NIOSH Investigation into INL Site Profile Review Issue 24

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ISSUE 24

Issue 24 states the following actions for NIOSH/SC&A: Look at interviews appearing in SC&A's site profile review for relevant anecdotal discussions on extremity exposures. NIOSH will report how many INL/ANL-W claimants have extremity cancers.

The table below illustrates the extremity cancers for claimants at INL/ANL-W. Fifty three claimants were diagnosed with a total of 62 cancers. The total number of claims for the INL and ANL-W is 1736. Three percent of INL and ANL-W claims involve extremity cancers.

NIOSH		ICD-9	Illness	Diagnosis		Extremity
Claim ID	Facility	Code	Description	Date	Job Title	Dosimetry
[Redacted]	Idaho National Laboratory	172.7	Malignant Melanoma of the left Foot, Clark's Level IV	1998	[Redacted]	N
[Redacted]	Idaho National Laboratory	232.6	Cancer in situ, right leg	1993	[Redacted]	N
[Redacted]	Idaho National Laboratory	232.6	Squamous cell carcinoma, in situ, right arm lesion	2002	[Redacted]	N
[Redacted]	Idaho National Laboratory	232.6	SCC, in situ, left wrist	2002	[Redacted]	N
[Redacted]	Idaho National Laboratory	232.6	SCC, in-situ, right posterior forearm	2000	[Redacted]	N
[Redacted]	Idaho National Laboratory	232.6	SCC in situ-3rd digit on left hand	2001	[Redacted]	N
[Redacted]	Idaho National Laboratory	232.6	SCC in-situ, left hand	2004	[Redacted]	Y 1988, 1989
[Redacted]	Idaho National Laboratory	232.6	SCC in-situ, left hand	2005	[Redacted]	Y 1988, 1989
[Redacted]	Idaho National Laboratory	232.6	Squamous cell carcinoma in situ left elbow	2003	[Redacted]	N

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NIOSH Claim ID	Es siliter	ICD-9	Illness	Diagnosis	Ich Title	Extremity
Claim ID	Facility	Code	Description Squamous cell	Date	Job Title	Dosimetry
	Idaho National		carcinoma in situ, left		[Redacted]	
[Redacted]	Laboratory	232.7	leg	2003	[Reducted]	N
[Kcdactcd]	Laboratory	232.1	icg	2003		11
	Idaho National				[Redacted]	
[Redacted]	Laboratory	232.6	SCC in-situ, left arm	2001		N
	,		Squamous cell			
	Idaho National		carcinoma, in-situ,		[Redacted]	
[Redacted]	Laboratory	232.7	right posterior ankle	2008		N
	Idaho National		Malignant melanoma,		[Redacted]	
[Redacted]	Laboratory	172.6	left forearm	2005		N
	Argonne					
	National		000 1 1 1 6		[Redacted]	
	Laboratory-	222 6	SCC, in-situ, left	2011		
[Redacted]	West	232.6	forearm	2011		N
	Idaho National		Melanoma, lower left		[Redacted]	
[Redacted]	Laboratory	232.6	arm in situ	2002	[Redacted]	N
[Kedacted]	Argonne	232.0	arm m situ	2002		11
	National					
	Laboratory-		Malignant melanoma		[Redacted]	
[Redacted]	West	232.7	in situ; right calf	1998		N
[reducted]	77 OSC	232.7	Squamous cell	1,7,0		1,
	Idaho National		carcinoma in situ,		[Redacted]	
[Redacted]	Laboratory	232.6	lower right arm	2004		N
[Troductor]	20001001	202.0	10 11 11 11 11 11 11 11 11	200.		
	Idaho National		SCC, right index		[Redacted]	
[Redacted]	Laboratory	232.6	finger (in-situ)	2004		N
	Idaho National		SCC, Bowen type,		[Redacted]	
[Redacted]	Laboratory	232.6	right forearm	2009		N
	Idaho National		SCC, skin left lower		[Dadaatad]	
[Redacted]	Laboratory	232.6	arm, in-situ	2005	[Redacted]	N
[Redacted]	Laboratory	232.0	arm, m-situ	2003		IN .
	Idaho National		Lentigo malignant		[Redacted]	Y
[Redacted]	Laboratory	232.6	melanoma, in-situ, left forearm	2007	[Iccacicu]	1955-1992
[Redacted]	Laboratory	232.0	TOTEATHI	2007		1733-1772
	Idaho National		Malignant melanoma-		[Redacted]	
[Redacted]	Laboratory	172.6	left dorsal arm	1991	[==========	N
[. =				
	Idaho National		SCC in situ; skin, R		[Redacted]	
[Redacted]	Laboratory	232.6	hand	2003		N

NIOSH Claim ID	Facility	ICD-9 Code	Illness Description	Diagnosis Date	Job Title	Extremity Dosimetry
Claim ID	Facility	Coue	Description	Date	JOD THE	Dosinieu y
	Idaho National		Carcinoma in situ,		[Redacted]	
[Redacted]	Laboratory	232.6	Skin of left arm	1989		N
			SCC, in-situ, Bowen's			
	Idaho National		type right middle		[Redacted]	
[Redacted]	Laboratory	232.6	finger	2005		N
	Idaho National		Melanoma of the right		[Dadaatad]	
[Redacted]	Laboratory	172.7	leg	1951	[Redacted]	N
[Redacted]	Argonne	1/2./	icg	1731		11
	National		Squamous cell		55 1 17	
	Laboratory-		carcinoma in situ;		[Redacted]	
[Redacted]	West	232.6	right arm	2002		N
			Squamous cell			
	Idaho National		carcinoma in situ;		[Redacted]	
[Redacted]	Laboratory	232.6	right arm	2002		N

	Idaho National	222.6	Skin; SCC in situ,	2004	[Redacted]	
[Redacted]	Laboratory	232.6	right forearm	2004		N
	Idaho National		Melanoma in situ, left		[Redacted]	
[Redacted]	Laboratory	232.6	wrist	2005	[Redacted]	N
[reducted]	Zucorucory	202.0	Malignant melanoma	2000		21
	Idaho National		in situ, right dorsal		[Redacted]	
[Redacted]	Laboratory	232.6	hand	2005		N
	_					
	Idaho National				[Redacted]	
[Redacted]	Laboratory	232.6	SCC, left wrist	2004		N
	711 NY 2 1		Squamous cell		[D - 14 - 4]	
[D 1 4 1]	Idaho National	222.6	carcinoma in situ; left	1007	[Redacted]	N
[Redacted]	Laboratory	232.6	dorsal hand	1997		N
	Idaho National		Melanoma in situ -		[Redacted]	
[Redacted]	Laboratory	232.6	left arm	1990	[reducted]	N
	, , , , , , , , , , , , , , , , , , ,		Squamous cell			
	Idaho National		carcinoma in-situ,		[Redacted]	
[Redacted]	Laboratory	232.7	right anterior tibia	1996		N
			- · · · · ·			
	Idaho National	222 5	Skin cancer R middle	1000	[Redacted]	
[Redacted]	Laboratory	232.6	finger Bowen's SCC	1989		N
	Idaha Mada a 1		Squamous cell		[Dadestad]	
[Dodostod]	Idaho National	232.6	carcinoma in-situ of the right wrist	2006	[Redacted]	N
[Redacted]	Laboratory	232.0	the right wrist	2000		N

NIOSH		ICD-9	Illness	Diagnosis		Extremity
Claim ID	Facility	Code	Description	Date	Job Title	Dosimetry
	Idaho National		Acral melanoma, right		[Dadaatad]	
[Redacted]	Laboratory	172.7	foot	2003	[Redacted]	N
[Redacted]	Laboratory	1/2./	1000	2003		11
	Idaho National		SCC, in situ, right		[Redacted]	
[Redacted]	Laboratory	232.6	dorsal hand	2012		N
			Squamous cell			
	Idaho National		carcinoma in-situ on		[Redacted]	
[Redacted]	Laboratory	232.7	the left lateral foot	2008		N
	711 N		36.12		55 1 17	
FD 1 . 13	Idaho National	170.6	Malignant Melanoma,	2002	[Redacted]	N
[Redacted]	Laboratory	172.6	Skin, Left Arm	2003		N
	Idaho National		SCC, Bowen's in situ,		[Redacted]	
[Redacted]	Laboratory	232.6	left forearm	2001	[Reducted]	N
[reducted]	Laboratory	232.0	Squamous cell	2001		11
	Idaho National		carcinoma in situ of		[Redacted]	
[Redacted]	Laboratory	232.6	the left hand	2002		N
[==========			,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			
	Idaho National		In Situ Malignant		[Redacted]	
[Redacted]	Laboratory	232.6	Melanoma	2002		N
			Squamous cell			
	Idaho National		carcinoma in-		[Redacted]	
[Redacted]	Laboratory	232.6	situ/right hand	2009		N
			Intraepithelial			
			squamous cell			
			carcinoma of the left		[Redacted]	
		173.7	ankle		[Reducted]	
	Idaho National					
[Redacted]	Laboratory			2009		N
			SCC, in situ, left			
	Idaho National		forearm (Bowen's		[Redacted]	
55[Redacted]	Laboratory	232.6	disease)	2011		N
			Squamous Cell			
			Carcinoma (SCC), in			
	Idaho National	205 -	situ of the right	2007	No data	
[Redacted]	Laboratory	232.6	forearm	2005	entered	N
	TII NT		SCC, in situ, of the		Dod 12	
ID 1 / 17	Idaho National	222.6	skin of the left hand	1000	[Redacted]	N.T.
[Redacted]	Laboratory	232.6	(thenar eminence)	1998		N
			SCC, in situ,			
	Idoho Matian 1		(Bowen's Disease) of		[Redacted]	
[Dadestad]	Idaho National	222.6	the skin of the left	2002		N
[Redacted]	Laboratory	232.6	thenar eminence	2002		N

NIOSH		ICD-9	Illness	Diagnosis		Extremity
Claim ID	Facility	Code	Description	Date	Job Title	Dosimetry
	Idaho National		SCC, in situ, right		No data	
[Redacted]	Laboratory	232.6	dorsum hand	2008	entered	N
[reducted]	2400140013	202.0	GOIDWIII IIWIIG	2000	01100100	2,
	Idaho National		Melanoma in-situ of		[Redacted]	
[Redacted]	Laboratory	172.6	right elbow skin	2011		N
	Argonne					
	National Laboratory-		Melanoma, in situ,		[Redacted]	
[Redacted]	West	172.6	right elbow	2000		N
[Redacted]	vv est	172.0	right cloow	2000		11
	Idaho National		Melanoma of the right		[Redacted]	Y
[Redacted]	Laboratory	172.7	shin	2008		1986-1988
			Squamous cell			
	Idaho National		carcinoma (SCC), in		[Redacted]	
[Redacted]	Laboratory	232.6	situ, right dorsal wrist	2006		N
	Idaho National				[Redacted]	Y
[Redacted]	Laboratory	173.71	BCC, right lower leg	2005	[Redacted]	2006-2011
[Redacted]	Laboratory	173.71	Squamous cell	2003		2000-2011
	Idaho National		carcinoma (SCC) in-		[Redacted]	
[Redacted]	Laboratory	232.6	situ right dorsal hand	2007		N
ID 1 1 11	Idaho National	170.6	Malignant melanoma	2012	[Redacted]	NT
[Redacted]	Laboratory	172.6	right lateral arm	2012		N
	Idaho National				[Redacted]	
[Redacted]	Laboratory	173.71	BCC right shin	2011	,	N
			Squamous cell			
	Idaho National		carcinoma (SCC) in		[Redacted]	
[Redacted]	Laboratory	232.6	situ right elbow	2006		N
	Idaho National		Melanoma left lateral		No data	
[Redacted]	Laboratory	172.7	calf	2008	entered	N
[zecacica]		- · - · ·	Squamous cell			-,
	Idaho National		carcinoma in situ		[Redacted]	
[Redacted]	Laboratory	232.7	medial left lower leg	2009		N

The following ICD-9 codes were used in the database query:

ICD-9	
Code	Description
172.6	Malig melanoma arm
172.7	Malig melanoma leg
	Unspecified malig neo skin lower limb, incl
173.70	hip
173.71	BCC skin lower limb, incl hip
173.72	SCC skin lower limb, incl hip
	Other specified malig neo skin lower limb,
173.79	incl hip
232.6	Ca in situ skin arm
232.7	Ca in situ skin leg

For codes 172.6, 172.7, 232.6 and 232.7, cancers with specified locations that did not meet the definition of extremity (arm below the elbow and leg below the knee) were excluded.

The following comments regarding extremity exposures are from interviews appearing in SC&A's site profile review:

Multiple badges and extremity dosimetry have been in use since 1953. Multiple badges included dosimetry for extremities (e.g., finger rings), the upper trunk, the lower trunk, and any other location deemed necessary by RadCon personnel. "Routine" badges were worn in addition to the multiple dosimeters provided for a job. Workers wore their primary dosimeters customarily on their chest or at their belt level. In the case of multiple dosimeters, the highest dosimeter value was recorded as the dose of record. The results from all badges of a multiple pack were maintained in the individual's dosimetry file. The use of multiple badging was based on multiple high-level sources being present simultaneously in the work area, high-level point source with multiple workers, or other arrangements reflecting non-uniform fields.

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Formal procedures are now in place for extremity and multiple badging, including when and how to use multi-badging. The multi-badging records were kept in the regular worker files. The highest dose recorded was assigned as the dose of record up until 1995. At that time, INL implemented weighting factors to calculate dose from multiple dosimetry systems.

There were situations, especially during maintenance activities, where there was partial-body exposure to workers. Many site experts were concerned about the potential in their jobs for extremity or nonuniform exposure. Multi-badging was used only in unusual conditions. For example, it was used during the SL-1 incident to monitor for high beta exposures. It was also sometimes used at the NWCF.

Multi-badging was rarely used among maintenance and operations workers. While typically there was some shielding afforded to the whole body during maintenance jobs, workers were often required to reach inside an area or around a pipe or valve where dose rates were much higher. In some cases, work was performed in tight spaces in close proximity to high-radiation sources. In the past, management required workers to perform some high radiation jobs without multi-badging. The multi-badging is very important in assessing external dose, as some jobs involved different dose rates at different body levels in a high radiation area.

Prior to the 1980 time period, extremity and multi-badging were rare. Laboratory personnel often wore extremity monitoring. The jobs which typically required extremity dosimetry included the following:

- Bottling of Krypton gas
- Maintenance at the NWCF
- Replacement of valve boxes in tank storage
- Entry into hot cells (starting in the 1990s)

Extremity dosimetry was implemented in the 1980s for crafts personnel. Not all operators were provided with extremity dosimetry in the earlier years.

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