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Upgrading the United States Transuranium and Uranium Registries' Health Physics Database

Stacey L. McCord, MS
USTUR Project Associate

smccord@tricity.wsu.edu

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"Learning from Plutonium and Uranium Workers"

USTUR Health Physics Database

Goals:

- **Searchable - Eight specialized tables that contain 179 individually searchable fields:**
 - **Incidents**
 - **Contamination**
 - **In Vitro**
 - **In Vivo**
 - **Air Monitoring**
 - **Work Site Assessments**
 - **External**
 - **Treatment**
- **Consistent – Quality Assurance Measures**



Incidents

- The 'Incidents' tab provides a ready index of possible intake dates by summarizing all radiological incidents that the worker was involved in.
- Incidents are categorized using 'Incident Indicators':
 - Air Sample
 - Contamination
 - Criticality
 - Fire
 - Wound
 - Bioassay – Used when a high or 'special request' bioassay is the only indicator of an incident.
 - Other



Incidents

frm_Health_DataEntry : Form

Incidents Contamination In Vitro In Vivo Air Monitoring Work Site Assessments External Treatment

Case_No: **0102** Chelated

Edit Incidents Lock Incidents Add to Contaminant List

Incident Indicator	Primary Contaminant	Date/Time	Location	Description	Source	Worksite Code
Bioassay Chemical Form:	Am-241 Chemical Form:	Start: 3/1/1952 End: 3/1/1954 Exposure Duration: unknown	University of California Berkeley	The first indication of an intake was in March 1958, when a routine urine sample indicated positive alpha counts. These counts were later determined to be from Am-241. There was no documented event to establish the time of exposure, but it is likely that the intake occurred between March 1952 and March 1954. During this time, the registrant repeatedly manipulated 3-	3/8/79 - Summary report on Registrant's	
Bioassay Chemical Form:	Ra-226 Chemical Form: unspecified	Start: End: 2/5/1963 Exposure Duration: unknown	unspecified	Possible inhalation of Ra-226/Rn-222 (and daughters). Whole Body Count performed on 2/6/1963 found no detetable activity above background. Detection limit for Ra-226 and daughters was 0.002 uCi.	4/17/63 - report of whole body counting	
* Chemical Form:	 Chemical Form:	Start: End: Exposure Duration:				

Record: 2 of 2

In Vitro

- **‘In Vitro’ measurements are recorded for five ‘Media’:**
 - **Blood**
 - **Feces**
 - **Nasal Smear**
 - **Oral Smear**
 - **Urine**
- **The ‘Type’ indicates how the activity per sample is normalized into Excretion Rate (pCi/day) or Total Blood Activity (pCi):**
 - **24-hr – (Feces & Urine)**
 - **Sim24 – (Feces & Urine)**
 - **Pooled – (Feces & Urine)**
 - **Timed – (Feces & Urine)**
 - **Volume/Mass – (Blood, Feces, & Urine)**
 - **Conc – (Blood, Feces, & Urine)**
 - **Creatinine – (Urine)**
 - **n.a. (all Mediums)**



In Vitro

frm_Health_DataEntry : Form

Incidents Contamination **In Vitro** In Vivo Air Monitoring Work Site Assessments External Treatment

Case_No: **0102** Chelated

Edit In Vitro Lock In Vitro Add to Contaminant List

Sample Info	Primary Contaminant	Collection Time	Reported Net Activity				Derived Activities				Value	
			Value	Uncert	MDA	DL	Unit	Value	Uncert	MDA		DL
Medium: Feces Type: 24-hr Chelation: <input type="checkbox"/>	Am-241	Start: 6/22/1958 End: 6/23/1958 Effective Sample Period, d: 1.00E+00	2.04	0.36			dpm	Activity, pCi/sa: 9.19E-01 Excretion Rate, pCi/day: 9.19E-01 Total Blood Activity, pCi: Nuclide Mass, ug:	1.62E-01			Collected: Analyzed: Creatinine, g:
Medium: Feces Type: 24-hr Chelation: <input checked="" type="checkbox"/>	Am-241	Start: 8/5/1958 End: 8/6/1958 Effective Sample Period, d: 1.00E+00	1.24	0.22			dpm	Activity, pCi/sa: 5.59E-01 Excretion Rate, pCi/day: 5.59E-01 Total Blood Activity, pCi: Nuclide Mass, ug:	9.91E-02			Collected: Analyzed: Creatinine, g:
Medium: Urine Type: 24-hr Chelation: <input type="checkbox"/>	Am-241	Start: 3/27/1958 End: 3/28/1958 Effective Sample Period, d: 1.00E+00	0.63	0.22			dpm	Activity, pCi/sa: 2.84E-01 Excretion Rate, pCi/day: 2.84E-01 Total Blood Activity, pCi: Nuclide Mass, ug:	9.91E-02			Collected: Analyzed: Creatinine, g:
Medium: Urine Type: 24-hr Chelation: <input type="checkbox"/>	Am-241	Start: 4/24/1958 End: 4/25/1958 Effective Sample Period, d: 1.00E+00	2.39	0.25			dpm	Activity, pCi/sa: 1.08E+00 Excretion Rate, pCi/day: 1.08E+00 Total Blood Activity, pCi: Nuclide Mass, ug:	1.13E-01			Collected: Analyzed: Creatinine, g:
Medium: Urine Type: 24-hr Chelation: <input type="checkbox"/>	Am-241	Start: 5/30/1958 End: 5/31/1958 Effective Sample Period, d: 1.00E+00	8.36	0.33			dpm	Activity, pCi/sa: 3.77E+00 Excretion Rate, pCi/day: 3.77E+00 Total Blood Activity, pCi: Nuclide Mass, ug:	1.49E-01			Collected: 855 Analyzed: Creatinine, g:
Medium: Urine Type: 24-hr Chelation: <input type="checkbox"/>	Am-241	Start: 6/21/1958 End: 6/22/1958 Effective Sample Period, d: 1.00E+00	8.03	0.22			dpm	Activity, pCi/sa: 3.62E+00 Excretion Rate, pCi/day: 3.62E+00 Total Blood Activity, pCi: Nuclide Mass, ug:	9.91E-02			Collected: 1000 Analyzed: Creatinine, g:
Medium: Urine Type: 24-hr Chelation: <input type="checkbox"/>	Am-241	Start: 6/28/1958 End: 6/29/1958 Effective Sample Period, d: 1.00E+00	11.11	0.58			dpm	Activity, pCi/sa: 5.00E+00 Excretion Rate, pCi/day: 5.00E+00 Total Blood Activity, pCi: Nuclide Mass, ug:	2.61E-01			Collected: 900 Analyzed: Creatinine, g:
Medium: Urine Type: 24-hr Chelation: <input type="checkbox"/>	Am-241	Start: 7/14/1958 End: 7/15/1958 Effective Sample Period, d: 1.00E+00	8.61	0.69			dpm	Activity, pCi/sa: 3.88E+00 Excretion Rate, pCi/day: 3.88E+00 Total Blood Activity, pCi: Nuclide Mass, ug:	3.11E-01			Collected: Analyzed: Creatinine, g:

Record: 3 of 22



In Vivo

- **The 'In Vivo' tab stores data from external counts that quantify the amount of activity in different 'Monitoring Targets':**
 - **Extremity**
 - **Liver**
 - **Lung**
 - **Skeleton**
 - **Thyroid**
 - **Whole Body**
 - **Wound**
 - **Other**

In Vivo

frm_Health_DataEntry : Form

Incidents Contamination In Vitro **In Vivo** Air Monitoring Work Site Assessments External Treatment

Case_No: **0102** Chelated

Edit In Vivo Lock In Vivo Add to Contaminant List

Monitoring Target	Detector Position	Primary Contaminant	Count Start Time	Reported Results				Derived Activity (pCi)				Count Length, min	Comments
				Value	Uncert	MDA	DL	Value	Uncert	MDA	DL		
Lung		Am-241	2/22/1972	12.57	1			nCi	1.26E+04	1.00E+03			Agrees with urine if assumed t
						<input type="checkbox"/> Reported <MDA							
Skeleton	Pelvis	Am-241	2/6/1962	0.39				uCi	3.90E+05				50 times greater than expecte
						<input type="checkbox"/> Reported <MDA							
Skeleton	Chest (ribs, etc.)	Am-241	2/6/1962	2.4				uCi	2.40E+06				50 times greater than expecte
						<input type="checkbox"/> Reported <MDA							
Skeleton	Tibia	Am-241	2/6/1962	1.48				uCi	1.48E+06				50 times greater than expecte
						<input type="checkbox"/> Reported <MDA							
Skeleton	Pelvis	Am-241	2/22/1972	1.23				uCi	1.23E+06				50 times greater than expecte
						<input type="checkbox"/> Reported <MDA							
Skeleton	Femurs (2)	Am-241	2/22/1972	2.35				uCi	2.35E+06				50 times greater than expecte
						<input type="checkbox"/> Reported <MDA							
Skeleton	Skull	Am-241	2/22/1972	1.6				uCi	1.60E+06				50 times greater than expecte
						<input type="checkbox"/> Reported <MDA							
Skeleton	Tibia	Am-241	4/12/1978	5.5	0.1			nCi	5.50E+03	1.00E+02			
						<input type="checkbox"/> Reported <MDA							
Skeleton	Skull	Am-241	4/12/1978	14.1	0.1			nCi	1.41E+04	1.00E+02			
						<input type="checkbox"/> Reported <MDA							
Whole Body		Ra-226	2/6/1963			0.002		uCi			2.00E+03		Includes Ra-226 progeny; 1 tr
*						<input type="checkbox"/> Reported <MDA							

Record: 2 of 10



Treatment

- **The 'Treatment' tab stores data associated with:**
 - **Chelation Therapy**
 - **Wound Excision**
 - **Wound Irrigation**
- **For Chelation treatments, the chelating agent and mode of administration can be selected from dropdown menus.**

Treatment

frm_Health_DataEntry : Form

Incidents Contamination In Vitro In Vivo Air Monitoring Work Site Assessments External Treatment

Case_No: **0102** Chelated

Edit Treatment Lock Treatment

Treatment	Modality	Date/Time	Dosage	Dosage Unit	Activity Removed	Activity Unit	Derived Values		Comments	Source
							Dosage g	Activity Removed, pCi		
Ca-EDTA	i.v.	8/5/1958	1	g			1		Medical log states "PS done today. Given 1 gm Veroine i.v. in 500 ml normal saline in 1 hour as a therapeutic trial. To collect urine for next 24 hrs and stools for next 48." Note:	RL-1993 Specimen
*										

Record: 1 of 1

Quality Assurance

- **Unit Standardization**
- **Automatic Calculations**
- **Dropdown Menus**

Unit Standardization

- Eliminates unit conversion errors.
- Database stores both the original (hard-file based) and the standardized values.

Reported Results					Derived Activity (pCi)			
Value	Uncert	MDA	DL	Unit	Value	Uncert	MDA	DL
14.1	0.1			nCi	1.41E+04	1.00E+02		
<input type="checkbox"/> Reported <MDA								
		0.002		uCi			2.00E+03	
<input checked="" type="checkbox"/> Reported <MDA								
1				dpm	4.50E-01			
<input type="checkbox"/> Reported <MDA								

Automatic Calculations

- **User-entered hard file data is used to calculate derived quantities**
 - **Effective Sample Period**
 - **Effective Sample Period = End Time – Start Time**
 - **Activity (pCi)**
 - **Derived Activity = Conc · Volume Collected**
(when not reported in activity units)
 - **Excretion Rate (pCi/day)**
 - **Excretion Rate = Activity/Sample Period**
 - **Total Blood Activity**
 - **Total Blood Activity = Conc · 5300 mL**



Automatic Calculations

- Chelation
 - Chelation Cases are flagged if the 'Treatment' tab contains a chelation record.
 - In Vitro records are flagged if the sample was collected within 14 days of chelation treatment.

Incidents Contamination **In Vitro** In Vivo Air Monitoring Work Site Assess

Case_No: 0102 **Chelated**

Edit In Vitro Lock In Vitro Add to Contaminant Lis

Sample Info Primary Contaminant Collection Ti

Medium:	Feces	Am-241	Start:	8/5/1958
Type:	24-hr		End:	8/6/1958
Chelation:	<input checked="" type="checkbox"/>		Effective Sample Period, d:	
Medium:	Urine	Am-241	Start:	3/27/1958
Type:	24-hr		End:	3/28/1958
Chelation:	<input type="checkbox"/>		Effective Sample Period, d:	

Dropdown Menus

- Consistent nomenclature, abbreviations, and spelling, are vital to a searchable database.
- Dropdown menus eliminate 'typos' and ensure consistent nomenclature by forcing the user to select from a finite list of values.

Incidents Contamination **In Vitro** In Vivo Air Monitoring Work Site

Case_No: **0102** Chelated

Edit In Vitro Lock In Vitro Add to Contam

Sample Info	Primary Contaminant	Colle
Medium: Feces Type: 24-hr Chelation: <input type="checkbox"/>	Am-241 Am-241, Pu Am-241, Pu-238 Am-241, Pu-239 Am-241, Pu-241 Am-242 Am-242m Am-243	Start: 6/2 End: 6/2 Effective S Period, d:
Medium: Urine Type: 24-hr Chelation: <input type="checkbox"/>		Start: 3/2 End: 3/2 Effective S Period, d:

Application

- **Standardized Units are compatible with the Integrated Modules for Bioassay Analysis (IMBA) software.**
- **Searchable forms and quality assurance measures extended and applied to the (now completed) internal USTUR pathology database.**
- **Will facilitate research based upon USTUR data.**
 - **Data is more accessible.**
 - **Reliable electronic source of health physics data.**



User Manual

- A work in progress...
- http://www.ustur.wsu.edu/PolicyProcedures/DataEntry_HP/index.html

Washington State University College of Pharmacy
United States Transuranium & Uranium Registries

USTUR Mission About Us Registrant Login

User Manual
USTUR health physics database

- 1.0 Form Layout and Design
 - 1.1 Field Colors: Locked, Required, and Optional fields
 - 1.2 Tabbed Structure: eight tabs for eight data types
 - 1.2.1 Tab one: Incidents
 - 1.2.2 Tab two: Contamination
 - 1.2.3 Tab three: In Vitro
 - 1.2.4 Tab four: In Vivo
 - 1.2.5 Tab five: Air Monitoring
 - 1.2.6 Tab six: Worksite Assessments
 - 1.2.7 Tab seven: External
 - 1.2.7.1 Historical External Nomenclature
 - 1.2.8 Tab eight: Treatment
- 2.0 Quality Assurance: Unit Standardization, Dropdown Menus and Automatic Calculations
- 3.0 Data Entry
 - 3.1 Editing, Adding, Locking, and Deleting Records
 - 3.2 Incidents
 - 3.3 Contamination
 - 3.4 In Vitro
 - 3.5 In Vivo
 - 3.6 Air Monitoring
 - 3.7 Worksite Assessments
 - 3.8 External
 - 3.9 Treatment
- A.0 Appendix A: Technical Table Details
 - A.1 Appendix A: Primary Data Tables
 - A.2 Appendix A: Validation Tables

This page was last updated on February 11, 2008. usturwebmaster@tricity.wsu.edu

USTUR, Washington State University, 1845 Terminal Dr. Suite 201, Richland, WA 99354-4959 USA, 1-509-946-8870 or 1-800-375-9317

Thank You

Questions?

- smccord@tricity.wsu.edu

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