specified by tooth number (e.g. FastID, PLASS). For systems such as WinID and UDIM, which internally list the tooth number with a permanent tooth number but use a deciduous indicator, those two pieces of information shall be combined together to assign the tooth number according to *ANSI/ADA Standard No. 3950* prior to inclusion in this record.

1 = Unable to determine if the teeth are permanent or deciduous at the tooth level but the system does allow a marker to indicate that deciduous teeth are present in the dentition (e.g. NCIC). The permanent tooth number shall be used.

2 = Coding system incapable of distinguishing deciduous from permanent teeth (e.g. NamUs). The permanent tooth number shall be used.

3 = Unknown whether the coding is capable of indicating deciduous and permanent teeth and / or whether the coding was performed using that capability. The permanent tooth number shall be used.

- The fourth information item is the **transmittal restoration data granularity code / TRDG**. It is mandatory. This index indicates the type and level of restoration and surface information coded in **Field 12.010 Tooth data detail / TDD**. The following values may be entered.

11 = The system is capable of **specifying individual restorations with the restored s**urface information and material composition coded separately for each restoration on the tooth; however, the submission of restorations with materials specified for each restoration is optional.

21 = The system is capable of specifying individual restorations with the restored surface coded separately; however, all of the individual material compositions are combined into a single code for the tooth. Material specification is optional. Unknown material composition may be implicit or explicitly coded.

31 = The system is capable of coding individual restorations with restored surfaces into a single code. All the materials utilized in all the restorations are combined into a single code when materials are represented. The codes are specified by tooth.

41 = The presence of restorations without surface information is combined to a single code for the tooth. All materials utilized in all the restorations are combined to a single code for the tooth, when materials are represented.

51 = Only the presence of restorations without surface or material information is included in the coding.

99 = The level of detail contained in **Field 12.010** concerning restorations, materials and/or surfaces is unknown.

Values 1-10, 12-20, 32-40, 42-50 and 52 through 98 are reserved for future use[21].

8.12.09 Field 12.009 Dental history data detail / HDD

This optional field should be included when prior data is available. This field includes a subfield with a repeating set of information items. Each subfield has one mandatory information item. There may be multiple subfields.

- The first information item is the **dental history ADA reference code text / HARC**. It is mandatory. Any code value corresponding to the data set descriptors in Section **8** of the *ANSI/ADA Standard No. 1058* may be entered. An example is **8.1.3.9.1.5** *for the National Provider Identifier Number of Dentist that treated the patient*.

- The second information item is the **dental history additional descriptive text / HADT**. It is a Unicode free text information item. It is used for those codes that require text, such as **8.1.1 Name of Practice** – *the full name of the practice where the patient was treated*. Other reference codes, such as **8.1.3.8.4 Chart Available** – *used when chart information is available from the practice where the patient was treated*, would not have any information recorded in **HADT.**

  Note that if **HARC** is set to 8.1.3.10 (the ADA code for CHART), the chart is contained in **Field 12.999.** If the chart is already in electronic format, it should be converted into Base 64 prior to sending (This is to avoid the use of any 'reserved' characters in XML). If it is physical, the most common approach is to scan the chart and transmit the PDF or JPEG of the scan, also converted to Base 64 before being contained in **HADT**.

8.12.10 Field 12.010 Tooth data detail / TDD

This optional field has subfields, each with a set of information items. There may be multiple subfields with the same tooth number. For transmittal coding systems that combine tooth conditions into a single subfield at the tooth level, one subfield is used per tooth. If information separately for conditions on a particular tooth, each condition shall be a separate subfield with the same tooth number, designated in **TID**.

This field shall only appear if **Field 12.007: Original dental encoding system information / ODES** is present in the record. If the transmittal system uses different coding than that defined in **ODES,** then **Field 12.008: Transmittal source dental encoding system information / TDES** shall be present in the record.

All destination systems should be capable of receiving data relating to a single tooth in multiple subfields, even if tooth conditions in the destination system are expressed jointly at the tooth level. If a destination system is capable of expressing tooth conditions separately does receive information from a system that is not capable of expressing tooth conditions separately, that destination system should take care concerning the assignment of *ANSI/ADA Standard No. 1058* codes to individual conditions on the

[21] In 2013, the granularity codes for some major systems are: 11=Plass, FastID, any EHR that utilized the ADA Code on Dental Procedures and Nomenclature (CDT) Coding system; 21=None; 31=WinID, UDIM; 41=NCIC; 51=NamUS

tooth.

- For cases when there is no information about a tooth (e.g. even whether it was missing or present on the subject), there shall be no field entry. However, if it is known that a tooth was missing, the appropriate ANSI/ADA Standard No. 1058 – Forensic Dental Codes should be represented, such as **9.3.2.2 – Missing not replaced** – *used regardless of the etiology of the lost (extracted, congenital, unknown) with the exception of the case where the tooth lost was believed to be an avulsion*, or **9.4.4.5.3 – Avulsion of Tooth** – *describing that a tooth has been forcefully exfoliated from its socket and the socket has exhibited virtually no healing, used only if there is substantial evidence that the loss was traumatic and not therapeutic or through natural causes*.

- The first information item is the **tooth capture date / TCD.** It corresponds to Section 9.2 of *ANSI/ADA Standard No. 3950.* It is mandatory. See **Section 7.7.2.3** for the format.

- The second information item is optional. It is **tooth capture date estimate range / TCDR.** This is the amount of time (plus and minus) of which **TCD** is the center point during which the tooth data could have been originally collected. It is entered in the format as $\mathbf{Y}^{yyyy}\mathbf{M}^{mm}\mathbf{D}^{dd}$**.** It is possible to enter only a year, month and/or day range, such D05, meaning that the actual date of collection is estimated to be 5 days plus or minus from that specified in **TCD.**

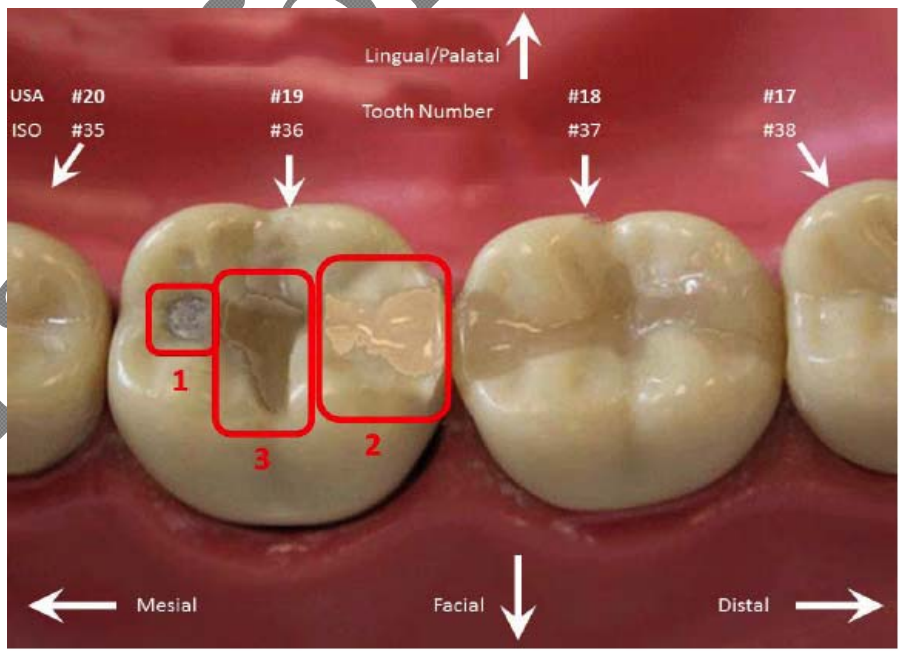
- The third information item is the **tooth ID / TID.** It is mandatory. Teeth shall be numbered utilizing the permanent and deciduous teeth codes in *ANSI/ADA Specification No. 3950*[22], shown in **Figure Dental Supplement 1**. Note that if **OTPC** indicates that there is no distinction between deciduous teeth and permanent teeth in the original coding, the tooth shall be listed as permanent, even if the transmittal coding is capable of distinguishing between the two types of teeth. The analyst should be aware of this when reviewing the data.

[22] This numbering system is the same as in ISO 3950:2009 *Dentistry -- Designation system for teeth and areas of the oral cavity*.

Figure Dental Supplement 1
Digital designation of the teeth and of the oral cavity
as specified in *ANSI/ADA Standard No. 3950*

Right																Left	
							00										Oral cavity
							01										Maxillary area
							10						20				Quadrant
			03				04					05					Sextant
18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28		Permanent teeth
			55	54	53	52	51	61	62	63	64	65					Deciduous teeth
			85	84	83	82	81	71	72	73	74	75					Deciduous teeth
48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38		Permanent teeth
			08				07					06					Sextant
							40						30				Quadrant
							02										Mandibular area

Figure Dental Supplement 2
Simulated Restorations in Tooth 36 from a Demonstration Sample



- The fourth information item is the **tooth original system tooth encoding text / TOET.** It is a Unicode field. It shall be entered unless **OSNC** has a value of 'None' (representing that the coding was performed by using the codes of *ANSI/ADA Standard No. 1058 – Forensic Dental Data Set* without specific reference to a dental forensic processing system's data restrictions).

  If data is coming from a dental practice management software system (**OSNC** is set to 'EDR'), this information item shall contain all of the conditions treated and they shall be listed in order, from the most recent to the first treated. The order is critical for the forensic analysis.

A tooth with three restorations (as in **Figure Dental Supplement 2**) may be described differently by various storage and comparison systems. See the XML exemplar for the actual coding.

Plass : amf O cef DO tif O
Plass distinguishes each restoration and describes their material content individually.
The Plass coding is described as:
restoration 1 is an amalgam restoration (amf) in occlusal location (O)
restoration 2 is a composite restoration (cef) in distal – occlusal location (DO)
restoration 3 is a tooth colored restoration (tif) in occlusal location (O)
Note: This would be coded using three subfields.

UDIM: DO mAC
UDIM does not distinguish the number of restorations or describe them individually. The coding indicates the presence of restorations at the distal and occlusal locations (DO) and that the materials (m) are amalgam (A) and composite (C). UDIM has four code types: tooth surface status (required), restoration code – r (optional), condition code – c (optional), material code – m (optional).

WinID: DO ES
WinID does not distinguish the number of restorations or describe them individually. The coding indicates the presence of restorations at the distal and occlusal locations (DO). The fillings are listed as resin (E) and silver (S).

NCIC: OD
NCIC does not distinguish the number of restorations or describe them individually. The required surface sequence for restoration data is MODFL. This coding example indicates the presence of restorations in the distal and occlusal locations (OD).

NamUs: F
NamUs does not distinguish the number of restorations or describe them individually. In addition, NCIC does not directly code the restoration composition, nor does NamUs describe which surfaces are restored. The coding only indicates the presence of a restoration.

- The fifth information item is the **tooth data ADA reference code text / TARC.** This information item is mandatory. Any code value in Section **9** of the *ANSI/ADA Standard No. 1058* may be entered. The *ANSI/ADA Standard No. 1058* coding system has a hierarchical arrangement so that codes with more nodes (represented by periods) provide greater specificity of the information concerning a characteristic. Note that if only general information is available, a code with fewer nodes may be entered, such as **9.3.2.5**, which corresponds to *present – restored*. If available information is more detailed, a code with more nodes should be entered, such as **9.3.2.5.1.3**, which indicates *present – restored; surfaces restored; distal*. The listing of a

reference code indicates the presence of the characteristic.

TARC is a Unicode information item. Several values can be entered for the same tooth[23]. The coding is order independent, so a code of 9.3.2.5.1.3 (Distal) followed by 9.3.2.5.1.2 (Occlusal) is treated identically to an entry of 9.3.2.5.1.2 (Occlusal) followed by a code of 9.3.2.5.1.3 (Distal). If the original system coding is very detailed but the transmitting system coding is at a summary (represented by codes with fewer nodes) level the mapping is straightforward. However, if the converse is true, care must be taken not to introduce 'false' information in the mapping of codes. Using the example for Figure Dental Supplement 1:

Plass : Three subfields describe the tooth.

In the first subfield, for the first condition (restoration 1) (amf O)
TARC = 9.3.2.5.1.2, 9.3.2.5.4.1
(present-restored, occlusal location)
(present-restored, amalgam material)

In the second subfield, for the second condition (restoration 2) (cef DO)
TARC = 9.3.2.5.1.3, 9.3.2.5.1.2, 9.3.2.5.4.2
(present-restored, distal location)
(present-restored, occlusive location)
(present-restored, composite/acrylic material)

In the third subfield, for the third condition (restoration 3) (tif O)
TARC = 9.3.2.5.1.2, 9.3.2.5.4.9
(present-restored, occlusal location)
(present-restored, other – by report) Note: 'By report' indicates that ***TDT*** *should explain that 9.3.2.5.4.9 here represents tooth colored filling. 9.3.2.5.4.9 is used since the composition of the restorative material is not specified in the code.*

UDIM: **TOET** = O mAC
One subfield that describes the entire tooth:
TARC = 9.3.2.5.1.2, 9.3.2.5.4.1, 9.3.2.5.4.2
(present-restored, occlusal location)
(present-restored, amalgam material)
(present-restored, composite/acrylic material)

WinID: **TOET** = O ES
One subfield that describes the entire tooth:
TARC = 9.3.2.5.1.2, 9.3.2.5.4.1, 9.3.2.5.4.2
(present-restored, occlusal location)
(present-restored, amalgam material)
(present-restored, composite/acrylic material)

[23] In XML, each item is listed separately. See the exemplar.

NCIC: **TOET** = OD

One subfield describes the entire tooth:
TARC = 9.3.2.5.1.2
(present-restored, occlusal location)

NamUs: **TOET** = F

One subfield that describes the entire tooth:
TARC = 9.3.2.5
(present-restored)

An example of how a person might code the tooth without reference to a particular system using the ANSI/ADA Standard No. 1058 – Forensic Dental Codes could be:

Two subfields with one describing the tooth.

In the first subfield, the restoration is described, but without a location.
TARC = **9.3.2.5.4.1**
(present-restored, amalgam material)

In the second subfield, the other restorations are jointly described, again without location associated to the restorations on the tooth.
TARC = 9.3.2.5.4.9
(present-restored, other – by report) The analyst may have indicated in **TDT** that there are other restorations that appear to be NON-metallic on the same tooth.

- The sixth information item is the **tooth transmitted system encoding text/ TTET.** This is important since the record creation systems may be different from the original system where the coding of the test first occurred. It is a Unicode information item. For the examples above, the first subfield for Plass would be *amf O*; the second subfield would be *cef DO*, The entry for UDIM would be *O mAC*. Note that for **OSN** = 'None' in **Field 12.007: Original dental encoding system information / ODES** and when **Field 12.008: Transmittal dental encoding system information / TDES** is not present in the record, there shall not be an entry in this information item**.** For all other coding, this information item is mandatory.

- The seventh information item is the **tooth ID certainty code / TICC**. This information item is optional. If it is not entered, a **TICC** of 0 is assumed. Possible values are:

  0 Unspecified (the system does not have the capability of stating that there is uncertainty in the tooth number)
  1 Certain
  2 Uncertain

- The eighth information item is the **tooth additional descriptive text / TADT**. It is a Unicode free text information. It is used for those codes that require text, such as **9.3.2.5.3.1.1.5** – *restoration material / Other (by report) – used to describe a restoration material not described*

by other descriptors. Other reference codes, such as **9.3.2.1.2.1.3 Type of Pontic / Resin** – *used for a pontic that is adhesive attached to adjacent teeth by an extra coronal partial coverage restoration of any material*, would not have any information recorded in **TADT.**

8.12.11 Field 12.011 Mouth data detail / MDD

This optional field allows the entry of information concerning the mouth. For instance, periodontal disease may be noted, as may partial removable dentures. This field is comprised of two information items in a subfield.

- The first information item is the **mouth capture date/ MCD.** It is mandatory. See **Section 7.7.2.3** for the format.
    - The second information item is optional. It is **mouth capture date estimate range/ MCDR.** It is entered in the format as $\mathbf{Y}^{yyyy}\mathbf{M}^{mm}\mathbf{D}^{dd}$**.** It is possible to enter only a year, month and/or day range, such D05, meaning that the actual date of collection is estimated to be 5 days plus or minus from that specified in **MCD.**

- The third information item is the **mouth data ADA reference code text / MARC.** It is mandatory. Any code value in Section 10 of the *ANSI/ADA Standard No. 1058* may be entered. Note that if only general information is available, a high level number may be entered, such as **10.3.2.4**, which corresponds to *Maxillofacial Prosthesis*. If more detailed information is available, a lower level code should be entered, such as **10.3.2.4.1.1**, which indicates *Maxilla (The prosthesis is used to replace portions of the maxilla)*. The listing of a code indicates that the characteristic is present. If only general information is available, a code with fewer nodes may be entered, such as **10.3.2.2**, which corresponds to *Partial Removable Denture*. If available information is more detailed, a code with more nodes should be entered, such as **10.3.2.2.1**, which indicates *Kennedy Class I – This Descriptor is used to describe a removable prosthesis replacing teeth on both sides of the arch where no other teeth exist posterior to the edentulous area.*

- The fourth information item is the **mouth additional descriptive text / MADT**. It is a Unicode free text information item. It is used for those codes that require text, such as **10.3.5.1 Prosthetic / ID Data** – *used to describe any identifying Serial number on the appliance*. Other reference codes, such as **10.5.1.1.8.1 Cleft lip** – *used to indicate the non-union of the soft tissue of the lip*, would not have any information recorded in **MADT.**

8.12.12 Field 12.012 Dental study and tooth imprints / DSTI

This field is optional and is used to transmit information about models fabricated from a dental arch impression or tooth imprints.

- The first information item is the **dental study and tooth imprints ADA reference code text / SARC.** It is mandatory. Any code in Section 7.5.1.1, 7.5.1.2 or 7.5.1.2 of the *ANSI/ADA Standard No. 1058* may be entered.

- The second information item is mandatory. It is the **dental study and tooth imprints additional descriptive text / SADT**. It is a Unicode free text information item. It is used to describe the physical location of the tooth imprint or dental study. This information items should also be used to describe any special characteristics of note concerning the dental study or tooth imprint**.** In the case of tooth imprints, the tooth or teeth numbers should be stated, using the tooth numbering specified in **Figure Dental Supplement 1.** For the **SARC** codes that are dates, the format shall be YYYYMMDD as entered in **SADT**.

8.12.13 Field 12.020: Comment / COM

This is an optional field. See **Section 7.4.4** for details.

8.12.14 Fields 12.200 through 12.900: User-defined fields / UDF

These fields are user-defined fields. Their size and content shall be defined by the user and be in accordance with the receiving agency.

8.12.16 Field 12.993: Source agency name / SAN

This is an optional field. It may contain up to 125 Unicode characters. It is the name of the agency referenced in **Field 12.004: Source Agency identification ID/ SRC**.

8.12.17 Field 12.995: Associated context / ASC

This optional field refers to one or more Record(s) Type-21. An example of the use of this field would be to transmit an image of a jaw containing teeth at the location where it was discovered, such as near a shallow grave dug up by an animal. When present, this field is comprised of subfields. There is one mandatory information item and one optional information item per subfield, as described in **Section 7.3.3.**

8.12.18 Field 12.996: Hash / HAS

This optional field shall contain the hash value of the data in **Field 12.999 / Dental chart data** of this record, calculated using SHA-256. See **Section 7.5.2.**

8.12.19 Field 12.998: Geographic sample acquisition location / GEO

This optional field contains the location where the image(s) / sample(s) was acquired – not where it is stored. See **Section 7.7.3**. This information applies to the entire Record Type-12. If different locations are applicable for the images / samples / data then separate instances of Record Type-12 should be created and transmitted jointly in the same transaction.

8.12.20 Field 12.999: Dental chart data / DATA

This field contains the dental chart if a value for **HARC** has been set to 8.1.3.10.

Part 2

Part 2 adds new imaging capabilities to the Type-10 record. This record type has new image categories added to its capabilities in order to handle pattern injury images and latent images of possible perioral origin. As a result of some changes, there are secondary changes to some other record types- as described herein.

Part 2 Subpart 1: NEW IMAGE CATEGORIES

Type-10 records have been black and white or color images in previous versions of the standard. The need to transmit different types of images has been recognized by the law enforcement and Disaster Victim Identification (DVI) communities, among others. Some individuals may be able to be identified through the use of X-rays that had been taken for diagnostic purposes. Other types of images used in the medical field may also be of potential service in the process of identifying an unknown deceased. Since **Field 10.012** is mandatory in the standard, this field is modified to accommodate these additional types of imaging. Although these new image types are not really 'color spaces' they are added to the codes that can be used in this field. **The field name is not changed even though its effective use has been extended beyond 'color,'** in order to maintain backward compatibility with earlier versions of the standard.

Section 8.10.12 of the *ANSI/NIST-ITL 1-2011* standard describes **Field 10.012** and refers to **Section 7.7.10** for details. Section **7.7.10** describes the use of **Table 16** (reproduced here for reference). In previous versions of the standard, this listing did not allow for X-rays, sonograms and other imaging techniques that may be useful in forensics, such as Disaster Victim Identification.

Table 16 Color spaces

Code	Description
UNK	Undefined
GRAY	Grayscale (monochrome)
RGB	Undetermined color space for an RGB image
SRGB	sRGB (*IEC 61966-2-1*)
YCC	YCbCr (legacy)
SYCC	YCbCr (JPEG 2000 compressed)

From *ANSI/NIST-ITL 1-2011* Section 7.7.10

This Supplement adds the following Codes and Descriptions to **Table 16**:

Code	Description
XRAY	X-Ray image
SONO	Sonogram image
MRI	Magnetic resonance image
CT	CT scan image
CONE	Cone beam image
IR	Infrared image
UV	Ultraviolet image
OTHR	Other type of image

When OTHR is specified, the user should add a comment in the **Comment / COM** field describing the type of image. A possible comment could be: "Holographic image."

Several record types are affected by this table change (Type-10, Type-16, Type-17 and Type-20).

Section 8.10.12 Field 10.012: Color space / CSP is updated to read:
This is a mandatory field. See **Section 7.7.10.3** for details. All codes are valid for use in a Type-10 record.

Section 8.16.13 Field 16.013: Color space / CSP is updated to read:
This optional field shall be completed in accordance with **Section 7.7.10.3** if entered in a Type-16 record. All codes are valid for use in a Type-16 record.

Section 8.17.13 Field 17.013: Color space / CSP is updated to read:
This field is mandatory if an image is present in **Field 17.999** for an iris record. Otherwise it is absent. See **Section 7.7.10** for details. If **Field 17.025: Effective acquisition spectrum / EAS** is set to "NIR" this field shall be set to "GRAY". Other than "GRAY", only "SYCC," "UNK," "RGB" or "SRGB" are allowed entries in this field.

Section 8.20.13 Field 20.013: Color space / CSP
This field is mandatory if a 2D still image is contained in this instance of the record. Otherwise it shall be omitted. All codes are valid for use in a Type-20 record. See **Section 7.7.10.3** for details.

Table Dental Supplement 3
Type-10 record layout addition

Field Number	Mnemonic	Content Description	Cond code	Character			Value Constraints	Occurrence	
				Type	MIn#	Max#		MIn#	Max#
10.046	**SUB**	**SUBJECT**	O					0	1
	SSC	subject current status code	M↑	A	6	8	VSC= 0, 1, 2, 3 or 4	1	1
	SBSC	subject body status code	D	N	1	1	VBSC= 1 or 2	0	1
	SBCC	subject body class code	D	N	1	1	VBCC = 1,2 or 3	0	1
	SIDT	subject identifier descriptive text	M↑	U	1	*	none	1	1
10.047	**CON**	**CAPTURE ORGANIZATION NAME**	O	U	1	1000	none	0	1
10.048	**PIID**	**PATTERN INJURY IMAGE DESCRIPTION**	D					0	1
	PIC	pattern injury code	M↑	ANS	3	5	Value from Code column on Table Dental Supplement 2	1	1
	PIDT	pattern injury or latent print image pattern injury descriptive text	D	U	1	*	none	0	1
10.049	**CID**	**CHEILOSCOPIC IMAGE DESCRIPTION**	D					0	1
	LPW	lip print width	O	AN	1	100	none	0	1
	LPH	lip print height	O	AN	1	100	none	0	1
	LPDT	lip print descriptive text	O	U	1	1000	none	0	1
10.050	**VID**	**DENTAL VISUAL IMAGE DATA**	O					0	1
	VCD	visual image capture date	M↑	**See Section 7.7.2.3 Local Date;** see **Annex C; NIEM-conformant encoding rules**			**See Section 7.7.2.3 Local Date;** see **Annex C; NIEM-conformant encoding rules**	0	1

Field Number	Mnemonic	Content Description	Cond code	Character			Value Constraints	Occurrence	
				Type	Min #	Max #		Min #	Max #
	VCDR	visual image capture date estimate range	O↑	AN	**3**	**15**	Time measure indicator followed by 2 digits. May be concatenated, with larger time units first. Units: Y year, M month, D day, h hour, m minute	0	1
	VARC	visual image ADA reference code	M↑	NS	3	30	Valid code from *ANSI/ADA Standard No. 1058*, Section 11.2 (integers and periods are in the codes)	1	1
	VADT	visual image additional descriptive text	D	U	1	*	None	0	1
10.051	**RID**	**RADIOGRAPH IMAGE DATA**	O					0	1
	RCD	radiograph image capture date	M↑	**See Section 7.7.2.3 Local Date;** see **Annex C; NIEM-conformant encoding rules**			**See Section 7.7.2.3 Local Date;** see **Annex C; NIEM-conformant encoding rules**	0	1
	RCDR	radiograph image capture date estimate range	O↑	AN	**3**	**15**	Time measure indicator followed by 2 digits. May be concatenated, with larger time units first. Units: Y year, M month, D day, h hour, m minute	0	1
	RGS	radiograph size	M↑	NS	3	30	Valid code from *ANSI/ADA Standard No. 1058*, Section 12.5 (integers and periods are in the codes)	1	1
	RIS	radiograph image series	M↑	NS	3	30	Valid code from *ANSI/ADA Standard No. 1058*, Section 12.6 (integers and periods are in the codes)	1	1
	RIIS	radiograph image in series text	M↑	U	1	50	none	1	1
	RPRI	radiograph practicioner information text	O↑	U	1	*	none	0	1

Field Number	Mnemonic	Content Description	Cond code	Character			Value Constraints	Occurrence	
				Type	MIn#	Max#		MIn#	Max#
10.052	**DICM**	**NEMA DICOM DATA**	O					0	1
	Note: Only one of the following <u>two</u> information items must be present in a subfield.								
	DICD	DICOM data	D	B	1	1	Binary Base64 object	0	1
	DSEF	DICOM source external file reference text	D	ANS	1	*	None	0	1
The following are modifications to the entries for fields 10.994 and 10.999									
10.994	**EXR**	**EXTERNAL FILE REFERENCE**	D	U	1	200	none	0	1
10.999	**DATA**	**BODY PART IMAGE**	D	B	1	*	none	0	1

Subpart 2: NEW DATA FIELDS

Three new fields are added to the Type-10 record, as described below.

8.10.40a Field 10.046: Subject / SUB

This field is optional. If the image contained in this record is of a pattern injury or latent image on a person, this field is used to describe the victim. Note that **Field 10.041: SMT size or size of injury or identifying characteristic / SMS** should be used in conjunction with this field. **SUB** is comprised of the following information items:

- The first information item is mandatory if this field is present. It is **subject status code / SSC.** Possible entries are:

  0 = Status of individual unknown
  1 = Data obtained from a living person – victim or person unable to identify themselves
  2 = Data obtained from a living person – as a candidate for comparison to a latent print or a pattern injury
  3 = Data obtained from a decedent – victim, or unknown deceased
  4 = Data obtained from a decedent – as a candidate for comparison to a latent print or a pattern injury

  Note that if data is to be obtained from a non-human source for comparison, it should be conveyed using a **Type-16** record.

- The second information item shall be entered if **SSC** is 3. It is **subject body status code / SBSC.** Its purpose is to indicate whether the information relates to an entire corpse or a separate body part. The numeric value is selected from the descriptors below:

1 = Whole
2 = Fragment

- The third information item shall be entered if **SSC** is 3. It is **subject body class code/ SBCC.** The numeric value is selected from the descriptors below:

  1 = Natural Tissue
  2 = Decomposed
  3 = Skeletal

- The fourth information item is mandatory. It is the **subject identifier descriptive text / SIDT.** It contains a unique identifier for the subject of this record (who may not be the subject of the transaction). This is so that the victim or person unable to identify can is distinguished from instances of this record type that carry information to be compared against pattern injuries or latent prints on the victim or person unable to identify can. It may be a name or a case number or other means of correlating the data to a particular person / file.

8.10.40b Field 10.047: Capture organization name / CON

This field is optional. Note that this can be different from the agency entered in **Field 10.004: Source agency / SRC** and **Field 10.993 Source agency name / SAN**. **SRC** and **SAN** describe the agency that created the record. Since the record may have been forwarded by another agency to the final destination, **Field 1.008: Originating agency identifier / ORI** is used to indicate the transmitting organization. See **Section 7.6** for details about **SRC, SAN**, and **ORI**. For example,

- At a disaster recovery scene, *Local Response Team A* may have collected the data in the field. It would be entered in **CON**.

- The data administration organization (such as *Disaster Recovery – Operation X*) would create the actual *ANSI/NIST-ITL 1-2011* conformant record. Such an organization's code would be entered in **Field 10.004: Source agency / SRC** (for example *NA54-X*) and its name in **Field 10.993 Source agency name / SAN** (for example *New Artichoke Regional Disaster Recovery Bureau)*

- In many implementation domains, there are a limited number of transmission organizations that can send data. Therefore, the agency listed in **SRC** may send the transaction to another location that has access rights to the final destination. This intermediary may add information to the transaction, as well. The final transmitting organization code is listed in **Field 1.008: Originating agency identifier / ORI.** Its name may be entered in **Originating agency name /OAN** in **Field 1.017: Agency names / ANM.**

8.10.40c Field 10.048: Pattern injury image description / PIID

This is an optional field that contains subfields. Each subfield is comprised of the following information items. It shall not appear if the entry in **Field 10.003 Image type / IMT** is SCAR, MARK

or TATTOO. Each subfield is comprised of the following information items:

- The first information item is mandatory. It is the **pattern injury code / PIC** and its value is selected from the CODE column of **Table Dental Supplement 2**.

- The second information item, **pattern injury image descriptive text / PIDT** is Unicode text of up to 1000 characters that shall be used to describe those **PIC** codes marked as requiring text in **Table Dental Supplement 2** for pattern injuries. It may be used to describe latent images.

The guidelines of the American Board of Forensic Odontologists[24] should be followed in the analysis and reporting of pattern injuries that exhibit characteristics that may be consistent with those caused by bite marks.

8.10.40d Field 10.049: Cheiloscopic image data / CID

This field is optional. This field may be used only if **Field 10.003 Image type / IMT** is not SCAR, MARK or TATTOO. Note that **Field 10.003** thus specifies the location on the body where the lip print occurred. If the (suspected) lip print is upon an object, the image shall be transmitted using Record Type-21, since Record Type-10 is reserved for images of bodies[25]. Note that this field may be used for an image of the lips themselves. In that case, **IMT** shall be FACE.

CID is comprised of two information items. For cheiloscopic analysis, it may be useful to include information in **Field 10.029 2D facial feature points / FFP** indicating the position of certain features of the lips, using the points shown in **Figure 14** of the *ANSI/NIST-ITL 1-2011* standard, as defined in *ISO/IEC 14496-2*.

- The first information item, **lip print width / LPW**, is optional. It contains the longest dimensions of the image. A standard ABFO # 2 scale ruler should be used[26].

- The second information item, **lip print height / LPH**, is optional. It contains the shortest dimensions of the image, taken at a 90 degree angle from the width. A standard ABFO # 2 scale ruler should be used.

- The third information item, **lip print description text/ LPDT,** is optional. It is Unicode text that may be used to describe the print. A typical entry may be: “Lip print with lipstick on the neck” or “image of the lips”. The analyst may wish to include classifications of the lips prints using one of the following classification developed by

[24] See Section III of the *American Board of Forensic Odontology Diplomates Reference Manual*. It is available at http://www.abfo.org/id_mark_guidelines.htm

[25] A User-defined field in Type-21 could directly mimic the format of this field for images on objects.

[26] See Kaminski J, *Old Dogs can Learn New Tricks – A New Application of the ABFO # 2 Scale*. Journal of Forensic Science, November 2004, Vol. 49, No. 6, pp 1332-1334 Available online at www.astm.org

Suzuki and Tscuchihashi[27]:

Type I – Vertical grooves
Type I´ – Partial length grooves
Type II – Branched grooves
Type III – Intersecting grooves
Type IV – Reticular grooves
Type V – Irregular grooves

This field describes the image. There may be multiple subfields, each with a separate image.

- The first information item is **visual image capture date / VCD.** It is mandatory. See Section 7.7.2.3 for details.

- The second information item is optional. It is **visual image capture date estimate range/ VUDR.** This is the amount of time (plus and minus) of which **VCD** is the center point during which the tooth data could have been originally collected. It is entered in the format as **Y**^{yyyy}**M**^{mm}**D**^{dd}**.** It is possible to enter only a year, month and/or day range, such D05, meaning that the actual date of collection is estimated to be 5 days plus or minus from that specified in **VUD.**

- The third information item is mandatory. It is the **visual image ADA reference code / VARC.** Any code value in Section **11.2** of the *ANSI/ADA Standard No. 1058* may be entered. Note that only one value may be entered. Each image requires a separate record Type-1 within the transaction. An example is **VARC =** 11.2.2.1, which is "intraoral frontal view."

- The third information item is optional. It is the **visual image additional descriptive text / VADT**. It is a Unicode free text information item. An example is "post-mortem with lips retracted"

8.10.40f Field 10.051: Radiograph image data / RID

This optional field may be used to describe a radiograph. The image should be losslessly compressed or not compressed when using digital images. The DICOM file format and DICOM tags may used when conveying digital radiographs (See **Field 10.052**). There shall be no conversion of digital images to hard copy analog prints for transmission. Digital images shall be transmitted in Base-64 format. There shall be one subfield per image.

[27] Suzuki K, Tsuchihashi Y., *Personal identification by means of lip prints*. Journal of Forensic Medicine 1970, 17-52-7 and *New attempt of personal identification by means of lip prints*, Canadian Society of Forensic Science Journal, 1971; 4:154-58

- The first information item is the **radiograph image capture date / RCD.** See **Section 7.7.2.3** for details. If the date is unknown, enter a date of 00000000. This information item is mandatory. This corresponds to code **12.6.11** of the *ANSI/ADA Standard 1058*.

- The second information item is optional. It is **radiograph image capture date estimate range/ RCDR.** This is the amount of time (plus and minus) of which **RCD** is the center point during which the tooth data could have been originally collected. It is entered in the format as **Y**^{yyyy}**M**^{mm}**D**^{dd}**.** It is possible to enter only a year, month and/or day range, such D05, meaning that the actual date of collection is estimated to be 5 days plus or minus from that specified in **RCD.**

- The third information item is the **radiograph size / RGS.** It is mandatory. Any code value in Section **12.5** of the *ANSI/ADA Standard No. 1058* may be entered. Note that only one value may be entered. Each image requires a separate **Type-10** record within the transaction.

- The fourth information item is mandatory. It is the **radiograph image series / RIS**. It is mandatory and any code value in Section **12.6** of the *ANSI/ADA Standard No. 1058* may be entered.

- The fifth information item is mandatory. It is the **radiograph image in series text / RIIS**. This is used to specify which individual image in a particular series is conveyed in this subfield. For example, if code **12.6.4.2.1** is selected (Two maxillary molar periapicals), this information item would specify 'right' for one **Type-12** record and 'left' for another instance of Type-12. This is a text field of up to 50 characters.

- The sixth information item is optional. It is the **radiograph practitioner information text/ RPRI.** This is a Unicode free text information item. It should contain the practitioner's name, address and telephone or other contact information. This corresponds to code **12.6.13** of the *ANSI/ADA Standard 1058*, but also allows additional explanatory text, such as any unique features associated with the radiograph.

8.10.40g Field 10.052: Electronic imagery / ELIM

This is an optional field. It is a text field describing the electronic imaging system used to transmit data in this record. The data may be external (such as on a thumb drive) with the location and description referenced in **Field 10.994 External field reference / EFR** or contained in digital format in **Field 10.999 Body part image / DATA**.

Section 12.4.6.2 of the *ANSI/ADA Standard No. 1058* states: "Ideally, images are transferred electronically to the requesting agency in DICOM format. If the requesting agency does not have software that can read the DICOM format directly, then a DICOM Viewer with basic image export feature should be provided." For a DICOM system, the entry in this field would simply be" "DICOM _ "

Other systems should state the system name, and a reference URL for information on how to decode

and use the data.

8.10.45a Field 10.994: External file reference / EFR

This conditional field shall be used to enter the URL / URI or other unique reference to a storage location for data referenced in this **Type-10** record. If this field is used, **Field 10.999 Body part image / DATA** shall not be used. However, one of the two fields shall be present in all instances of this record type. A non-URL type of reference could be " CD labeled: Dental imagery from the offices of Doctors Toothaker and Paine for patient Hamish Blobb – recorded on 3 February 2013." The format of the file should be stated in **Field 10.052 Electronic imagery /ELIM.**

Update to **Field 10.041: SMT size or size of injury or identifying characteristic / SMS**

The statement: "This field shall be used only when **Field 10.003: Image type / IMT** does not equal "Face" is removed. This field may now also be used to describe the size of tattoos, scars and injuries on the face as well as other parts of the body.

All images should be taken with the height defined as the longest dimension and the opposite 90 degrees as the width. A standard ABFO # 2 scale ruler should be used. It should be positioned to correspond to the definition of height and width. Care should be taken to avoid distortion of the image by taking the image from an off-angle.

Update to **Field 10.996 Hash / HAS**

This optional field shall contain the hash value of the data in **Field 10.999 Body part image / DATA** of this record or of the data contained digitally in the device referenced by **Field 10.994 External field reference / EFR**. The hash shall be calculated using SHA-256. See **Section 7.5.2**.

Update to **Field 10.999 Body part image / DATA**

This field contains digital data for this **Type-10** record. If this field is used, **Field 10.994: External file reference / EFR** shall not be used. However, one of the two fields shall be present in all instances of this record type. See **Section 7.2** for details on this field entry. In Traditional format, this field shall be the last field in the record layout.

Table Dental Supplement 2
Pattern Injury Codes[28]

Code	Description	Requires Text
	Type of injury (Multiple codes beginning with 1. May be entered)	
1.1	Abrasion	No
1.2	Artifact	Yes
1.3	Avulsion	No
1.4	Contusion (ecchymosis)	No
1.5	Perforation (Incision)	No
1.6	Laceration	No
1,7	Petechial hemorrhage	No
1.8	Other	Yes
	Color of the pattern injury[29] (Multiple color codes may be entered – all begin with 2)	
2.1	Red	No
2.2	Violet	No
2.3	Red	No
2.4	Violet / Magenta	
2.5	Blue	No
2.6	Purple/ Black	No
2.7	Blue	No
2.8	Green	No
2.9	Dark Yellow	No
2.10	Pale Yellow	No
2.11	Brown	No
2.12	Other color	No
	Surface contour (only one code beginning with 3. May be entered)	

[28] For more information about pattern injuries, see *Bitemark Evidence, A Color Atlas and Text*, edited by Robert B.J. Dorion, CRC Press, 2012.

[29] For a discussion of coloration and aging of bitemarks, see Dailey JC and Bowers CM. *Aging of bitemarks: A literature review*. Journal of Forensic Science 1997:42(5):792-795

Code	Description	Requires Text
3.1	Flat	No
3.2	Curved	No
3.3	Irregular (such as on loose skin)	Yes
3.4	Unknown	No
	Shape of pattern injury (only one code beginning with 4. May be entered)	
4.1	Round	No
4.2	Ovoid	No
4.3	Crescent	No
4.4	Diamond	No
4.5	Rectangular	No
4.6	Irregular/Multiple (such as only an upper or lower jaw mark)	Yes
	Surface Tissue characteristics (only one code beginning with 5. May be entered)	
5.1	Fixed	No
5.2	Mobile	No
5.3	Unknown	No
	Underlying structure (multiple codes beginning with 6. Are allowed)	
6.1	Bone	No
6.2	Cartilage (including ears and nose)	No
6.3	Muscle (including buttocks)	No
6.4	Fat (including breasts)	No
6.5	Other (including penis, testicles, Achilles tendon)	Yes
	Cause of pattern injury	
	Animal (NON-human)	
7.1	Suggestive of animal origin	Yes
	Unknown/ other origin take out sub categories	Yes
7.2C	Caused by NON-animal (e.g. ringworm)	Yes
7.2S	Suggestive of NON-animal organic agent causation	Yes
7.3C	Caused by NON-formally living organism	Yes
7.3S	Suggestive of NON-formally living organism causation	Yes
7.4C	Caused by other object (e.g. meat tenderizing hammer, zipper,	Yes

Code	Description	Requires Text
	chain, etc.)	
7.4S	Suggestive of being caused by other object (e.g. meat tenderizing hammer)	Yes
7.5C	Caused by impact	Yes
7.5S	Suggestive of being caused by impact	Yes
	Human origin → adult / mixed / child	
7.6C	Caused by self-inflicted biting	Yes
7.6S	Suggestive of self-inflicted biting	Yes
7.7C	Caused by a bite mark from another human being	Yes
7.7S	Suggestive of a bite mark from another human	Yes
7.8C	Caused by an unknown human making a bite	Yes
7.8S	Suggestive of a human bite mark – unknown agent	Yes
	Other	
7.9	Suggestive of a bite mark pattern but no determination made	Yes
7.10	Suggestive of not being caused by a bite but no determination made	Yes
7.11	Not caused by a bite	Yes
7.12	Inconclusive	Yes
7.13	No determination or speculation as to causing agent / unknown	No

Part 3

Part 3 updates additional Sections of the *ANSI/NIST-ITL 1-2011* standard that are affected by the addition of the **Type-12** record and the update of the Type-10 record.

Part 3, Subpart 1 Additions to Section 3 of *ANSI/NIST-ITL 1-2011*

This Subpart adds normative references to the ANSI/NIST-ITL standard as required by this Supplement.

Add to **Section 3** of the ANSI/NIST-ITL 1-2011 standard:

American Board of Forensic Odontology, *Diplomates Reference Manual*. It is available at http://www.abfo.org/id_mark_guidelines.htm

ANSI/ADA Standard No. 1058, *Forensic Dental Data Set.* It is available at http:webstore.ansi.org

ANSI/ADA Specification No. 1067 *Standard Functional Requirements for an Electronic Dental Record System.* It is available at http:webstore.ansi.org

ANSI/ADA Specification No. 3950, *Designation System for Teeth and Areas of the Oral Cavity.* It is available at http:webstore.ansi.org
This contains the same information as:
ISO 3950:2009 *Dentistry – Designation system for teeth and areas of the oral cavity.* It is available at http://www.iso.org/

ISO 12052:2006 *Health informatics – Digital imaging and communication in medicine (DICOM) including workflow and data management.* It is available at http://www.iso.org/
This is also known as:
National Electrical Manufacturers Association (NEMA) PS3 *Digital Imaging and Communications in Medicine (DICOM)*. It is available at http://medical.nema.org/standard.html

Part 3, Subpart 2 Additions to Section 4 of *ANSI/NIST-ITL 1-2011*

This Subpart adds terms and definitions to the ANSI/NIST-ITL standard as required by this Supplement.

Add to **Section 4** of the ANSI/NIST-ITL 1-2011 standard**:**

ADA

The American Dental Association

DICOM

The standard “Digital Imaging and Communications in Medicine”

NEMA

The National Electrical Manufacturers Association

Part 3, Subpart 3 Additions to Section 5.3 of *ANSI/NIST-ITL 1-2011*

In **Section 5.3** of the ANSI/NIST-ITL 1-2011 standard, there is a table listing the record types. This Subpart updates that table and the descriptive section for the **Type-12** record that follows that table.

Table 3: Record Identifier 12 is update to read: **Dental and Oral Forensics**

Section 5.3.13 is updated to read:

The Type-12 record shall contain and be used to exchange information that may be used to identify persons or verify the identity of an individual using dental or oral characteristics. It is designed to closely correspond to the *ANSI/ADA Standard No. 1058* – using the condition codes from that standard.

Part 3, Subpart 4 Additions to Annex B of *ANSI/NIST-ITL 1-2011*

Annex B of the ANSI/NIST-ITL 1-2011 standard concerns Traditional encoding of the content of the standard. These are editorial updates.

Table 97 is updated as follows:

Record Identifier	Logical record contents	Type of Data
12	Dental and oral forensics	ASCII/Binary

Annex B Section B.2.8 is updated:

There are no special requirements for this record type.

Part 3, Subpart 5 Additions to Annex C of *ANSI/NIST-ITL 1-2011*

Annex C of the *ANSI/NIST-ITL 1-2011* standard concerns NIEM-conformant encoding rules.
Table 100 Record element tags for the record types is updated with the following:

Record Category Code	Record Element Tag	Logical record contents
12	<itl:PackageDentalRecord>	Dental and Oral forensics

Section C.10.10 Dental record is updated to read:

The XML name for the **Type-12** record (**Section 8.12**) is <itl:PackageDentalRecord> and its <biom:RecordCategoryCode> shall have a value of “12”.

Part 3, Subpart 6 Additions to Annex G of *ANSI/NIST-ITL 1-2011*

Annex G of the *ANSI/NIST-ITL 1-2011* standard maps the elements defined in the standard to the NIEM IEPD. This update includes the update to the table for **Type-10** and the insertion of a new table for **Type-12**.

Table Dental Supplement 4
Modifications to Annex G Type-10

Insertion before 10.999 and modification to 10.999

Field ID	Mnemonic	XML element name	Cardinality
10.994	EFR	biom:SourceExternalFileReferenceText	0..1
10.999	DATA	nc:BinaryBase64Object	0..1

Addition to end of existing Type-10

Field ID	Mnemonic	XML element name	Cardinality
10.046	SUB	biom:SubjectData	0..1
“	SSC	biom:SubjectStatusCode	1..1
“	SSBC	biom:SubjectBodyStatusCode	0..1
“	SBCC	biom:SubjectBodyClassCode	0..1
“	SIDC	biom:SubjectIdentifierDescriptiveText	1..1
-	-	biom:CaptureOrganization	0..1
10.047	CON	nc:OrganizationName	1..1
10.048	PIID	biom:PatternInjuryImageDescriptionDetail	0..1
“	PIC	biom:PatternInjuryCode	1..1
“	PIDT	biom:PatternInjuryDescriptiveText	0..1
10.049	CID	biom:CheiloscopicImageData	0..1
“	LPW	biom:LipPrintWidthValue	0..1
“	LPH	biom:LipPrintHeightValue	0..1
“	LPDT	biom:LipPrintDescriptiveText	0..1
10.050	VID	biom:VisualImageData	0..1
“	-	biom:VisualImageCollectionDate	1..1
“	VCD	nc:Date	1..1
“	VCDR	biom:DateRangeText	0..1
“	VARC	biom:ADAReferenceCodeText	1..1

“	VADT	biom:AdditionalDescriptiveText	0..1
10.051	RID	biom:RadiographImageData	0..1
“	-	biom:RadiographImageCollectionDate	1..1
“	RCD	nc:Date	1..1
“	RCDR	biom:DateRangeText	0..1
“	RGS	biom:ADAReferenceCodeText	1..1
“	RIS	biom:ADAReferenceCodeText	1..1
“	RIIS	biom:RadiographImageInSeriesText	1..1
“	RPRI	biom:RadiographPractitionerInformationText	0..1
10.052	DICM	biom:DicomData	0..1
“	DICD	nc:BinaryBase64Object	0..1
“	DSEF	biom:SourceExternalFileReferenceText	0..1

Table Dental Supplement 5
Addition to Annex G for Type-12

-

Field ID	**Mnemonic**	**XML element name**	**Cardin-ality**
		itl:PackageInformationRecord	1..1
12.001	-	biom:RecordCategoryCode	1..1
12.002	-	biom:ImageReferenceIdentification	1..1
-	IDC	nc:IdentificationID	
12.200-12.900	UDF	Well-formed XML. Users may define a substitute element	0..*
12.902	ANN	biom:ProcessAnnotation	0..*
“	GMT	biom:ProcessUTCDate	1..1
“	NAV	biom:ProcessName	1..1
“	OWN	biom:ProcessOwnerText	1..1
“	PRO	biom:ProcessDescriptionText	1..1
12.995	ASC	biom:AssociatedContext	0..255
“	CAN	biom:ContextIdentification	1..1
“	ASP	biom:ImageSegmentIdentification	0..1
12.996	HAS	biom:ImageHashValue	0..1
12.997	SOR	biom:SourceRepresentation	0..255

“	SRN	biom:SourceIdentification	1..1
“	RSP	biom:ImageSegmentIdentification	0..1
-	-	biom:DentalData	1..1
-	-	biom:Biometric Capture Detail	1..1
12.998	GEO	biom:CaptureLocation	0..1
“	GRT	nc:LocationDescriptionText	0..1
“	-	nc:LocationGeographicElevation	0..1
“	ELE	nc:MeasurePointValue	1..1
“	-	biom:LocationTwoDimensionalGeographicCoordinate	0..1
“	-	nc:GeographicCoordinateLatitude	0..1
“	LTD	nc:LatitudeDegreeValue	0..1
“	LTM	nc:LatitudeMinuteValue	0..1
“	LTS	nc:LatitudeSecondValue	0..1
“	-	nc:GeographicCoordinateLongitude	0..1
“	LGD	nc:LongitudeDegreeValue	0..1
“	LGM	nc:LongitudeMinuteValue	0..1
“	LGS	nc:LongitudeSecondValue	0..1
“	GDC	biom:GeodeticDatumCoordinateSystemCode	0..1
“	GDC	biom:GeodeticDatumCoordinateSystemName	0..1
“	-	nc:LocationUTMCoordinate	0..1
“	GCE	nc:UTMEastingValue	0..1
“	GCM	nc:UTMGridZoneID	0..1
“	GCN	nc:UTMNorthingValue	0..1
“	-	biom:LocationAlternateGeographicSystemValue	0..1
“	OSI	biom:GeographicLocationSystemName	1..1
“	OCV	biom:GeographicLocationText	1..1
“	UTE	biom:CaptureUTCDateTime	0..1
-	-	biom:CaptureOrganization	0..1
12.999	DATA	nc:BinaryBase64Object	0..1
12.005	CON	nc:OrganizationName	1..1
12.004	-	biom:SourceOrganization	1..1
-	-	nc:OrganizationIdentification	1..1
-	SRC	nc:IdentificationID	1..1

12.003	FDS	biom:ForensicDentalSetting	0..1
“	FACC	biom:ForensicAnalystCategoryCode	1..1
“	-	nc:OrganizationPrimaryContactInformation	0..1
“	FOPC	nc:ContactInformationDescriptionText	0..1
“	FSCC	biom:SourceCountryCodeISO3166Alpha2Code	0..1
“	FSCC	biom:SourceCountryCodeISO3166Alpha3Code	0..1
“	FSCC	biom:SourceCountryCodeISO3166NumericCode	0..1
12.006	DSI	biom:DentalSubject	1..1
“	DSC	biom:SubjectStatusCode	1..1
“	-	biom:SubjectLastContactDate	0..1
“	DLCD	nc:Date	1..1
“	DRLC	biom:DateRangeText	0..1
“	-	nc:PersonBirthDate	0..1
“	DPBD	nc:Date	1..1
“	DRBD	biom:DateRangeText	0..1
“	DPET	nc:PersonEthnicityText	0..1
“	DRAC	biom:SubjectDNARecordsAvailableCode	0..1
“	DCLD	biom:SubjectCollectionLocationDescriptionText	0..1
“	-	biom:EstimatedDeathDate	0..1
“	DEDD	nc:DateTime	0..1
“	DRDE	biom:DateRangeText	0..1
“	DTER	biom:DeathTimeEstimateRationaleText	0..1
“	DAET	biom:DeathAgeEstimateText	0..1
12.007	ODES	biom:OriginalForensicDentalEncodingSysemInformation	0..1
“	OSNC	biom:SystemNameCode	1..1
“	OSVT	biom:SystemVersionText	0..1
“	OTPC	biom:ToothPermanenceCategoryCode	1..1
“	ORDG	biom:RestorationDataGranularityCode	1..1
12.008	TDES	biom:SourceForensicDentalEncodingSysemInformation	0..1
“	TSNC	biom:SystemNameCode	1..1
	TSVT	biom:SystemVersionText	0..1
	TTPC	biom:ToothPermanenceCategoryCode	1..1
	TRDG	biom:RestorationDataGranularityCode	1..1

12.009	-	biom:DentalHistoryData	0..*
-	HDD	biom:DentalHistoryDataDetail	1..1
“	HARC	biom:ADAReferenceCodeText	1..1
“	HADT	biom:AdditionalDescriptiveText	0..1
12.010	-	biom:ToothData	0..*
-	TDD	biom:ToothDataDetail	1..1
“	-	biom:CaptureDate	1..1
“	TCD	nc:Date	1..1
“	TCDR	biom:DateRangeText	0..1
“	TID	biom:ToothID	1..1
“	TOET	biom:OriginalSystemToothEncodingText	1..1
“	TARC	biom:ADAReferenceCodeText	1..1
“	TTET	biom:TransmittedSystemToothEncodingText	1..1
“	TICC	biom:ToothIDCertaintyCode	0..1
“	TADT	biom:AdditionalDescriptiveText	0..1
12.011	-	biom:MouthData	0..*
-	MDD	biom:MouthDataDetail	1..1
“	-	biom:CaptureDate	1..1
“	MCD	nc:Date	1..1
“	MCDR	biom:DateRangeText	0..1
“	MARC	biom:ADAReferenceCodeText	1..1
“	MADT	biom:AdditionalDescriptiveText	0..1
12.012	-	biom:StudyAndImprint	0..1
-	STI	biom:StudyAndImprintDetail	1..1
“	SARC	biom:ADAReferenceCodeText	1..1
“	SADT	biom:AdditionalDescriptiveText	1..1
12.020	COM	biom:CommentText	0..1

Part 3, Subpart 7

This subpart provides a sample XML instance of the Type-12 record.

```
<?xml version="1.0" encoding="UTF-8"?>

<!-- ************************************************** -->

<!--  RECORD TYPE 12     Forensic Dental Record          -->
```

```
<!-- ********************************************** -->
<itl:PackageForensicDentalDataRecord>
   <!--   12.001  -->
   <biom:RecordCategoryCode>12</biom:RecordCategoryCode>

   <!--   12.002 IDC  -->
   <biom:ImageReferenceIdentification>
      <nc:IdentificationID>4</nc:IdentificationID>
   </biom:ImageReferenceIdentification>

   <!--   12.200-900 UDF  -->
   <ext:ExampleUserDefinedFields>
      <!-- Well-formed XML goes here.  Users may define a substitute element. -->
   </ext:ExampleUserDefinedFields>

   <!--   12.901   RESERVED for use by ANSI/NIST-ITL-->

   <!--   12.902 ANN  -->
   <biom:ProcessAnnotation>
      <!-- GMT  -->
      <biom:ProcessUTCDate>
         <nc:DateTime>2011-11-05T05:25:00Z</nc:DateTime>
      </biom:ProcessUTCDate>
      <!-- NAV  -->
      <biom:ProcessName>A process name</biom:ProcessName>
      <!-- OWN  -->
      <biom:ProcessOwnerText>A process owner</biom:ProcessOwnerText>
      <!-- PRO  -->
      <biom:ProcessDescriptionText>A process description</biom:ProcessDescriptionText>
   </biom:ProcessAnnotation>

   <!--   12.903-12.992   RESERVED for use by ANSI/NIST-ITL-->

   <!--   12.995 ASC  -->
   <biom:AssociatedContext>
      <!-- ACN  -->
```

```
    <biom:ContextIdentification>
      <nc:IdentificationID>1</nc:IdentificationID>
    </biom:ContextIdentification>
    <!-- ASP  -->
    <biom:BiometricSegmentIdentification>
      <nc:IdentificationID>3</nc:IdentificationID>
    </biom:BiometricSegmentIdentification>
</biom:AssociatedContext>

<!--   12.997 SOR  -->
<biom:SourceRepresentation>
    <!-- SRN  -->
    <biom:SourceIdentification>
      <nc:IdentificationID>1</nc:IdentificationID>
    </biom:SourceIdentification>
    <!-- RSP  -->
    <biom:BiometricSegmentIdentification>
      <nc:IdentificationID>3</nc:IdentificationID>
    </biom:BiometricSegmentIdentification>
</biom:SourceRepresentation>


<biom:DentalData>
    <biom:BiometricCaptureDetail>
      <!--   12.998 GEO  -->
      <biom:CaptureLocation>
        <!-- GRT  -->
        <nc:LocationDescriptionText>Corner of Washington and Madison, Geneva,  NY</nc:LocationDescriptionText>
        <!-- ELE  -->
        <nc:LocationGeographicElevation>
          <nc:MeasurePointValue>159</nc:MeasurePointValue>
        </nc:LocationGeographicElevation>
        <biom:LocationTwoDimensionalGeographicCoordinate>
          <nc:GeographicCoordinateLatitude>
            <!-- LTD  -->
            <nc:LatitudeDegreeValue>42</nc:LatitudeDegreeValue>
            <!-- LTM  -->
```

```
            <nc:LatitudeMinuteValue>51</nc:LatitudeMinuteValue>
            <!-- LTS  -->
            <nc:LatitudeSecondValue>48</nc:LatitudeSecondValue>
        </nc:GeographicCoordinateLatitude>
        <nc:GeographicCoordinateLongitude>
            <!-- LGD  -->
            <nc:LongitudeDegreeValue>76</nc:LongitudeDegreeValue>
            <!-- LGM  -->
            <nc:LongitudeMinuteValue>59</nc:LongitudeMinuteValue>
            <!-- LGS  -->
            <nc:LongitudeSecondValue>24</nc:LongitudeSecondValue>
        </nc:GeographicCoordinateLongitude>
        <!-- GDC  -->
        <!--Note:Only once occurrence of GDC is allowed per GEO field) -->
        <!--<biom:GeodeticDatumCoordinateSystemCode>WGS84</biom:GeodeticDatumCoordinateSystemCode>-->
        <!--<biom:GeodeticDatumCoordinateSystemName>NAD83</biom:GeodeticDatumCoordinateSystemName>-->
    </biom:LocationTwoDimensionalGeographicCoordinate>
    <nc:LocationUTMCoordinate>
        <!-- GDC -->
        <nc:UTMDatumID>WGS84</nc:UTMDatumID>
        <!-- GCE  -->
        <nc:UTMEastingValue>337436</nc:UTMEastingValue>
        <!-- GCM  -->
        <nc:UTMGridZoneID>18N</nc:UTMGridZoneID>
        <nc:UTMGridZoneSquareID>WC</nc:UTMGridZoneSquareID>
        <!-- GCN  -->
        <nc:UTMNorthingValue>4747558</nc:UTMNorthingValue>
    </nc:LocationUTMCoordinate>
    <biom:LocationAlternateGeographicSystemValue>
        <!-- OSI  -->
        <biom:GeographicLocationSystemName>LANDMARK</biom:GeographicLocationSystemName>
        <!-- OCV  -->
        <biom:GeographicLocationText>Hydrant NW31</biom:GeographicLocationText>
    </biom:LocationAlternateGeographicSystemValue>
</biom:CaptureLocation>
```

```
    <!--   12.999 DATA  Dental chart data  -->
    <nc:BinaryBase64Object>Chart in Base64</nc:BinaryBase64Object>
    <!--   12.996 HAS  Hash of dental chart -->
    <biom:ImageHashValue>Put the SHA 256 hash value here </biom:ImageHashValue>
    <!-- 12.005 CON -->
    <biom:CaptureOrganization>
       <nc:OrganizationName>Hurricane XXX Disaster Recovery Team </nc:OrganizationName>
    </biom:CaptureOrganization>
</biom:BiometricCaptureDetail>

<biom:SourceOrganization>
    <!-- 12.004 SRC -->
    <nc:OrganizationIdentification>
       <nc:IdentificationID>FL013415Y</nc:IdentificationID>
    </nc:OrganizationIdentification>
    <!-- 12.993 SAN -->
    <nc:OrganizationName>Florida Department of Law Enforcement</nc:OrganizationName>
</biom:SourceOrganization>

<!-- 12.003 FDS -->
<biom:ForensicDentalSetting>
    <!--FACC-->
    <biom:ForensicAnalystCategoryCode>M</biom:ForensicAnalystCategoryCode>
    <!--FOPC-->
    <nc:OrganizationPrimaryContactInformation>
       <nc:ContactInformationDescriptionText>Bob Jones, 767-555-1212 </nc:ContactInformationDescriptionText>
    </nc:OrganizationPrimaryContactInformation>
    <!--FSCC-->
    <biom:SourceCountryCodeISO3166Alpha2Code>US</biom:SourceCountryCodeISO3166Alpha2Code>
    <!--Examples of other allowed code elements -->
    <!-- <biom:SourceCountryCodeISO3166Alpha3Code>USA</biom:SourceCountryCodeISO3166Alpha3Code> -->
    <!-- <biom:SourceCountryCodeISO3166NumericCode>840</biom:SourceCountryCodeISO3166NumericCode> -->
</biom:ForensicDentalSetting>

<!-- 12.006 DSI -->
<biom:DentalSubject>
    <!-- DSC -->
    <biom:SubjectStatusCode>2</biom:SubjectStatusCode>
```

```
<!-- DLCD -->
<biom:SubjectLastContactDate>
   <nc:Date>2010-12-25</nc:Date>
</biom:SubjectLastContactDate>
<!-- DRLC -->
<biom:DateRangeText>D05</biom:DateRangeText>
<!-- DPBD -->
<nc:PersonBirthDate>
   <nc:Date>1953-04-23</nc:Date>
</nc:PersonBirthDate>
<!-- DRBD-->
<biom:DateRangeText>Y01</biom:DateRangeText>
<!-- DPET-->
<nc:PersonEthnicityText>Puerto Rican</nc:PersonEthnicityText>
<!-- DRAC -->
<biom:SubjectDNARecordsAvailableCode>0</biom:SubjectDNARecordsAvailableCode>
<!-- DCLD -->
<biom:SubjectCollectionLocationDescriptionText>Lower jaw recovered 4.3 meters from the tip of the left wing of the airplane, in grid 4.3. Separated from skull. Four teeth found within 20 centimeters of the lower jaw.</biom:SubjectCollectionLocationDescriptionText>
<!-- DEDD -->
<biom:EstimatedDeathDate>
   <nc:DateTime>2012-01-01T12:56:00</nc:DateTime>
</biom:EstimatedDeathDate>
<!--DRDE-->
<biom:DateRangeText>h05</biom:DateRangeText>
<!--DAET-->
<biom:DeathAgeEstimateText> Dental Cementum Increment Analysis (DCIA) was
   performed on the left second premolar. The tooth was embedded in epoxy,
   sectioned, mounted to a glass slide, ground, and polished, and examined under 10,
   20 and 40 X magnification under polarized light.  Subject's age between 50 and 60</biom:DeathAgeEstimateText>
</biom:DentalSubject>

<!-- 12.007 ODES-->
<biom:OriginalDentalEncodingSystemInformation>
   <!-- OSNC -->
   <biom:SystemNameCode>FastID</biom:SystemNameCode>
   <!-- OSVT -->
```

```
    <biom:SystemVersionText>Version 2</biom:SystemVersionText>
    <!-- OTPC -->
    <biom:ToothPermanenceCategoryCode>0</biom:ToothPermanenceCategoryCode>
    <!-- ORDG -->
    <biom:RestorationDataGranularityCode>11</biom:RestorationDataGranularityCode>
</biom:OriginalDentalEncodingSystemInformation>

<!-- 12.008 TDES-->
<biom:SourceDentalEncodingSystemInformation>
    <!-- TSNC -->
    <biom:SystemNameCode>PLASS</biom:SystemNameCode>
    <!-- TSVT -->
    <biom:SystemVersionText>Version 7.8</biom:SystemVersionText>
    <!-- TTPC -->
    <biom:ToothPermanenceCategoryCode>0</biom:ToothPermanenceCategoryCode>
    <!-- TRDG -->
    <biom:RestorationDataGranularityCode>11</biom:RestorationDataGranularityCode>
</biom:SourceDentalEncodingSystemInformation>

<!-- 12.009 HDD -->
<biom:DentalHistoryData>
    <biom:DentalHistoryDataDetail>
        <!-- HARC  -->
        <biom:ADAReferenceCodeText>8.1.3.9.1.5</biom:ADAReferenceCodeText>
        <!-- HADT  -->
        <biom:AdditionalDescriptiveText>Additional Information pertaining to the HARC Code</biom:AdditionalDescriptiveText>
    </biom:DentalHistoryDataDetail>
    <biom:DentalHistoryDataDetail>
        <!-- HARC  -->
        <biom:ADAReferenceCodeText>8.1.3.8.4</biom:ADAReferenceCodeText>
    </biom:DentalHistoryDataDetail>
</biom:DentalHistoryData>

<!-- 12.010 TDD -->
<biom:ToothData>
    <biom:ToothDataDetail>
```

```
    <!--TCD -->
    <biom:CaptureDate>
       <nc:Date>2012-01-01</nc:Date>
    </biom:CaptureDate>
    <!-- TDCR -->
    <biom:DateRangeText>D05</biom:DateRangeText>
    <!-- TID  -->
    <biom:ToothID>36</biom:ToothID>
    <!-- TOET  -->
    <biom:OriginalSystemToothEncodingText>amf O</biom:OriginalSystemToothEncodingText>
    <!-- TARC  -->
    <biom:ADAReferenceCodeText>9.3.2.5.1.3</biom:ADAReferenceCodeText>
    <biom:ADAReferenceCodeText>9.3.2.5.4.1</biom:ADAReferenceCodeText>
    <!-- TTET -->
    <biom:TransmittedToothEncodingText>amf O </biom:TransmittedToothEncodingText>
    <!-- TICC -->
    <biom:ToothIDCertaintyCode>0</biom:ToothIDCertaintyCode>
    <!-- TADT -->
    <biom:AdditionalDescriptiveText>Text field used for those codes that require additional description</biom:AdditionalDescriptiveText>
</biom:ToothDataDetail>
<biom:ToothDataDetail>
    <!--TCD -->
    <biom:CaptureDate>
       <nc:Date>2012-01-01</nc:Date>
    </biom:CaptureDate>
    <!-- TDCR -->
    <biom:DateRangeText>D01</biom:DateRangeText>
    <!-- TID  -->
    <biom:ToothID>36</biom:ToothID>
    <!-- TOET  -->
    <biom:OriginalSystemToothEncodingText>cef DO</biom:OriginalSystemToothEncodingText>
    <!-- TARC  -->
    <biom:ADAReferenceCodeText>9.3.2.5.1.3 </biom:ADAReferenceCodeText>
    <biom:ADAReferenceCodeText>9.3.2.5.1.2</biom:ADAReferenceCodeText>
    <biom:ADAReferenceCodeText>9.3.2.5.4.2</biom:ADAReferenceCodeText>
    <!-- TTET -->
    <biom:TransmittedSystemToothEncodingText>cef DO </biom:TransmittedSystemToothEncodingText>
```

```
            <!-- TICC -->
            <biom:ToothIDCertaintyCode>0</biom:ToothIDCertaintyCode>
            <!-- TADT -->
            <biom:AdditionalDescriptiveText> Text field used for those codes that require additional description</biom:AdditionalDescriptiveText>
        </biom:ToothDataDetail>
    </biom:ToothData>

    <!-- 12.011 MDD -->
    <biom:MouthData>
        <biom:MouthDataDetail>
            <!--MCD -->
            <biom:CaptureDate>
                <nc:Date>2012-01-01</nc:Date>
            </biom:CaptureDate>
            <!-- MCDR -->
            <biom:DateRangeText>h05</biom:DateRangeText>
            <!-- MARC  -->
            <biom:ADAReferenceCodeText>10.3.2.4.1.1</biom:ADAReferenceCodeText>
            <!-- MADT -->
            <biom:AdditionalDescriptiveText> Text field used for those codes that require additional description</biom:AdditionalDescriptiveText>
        </biom:MouthDataDetail>
        <biom:MouthDataDetail>
            <!--MCD -->
            <biom:CaptureDate>
                <nc:Date>2012-01-01</nc:Date>
            </biom:CaptureDate>
            <!-- MARC  -->
            <biom:ADAReferenceCodeText>10.5.1.1.8.1</biom:ADAReferenceCodeText>
        </biom:MouthDataDetail>
    </biom:MouthData>
<!-- 12.012 STI -->
    <biom:StudyAndImprintData>
        <biom:StudyAndImprintDataDetail>

            <!-- SARC  -->
            <biom:ADAReferenceCodeText>7.5.1.1.1.1</biom:ADAReferenceCodeText>
            <!-- SADT -->
```

```
      <biom:AdditionalDescriptiveText> Text field used for those codes that require additional description</biom:AdditionalDescriptiveText>
    </biom:MouthDataDetail>
    <biom:MouthDataDetail>
      <!--MCD -->
      <biom:CaptureDate>
        <nc:Date>2012-01-01</nc:Date>
      </biom:CaptureDate>
      <!-- MARC  -->
      <biom:ADAReferenceCodeText>10.5.1.1.8.1</biom:ADAReferenceCodeText>
    </biom:MouthDataDetail>
  </biom:MouthData>

  <!--12.013 -019 RESERVED for use by ANSI/NIST-ITL -->
```

Part 3, Subpart 8

This section adds to Annex I: Bibliography. (Informative)

Coward R.C.; *The Stability of Lip Pattern Characteristics Over Time;* Journal of Forensic Odonto-Stomatology, Vol. 25, No. 2, December 2007, pp 40-56

Dailey J.C.; *Aging of Bitemarks: A Literature Review,* Journal of Forensic Sciences 1997;42(5):792-795

Dorion R.B.J.; *Bitemark Evidence, A Color Atlas and Text*, Second Edition, 2012, CRC Press

Golden, S.G.; *Use of Alternative Light Source Illumination in Bite Mark Photography*, Journal of Forensic Sciences Vol 39, No.3, May 1994, pp. 815-823

Kaminski J.A., *Old Dogs Can Learn New Tricks – A New Application of the ABFO #2 Scale*, Journal of Forensic Sciences, Vol 49, No.6, November 2004, pp. 1332-1334.

Senn D.R. and Stimson P.G.; *Forensic Dentistry,* Second Edition, 2010, CRC Press

Silver W.E and Souviron R.R.; *Dental Autopsy,* 2009, CDC Press

Suzuki K and Tsuchihashi Y; *New Attempt of Personal Identification by Means of Lip Print*, Journal of the Indian Dental Association, January 1970, pp 8-9

Part 4

This section illustrates some representative scenarios of how to utilize this Supplement's new record types and fields in conjunction with existing record types within the standard.

A) **Suspected Pattern Injuries Of Intraoral Origin on a Human Victim – With Dental Records Available from a Human Potential Comparison Candidate and one Canine.**
Note that this transaction in no way indicates that a determination has been made that the pattern injuries were definitely bitemarks, or in particular, that they were human bitemarks.

a. **Type-1** record (mandatory)
b. **Type-2** record containing information about the *subject of the transaction*. In this case it would be the victim. Complete in accordance with instructions of the implementation domain (such as NORAM or INTERPOL or RCMP)

Records associated with the victim

c. **Type-10** record containing a photograph of the pattern injury and any associated metadata.
   i. Fields 10.001, 10.002, 10.004, 10.005, 10.06, 10.007, 10.008, 10.09, 10.010 10.010 10.011 and 10.012 are mandatory. Note that **Field 10.012 Color space / CSP** has new codes as a result of this Supplement. Thus, if the injury were photographed with ultraviolet, it should be so indicated. See Part 2 Subpart 1 of this Supplement.
   ii. For **Field 10.003 Image type / IMT**, enter the part of the body where the pattern injury is found, according to Table 58.
   iii. Field **10.046 Subject / SUB** should be completed**. Subject status code / SSC** would be set to 1 (assuming that the victim was still alive). **Subject identifier text / SIDT** could be the case name or the victim's name.
   iv. Field **10.048 Pattern injury image description / PIID** should be entered. Appropriate codes from **Table Dental Supplement 2** are entered in **pattern injury code / PIC** and text is entered in **pattern injury descriptive text /PIDT** when it is indicated in the table that text is required. As many descriptors as the examiner / agent feels are appropriate may be entered.
   v. Field **10.041 SMT size or size of injury or identifying characteristic / SMS** should be entered. The information items for **height / HGT** and **width / WID** should be based upon measurements taken using an ABFO # 2 ruler, in accordance with the recommendations of the American Board of Forensic Odontologists.
   vi. The image is transmitted using **Field 10.999 Body part image / DATA.**
d. The investigating agency may also wish to include a **Type-21** record with an image of the person when the victim was found or the location where the injury supposedly occurred (such as on the front porch of the house).

Records associated with the human candidate for comparison

Type-10 record containing a dental images of the human candidate as well as any relevant metrics.

i. Fields 10.001, 10.002, 10.004, 10.005, 10.06, 10.007, 10.008, 10.09, 10.010 10.010 10.011 and 10.012 are mandatory. Note that **Field 10.012 Color space / CSP** has new codes as a result of this Supplement. Thus, its value would be XRAY.

ii. For **Field 10.003 Image type / IMT**, enter FACE, according to Table 58.

iii. Field **10.046 Subject / SUB** should be completed**. Subject status code / SSC** would be set to 2 (assuming that the comparison candidate was still alive). **Subject identifier text / SIDT** could be the candidate's unique identifier.

iv. For this example, assume that DICOM data is available from the office of the dentist for the comparison candidate. **Field 10.052 DICOM / DICM** would be used to convey the information. For purposes of illustration, assume that it has been exported in a digital format and can be conveyed in **DICOM data /** DICD**.**

v. The analyst may want to use **Field 12.020 Comment / COM** to enter information concerning the teeth of the subject for comparison and their correspondence (if any) to the possible pattern injury on the victim.

Records associated with the canine candidate for comparison.

Note that Type-10 records are reserved for HUMAN images. Thus the canine information for comparison is transmitted in Record Type-21.

Field 21.020 Comment / COM should be used to clearly state that the image conveyed in the instance of Record **Type-21** is that of a canine comparison candidate. The field may also be used to describe the canine's dentition the results of a comparison.

The actual image would be transmitted in **Field 21.999 Associated context data / DATA.**

B) **Body exhumed in cold-case for identification (no soft tissue; but hair, bones and teeth intact) -- no fingerprints possible -- no facial features**[30]

Various combinations of the following record instances might be sent to appropriate agencies or installations during the investigation process. They need not all be bundled together in every transaction. The only mandatory record type is Type-1. However, for final recordkeeping, it is advisable to prepare a full transaction with all of the data consolidated and in its final state.

a. **Type-1** record (mandatory)

b. **Type-2** record containing information about the *subject of the transaction*. In this case it

[30] This example is based upon the case reported in Wedel L, Found G, Nusse G *A 37-Year-Old Cold Case Identification Using Novel and Collaborative Methods*, Journal of Forensic Identification Vol. 63. No 1. pp. 5-21. Note that the actual case did not exchange data using this standard since the standard had not been updated to include this material at the time of the case. Instead " Forensic postmortem reports of findings and analysis were prepared and a complete copy of all DEXIS and WinID3 files and digital photographs were submitted on CD to the Stanislaus County Coroners Office." Image of the dental radiographs copied with permission. Text in quotes in this example is from this article.

would be the victim. Complete in accordance with instructions of the implementation domain (such as NORAM or INTERPOL or RCMP)

c. **Type-21** records containing images of the exhumation process and artifacts still intact that were buried with the victim.

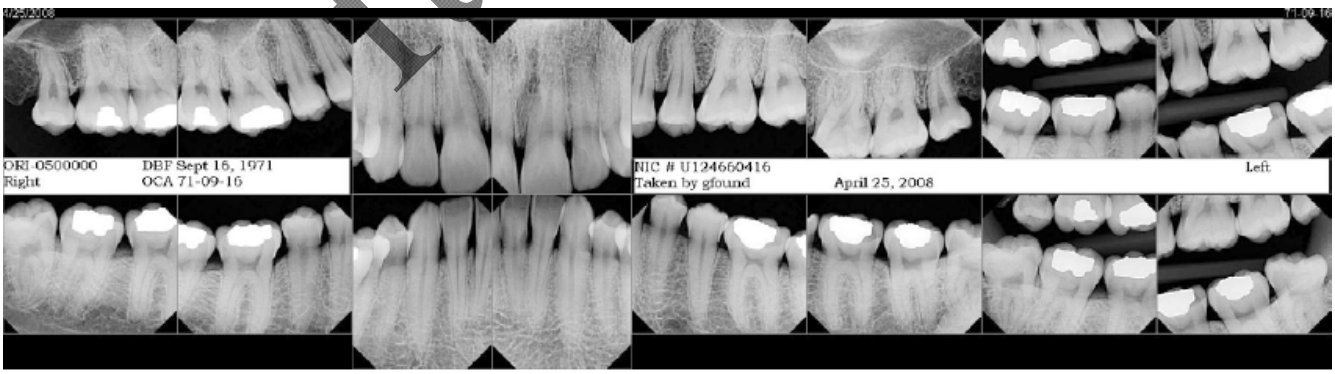
d. **Type-21** record with either digital images of the original autopsy report (in **Field 21.999**) or with the location of the report's location entered in **Field 21.994.**

e. **Type-10** record with radiograph images of the subject. Note that one **Type-10** record instance is required for each radiograph.

The radiograph images would be in **Field 10.051 Radiograph image data / RID.** Note that some images above are dated 1971 – when the body was placed in the grave as an unknown deceased. The other images are dated 2008, after the body was exhumed and re-examined.

The images from the original autopsy would be entered with a **radiograph capture date / RCD** of 19710915. The information items **radiograph size / RGS, radiograph image series / RIS,** and **radiograph image in series text / RIIS** are mandatory and would be entered with appropriate information. For the 1971 radiographs, it may be desirable to enter something like "radiographs taken at the medical examiner's office prior to burial in 1971 as an unknown deceased" and any specific conclusions of the examiner in **radiograph practitioner information text / RPRI.**

The images after exhumation would be entered with a **radiograph capture date / RCD** of 20080425. As with the other radiographs, the information items **radiograph size / RGS, radiograph image series / RIS,** and **radiograph image in series text / RIIS** are mandatory and would be entered with appropriate information. **Radiograph practitioner information text / RPRI** should contain information about the practitioner and can contain any additional information about each specific radiograph.



Photoradiograph of the teeth of Jane Doe # 48

f. At least one of the **Type-10** records should contain **Field 10.046 Subject / SUB.** The first information item **subject status code / SSC** would be set to 3 (data obtained from a decent – victim or unknown deceased). **Subject body status code / SBCC** would be 2

(Fragment) since portions of the body were missing. **Subject body class code / SBCC**. would be set to 3 (Skeletal).

g. The article stated that there were postmortem pictures from 1971. These should be included as separate **Type-10** records. Each would be indicated **Field 10.005 Photo capture date / PHD** clearly set to 19710915. **Field 10.003 Image type / IMT** would be coded as to the portion of the body imaged in each photo. The scanned image would be entered in **Field 10.999 Body part image / DATA.**

h. Although the article did not mention specific feature points being part of the forensic facial reconstruction, that is possible using a **Type-10** record. The original images from 1971 could be marked to indicate the exact position of certain characteristics, either 2D (x and y coordinates only) or with depth added (a z coordinate). **Field 10.029 2D feature points / FFP** and **Field 10.032 3D facial feature points / 3DF** are used for these purposes. Another forensic markup capability is contained in **Field 10.033 Feature contours / FEC**. All of these may be useful in comparing original images with the reconstructed face.

i. The article mentions that NCIC was checked. Record **Type-10** also includes the capability to mark the NCIC codes related to body features. As an example, the article mentions that the victim had an earring loop in her right ear. A **Type-10** record would contain **Field 10.003 Image type / IMT** set to SCAR (See Table 58 and the footnotes associated with it describing the setting for each of the NCIC code categories). **Field 10.040 NCIC SMT code / SMT** would be set to 'PRCD R EAR'. Any other identifying characteristics could be similarly entered.

j. The article lists several injuries that were apparent from examination of the bones. There are several ways to record this. The entire text of the analysis can be entered in **Field 10.038 Comment / COM.** If images are to be conveyed, each image requires a separate instance of Record **Type-10**. As an example, the article states, " One distal hand phalanx exhibits sharp force trauma to the palmar surface of the bone. The cut runs proximal to distal. This type of cut is consistent with a hand being palm up while being cut with a blade that severs the tip of the digit." For this instance, **Field 10.003 Image type / IMT** could be selected to be HANDS-PALM or HANDS-BACK. (If two images from different angles are taken, one of each is possible). The image would be conveyed in **Field 10.999 Body part image / DATA.**

k. The **Type-12** record would contain the mandatory fields 12.001 and 12.002.

1. **Field 12.003 Forensic dental setting / FDS** for this example would have the first information item **forensic analyst category code / FACC** be set to D (Dental Professional / Forensic odontologist) since the dental examination was done by a forensic odontologist. His name and contact information would be entered into **forensic organization primary contact information / FOPC. Field 12.006 Dental subject information / DSI** would have the **subject status code / DSC** set to 2 (data obtained from a decedent). **Subject person ethnicity text / DPET** would be entered as "The skull exhibited the traits of someone primarily of European American ancestry, commonly dubbed 'white'…. Nonmetric

traits that suggested Native American ancestry included mild malar prognathism and pronounced shoveling of the maxillary incisors." **Subject DNA records available code / DRAC** would be set to 1 (YES). **Subject – estimated death date** could be entered as 'Y1971'**.** The information item **subject – death age estimate text / DEAT** could be "At the original autopsy in 1971, Jane Doe #48's age at death had been estimated at 15 to 25 years based on physical appearance. However, several markers on the skeleton suggested that the original estimate was too young. The third molars had erupted and were in occlusion. This is usually completed in the early 20s. The coronal, sagittal, and lambdoid sutures were already in the process of fusing. The auricular surface of the left ilium retained some billowing but had begun to form striae. These features are consistent with an age estimate of 25 to 34 years…The sternal end of the right clavicle was partly fused, and the bilateral iliac crests were unfused, as were several vertebral annular rings. … [W]hite females with unfused medial clavicles and iliac crests average 23 to 30 years at death. Therefore, based on the developmental indices and some very mild osteoarthritis, a revised skeletal age range of 23 to 30 was submitted in the case report. As discussed above, the age estimate based on cementum bands was narrower, 23.5 to 25 years ±2.5 years."

2. The article states that the final postmortem dental data was inputted into WinID. Thus, Field **12.007 Original dental encoding system / ODES** would be completed with **original system name code / OSNC** as WinID. Because WinID was chosen, **original tooth permanence code / OTPC** is set to 0 and **original restoration data granularity code / ORDG** is set to 31.

3. **Field 12.010 Tooth data detail / TDD** could have the following data in a particular subfield relating to a specific tooth. There would be multiple subfields if multiple teeth were described. **Tooth capture date / TCD** would be 20080425. As an example, the article states that all four wisdom teeth were fully erupted. Thus there would be four subfields to describe them, each with a different value for **tooth ID / TID.** They would be set to 18, 28, 38 and 48. The **tooth original system encoding text / TOET** would be V for these teeth. To be able to input this into other systems, the **tooth data ADA reference code text / TARC** is generated as 9.3.2.3 (Present – Unrestored Erupted (Virgin)). **Tooth additional descriptive text / TADT** may be entered as "The four wisdom teeth were fully erupted and the apices were completely closed. The wisdom tooth apical closure was the basis for establishing the lower age estimation at 18 years of age."

l. The article mentions that a woman claimed to be possibly related to the decedent and that she supplied a DNA sample to be compared against the DNA recovered from a tooth of the decedent. Thus there would be two **Type-18** DNA records – one for each person.

1. For the decedent, a **Type-18** record would be generated.
    a. Fields 18.001, 18.002, and 18.004 are mandatory.

b. Field 18.003 is also mandatory and would (for this example) be populated as follows. **Unit type / UTY** is set to 1 (Laboratory DNA processing unit). **Lab type / LTY** is set to G (Government). The **accreditation information / ACC** would be 255 (since it is unknown to this author).
c. The article does not state the number of analyses, but for this example, assume that **Field 18.005 Number of analyses flag / NAL** is set to 1 (Single).
d. **Field 18.006 Sample donor information / SDI** could have the following values.
    i. **DNA sample donor / DSD** is set to 0 (subject of the transaction)
    ii. **Gender ID / GID** is set to F
    iii. **Date of last contact / DLC** would be set to 19710911
    iv. **Dental records available / DRA** would be set to 1 (Yes)
    v. **Sample donor status / SDS** would be set to 0 (Deceased)
e. **Field 18.010 Sample type / STY** has an information item **sample cellular type / SCT** that would be set to 9 (Tooth). The article states "Two teeth were removed for submission to the California Department of Justice Missing Persons DNA unit at Richmond, California, for DNA analysis."
f. **Field 18.011 Sample typing information / STI** would have a value of 1 (mtDNA).
g. **Field 18.013 Sample collection date / SCD** would be set to 20080626
h. **Field 18.014 Profile storage date / PSD** is mandatory and the proper date would be entered.
i. **Field 18.015 DNA profile data / DPD** is mandatory. Its information items are described below.
    i. **Profile type / PTP** is set to 0 (Person)
    ii. **Profile ID / PRF** would be completed using a unique identification from the laboratory
j. **Field 18.017 Mitochondrial DNA data / DMD** would be completed with the results of the mtDNA analysis.

2. For the person stating that she may be a cousin of the decedent, a **Type-18** record would be generated.
    a. Fields 18.001, 18.002, and 18.004 are mandatory.
    b. Field 18.003 is also mandatory and would (for this example) be populated as follows. **Unit type / UTY** is set to 1 (Laboratory DNA processing unit). **Lab type / LTY** is set to G (Government). The **accreditation information / ACC** would be 255 (since it is unknown to this author).
    c. The article does not state the number of analyses, but for this example, assume that **Field 18.005 Number of analyses flag / NAL** is set to 1 (Single).
    d. **Field 18.006 Sample donor information / SDI** could have the following values.
        i. **DNA sample donor / DSD** is set to 1 (Claimed, purported or validated relative)

ii. **Gender ID / GID** is set to F
iii. **Date of last contact / DLC** would be set to 20080626

e. **Field 18.007 Claimed or purported relationship / COPR** is mandatory since **DSD** is set to 1. The value would be set to 5 (maternal relative).
f. Upon successful comparison of the cousin's DNA to that of the decedent, **Field 18.008 Validated relationship /VRS** would be completed and its value would be set to 5 (maternal relative).
g. **Field 18.009 Pedigree information / PED** is optional, but highly recommended for cases such as described in this article.
   i. **Pedigree ID / PID** is unique and established by the investigative team or laboratory.
   ii. **Pedigree member ID / PMI** refers to the ID of the claimed cousin in the tree.
   iii. **Pedigree member status / PMS** is set to K (Known)
   iv. **DNA sample identifier / SID** relates the DNA sample identification to the pedigree reference
   v. **Father identifier / FID** would be the code in the pedigree chart for the father of the cousin
   vi. **Mother identifier / MID** would be the code in the pedigree chart for the mother of the cousin
h. **Field 18.010 Sample type / STY** has an information item **sample cellular type / SCT** that would be set to 0 (Blood).
i. **Field 18.011 Sample typing information / STI** would have a value of 1 (mtDNA).
j. **Field 18.013 Sample collection date / SCD** would be set to 20080626
k. **Field 18.014 Profile storage date / PSD** is mandatory and the proper date would be entered.
l. **Field 18.015 DNA profile data / DPD** is mandatory. Its information items are described below.
   i. **Profile type / PTP** is set to 0 (Person)
   ii. **Profile ID / PRF** would be completed using a unique identification from the laboratory
m. **Field 18.017 Mitochondrial DNA data / DMD** would be completed with the results of the mtDNA analysis.

C) **Latent prints of possible perioral origin on a glass – With lip print images available from a comparison candidate.**

Note that this transaction in no way indicates that a determination has been made that the latent prints are definitely lip prints or that a comparison has been successfully done.

a. **Type-1** record (mandatory)
b. **Type-2** record containing information about the *subject of the transaction*. In this case it would be the victim. Complete in accordance with instructions of the implementation domain (such as NORAM or INTERPOL or RCMP)

Records associated with the latent print

c. A **Type-20** record **(Source representation record)** would be created for the image of the glass including the image of the lip print**.**

   i. **Fields 20.001** through **20.004** are mandatory and are completed as with other record types.
   ii. Since the image is a 2D still image, **Fields 20.006** through **20.013** are also mandatory. They describe the image size, compression and other important information.
   iii. **Field 20.014 Acquisition source / AQS** would have **acquisition source type / AQT** set to 2 (Static digital image from a digital still-image camera).
   iv. **Field 20.015 Source representation format / SFT** is mandatory and appropriate data should be entered in its information items.
   v. **Field 20.021 Source representation number / SRN** would be completed with a unique number that links this record to the extracted, close-up lip print image conveyed in Record **Type-10**.
   vi. **Field 20.999 Source representation data / DATA** would contain the full image.

d. A **Type-10** record would convey the image of the latent lip print itself that was derived from the image contained in the **Type-20** record.
   i. The mandatory fields would be completed as required for all **Type-10** records.
   ii. **Field 10.003 Image type / IMT** is set to FACE.
   iii. The image itself would be conveyed in **Field 10.999 Body Part Image / DATA.**
   iv. To assist in forensic analysis of the lip print image, feature points can be marked using **Field 10.029 2D facial feature points / FFP.** Note that **Figure 14** in the standard illustrates the feature point codes for the mouth area.
   v. If contour marking is useful to the forensic analyst, it may included in **Field 10.033 Feature contours / FEC.**
   vi. **Field 10.049 Cheiloscopic image data / CID** should be completed with the three information items correctly entered: **lip print width / LPW; lip print height/ LPH;** and **lip print description text / LPDT.**
   vii. **Field 10.999 Body part image / DATA** contains the actual digital image.

Records associated with the comparison subject

e. A **Type-10** record would convey a lip print image from a potential comparison subject.

   i. The mandatory fields would be completed as required for all **Type-10** records.
   ii. **Field 10.003 Image type / IMT** is set to FACE.
   iii. The image itself would be conveyed in **Field 10.999 Body Part Image / DATA.**
   iv. To assist in forensic analysis of the lip print image, feature points can be marked using **Field 10.029 2D facial feature points / FFP.** Note that **Figure 14** in the standard illustrates the feature point codes for the mouth area.
   v. If contour marking is useful to the forensic analyst, it may included in **Field 10.033 Feature contours / FEC.**
   vi. **Field 10.046 / Subject / SUB** is completed in order to indicate that this instance of a **Type-10 record** is submitted for comparison to the latent image. **Subject status code / SSC** is set to 2 (Data obtained from a living person – as a candidate

for comparison to a latent print or a pattern injury).

vii. **Field 10.049 Cheiloscopic image data / CID** should be completed with the three information items correctly entered: **lip print width / LPW; lip print height/ LPH;** and **lip print description text / LPDT.**

viii. **Field 10.999 Body part image / DATA** contains the actual digital image.