DEFENSE LOGISTICS AGENCY
DEFENSE NATIONAL STOCKPILE CENTER
8725 JOHN J. KINGMAN ROAD, SUITE 3229
FT. BELVOIR, VIRGINIA 22060-6223

August 19, 2005

AMENDMENT NO. 002
TO
SOLICITATION OF OFFERS FOR
FERROTUNGSTEN AND TUNGSTEN METAL POWDER
UNDER
DLA-FERROTUNGSTEN AND TUNGSTEN METAL POWDER-003

The above referenced Solicitation for the sale of Ferrotungsten and Tungsten Metal Powder is hereby amended to schedule a Tungsten Metal Powder offering for fiscal year 2005 and update various sections of the Solicitation, as follows:

1. Section A.1 Introduction (FEB 05)

Delete this section in its entirety and replace with the following:

A.1 Introduction (AUG 05)

a. The Defense Logistics Agency (DLA), Defense National Stockpile Center (DNSC), is soliciting offers for the sale of approximately 300,000 pounds of Ferrotungsten and 300,000 lbs of Tungsten Metal Powder and Fabricated Tungsten Materials in Fiscal Year 2005.

The offering for **Ferrotungsten** in Fiscal Year 2005 has been completed.

The offering for **Tungsten Metal Powder and Fabricated Tungsten Materials** will be held on **Thursday, September 1, 2005, at 2:00 pm** local time, Fort Belvoir, VA.

Offers must be received at the address in Section B.2.a. by 2:00 pm, local time, Fort Belvoir, VA. In the event that DNSC is closed at that time, offers for that day will be received at 2:00 pm on the next DNSC business day.

b. Delivery of any and all Tungsten is F.O.B. carrier's conveyance. (See Sections F.1.d. and F.1.e.)

2. SECTION B.8 Negotiation Procedures (SEP 02)

Delete the following portion of this section:

"The Government intends to evaluate offers and award a contract after conducting discussions with all offerors whose offers have been determined to be within the competitive range.

The following procedure will be utilized:"

Replace with the following:

"The Government intends to evaluate offers and award a contract after conducting discussions with all offerors whose offers have been determined to be within the competitive range. However, the Government reserves the right to award without discussions. Accordingly, offerors are advised to include their best possible terms in their initial offer.

If the Government determines that holding discussions is in its best interest, the following procedure will be utilized:"

3. SECTION F.1 Request for Shipment (MAY 02), paragraph h

Delete this paragraph in its entirety and replace with the following:

h. Requests for shipment shall be for a minimum of one complete line item. Shipping instructions and information requested in paragraph b., above, are to be furnished to the following address:

Defense National Stockpile Center
ATTN: Tungsten Contract Specialist
8725 John J. Kingman Road, Suite 3229
Fort Belvoir, VA 22060-6223
Facsimile Number (703) 767-5494

The Government shall determine the order in which the material is scheduled, coordinated, and outloaded.

4. Section I.2 Item Offer Page – Tungsten Metal Powder Carbon & Hydrogen Reduced

Delete this section in its entirety and replace with the attached **Section I.2 Item Offer Page – Tungsten Metal Powder (Carbon & Hydrogen Reduced Powder + Fabricated Materials) (AUG 05)**

5. **Section J.1 Analysis Tungsten Metal Powder (APR 03)**

Delete this section in its entirety and replace with the attached **Section J.1 Analysis – Tungsten Metal Powder (Carbon & Hydrogen Reduced Powder + Fabricated Materials) (AUG 05)**.

6. **Section J.5 Material Safety Data Sheet - Tungsten Metal Powder**

Delete this section in its entirety and replace with the attached **Section J.5 Material Safety Data Sheet – Tungsten Metal Powder**

7. Except as provided herein, all other terms and conditions of DLA-FERROTUNGSTEN AND TUNGSTEN METAL POWDER-003, as amended by Amendment No. 001 thereto, remain unchanged and in full force and effect.

8. Offerors shall acknowledge receipt of this Amendment by signing in the space provided below and returning a copy of this form along with their offer to:

ATTN: DNSC-R/Bid Custodian
Defense National Stockpile Center
8725 John J. Kingman Road
Suite 3229
Fort Belvoir, VA 22060-6223
Facsimile No. (703) 767-5541

Failure to acknowledge receipt of this Amendment may result in the offeror being considered ineligible for award.

NAME OF FIRM: _____

ADDRESS: _____

TELEPHONE: _____

FACSIMILE: _____

BY: _____

SIGNATURE: _____

TITLE: _____

DATE: _____

I.2 Item Offer Page -- Tungsten Metal Powder (Carbon & Hydrogen Reduced Powder + Fabricated Materials) (AUG 05)

Item	Location	Lot	Description	# of Units	Bulk Wt. (lbs)	W Content (%)	W Content (lbsW)	W Content (kgW)		Offered Unit Price ($ / kgW)		Total Offered Price ($)
338	Point Pleasant, WV	CF-12	Carbon reduced	21	21,844	99.45	21,724	9,853.78	X		=	
339	Point Pleasant, WV	CF-13	Carbon reduced	20	21,144	99.35	21,007	9,528.42	X		=	
342	Point Pleasant, WV	CF-9	Carbon reduced	20	21,470	99.58	21,380	9,697.73	X		=	
365	New Haven, IN	CF-14	Carbon reduced	9	9,198	99.65	9,166	4,157.54	X		=	
366	New Haven, IN	CF-15	Carbon reduced	21	21,384	99.65	21,309	9,665.67	X		=	
367	New Haven, IN	CF-16	Carbon reduced	22	21,280	99.67	21,210	9,620.59	X		=	
368	New Haven, IN	CF-18	Carbon reduced	20	20,435	99.69	20,372	9,240.43	X		=	
369	New Haven, IN	CF-19	Carbon reduced	19	19,072	99.68	19,011	8,623.23	X		=	
370	New Haven, IN	CF-20	Carbon reduced	19	20,037	99.58	19,953	9,050.46	X		=	
372	New Haven, IN	CF-22	Carbon reduced	19	18,988	99.62	18,916	8,580.08	X		=	
374	New Haven, IN	2604	Carbon reduced	17	7,284	97.73	7,119	3,228.97	X		=	
375	New Haven, IN	2608	Carbon reduced	20	14,999	99.24	14,885	6,751.73	X		=	
376	New Haven, IN	2609	Carbon reduced	20	14,999	99.24	14,885	6,751.73	X		=	
377	New Haven, IN	2610	Carbon reduced	20	14,999	99.50	14,924	6,769.42	X		=	
378	New Haven, IN	2614	Carbon reduced	20	14,999	99.23	14,884	6,751.05	X		=	
379	New Haven, IN	2615	Carbon reduced	21	14,999	99.42	14,912	6,763.97	X		=	
380	New Haven, IN	2621	Carbon reduced	20	14,999	99.46	14,918	6,766.69	X		=	
381	New Haven, IN	2622	Carbon reduced	20	14,999	99.43	14,914	6,764.65	X		=	
382	New Haven, IN	2623	Carbon reduced	20	14,999	99.48	14,921	6,768.05	X		=	
383	New Haven, IN	2628	Carbon reduced	20	14,999	99.45	14,917	6,766.01	X		=	
384	New Haven, IN	2629	Carbon reduced	20	14,999	99.47	14,920	6,767.37	X		=	
385	New Haven, IN	2630	Carbon reduced	20	14,999	99.46	14,918	6,766.69	X		=	
					367,125		**365,161**	**165,634.26**				
501	New Haven, IN	001	Hydrogen reduced	20	9,986	98.81	9,867	4,475.67	X		=	
502	New Haven, IN	002	Hydrogen reduced	20	9,994	99.22	9,916	4,497.96	X		=	
503	New Haven, IN	003	Hydrogen reduced	20	9,995	98.92	9,887	4,484.47	X		=	
504	New Haven, IN	004	Hydrogen reduced	20	9,907	99.23	9,831	4,459.14	X		=	
505	New Haven, IN	005	Hydrogen reduced	20	9,963	99.24	9,888	4,485.00	X		=	
506	New Haven, IN	006	Hydrogen reduced	20	9,965	99.48	9,913	4,496.45	X		=	
507	New Haven, IN	1/10	Hydrogen reduced	19	18,696	99.61	18,623	8,447.47	X		=	
508	New Haven, IN	11/17	Hydrogen reduced	13	13,026	99.77	12,996	5,894.86	X		=	
509	New Haven, IN	29/39	Hydrogen reduced	22	21,953	99.82	21,913	9,939.59	X		=	
510	New Haven, IN	51/57	Hydrogen reduced	10	10,015	99.62	9,976	4,525.25	X		=	
512	New Haven, IN	6301	Hydrogen reduced	27	9,999	99.77	9,976	4,525.04	X		=	
513	New Haven, IN	6306	Hydrogen reduced	14	4,999	99.79	4,989	2,262.75	X		=	
514	New Haven, IN	6307	Hydrogen reduced	27	9,999	99.71	9,970	4,522.32	X		=	
515	New Haven, IN	6308	Hydrogen reduced	38	13,999	99.75	13,964	6,333.97	X		=	
516	New Haven, IN	6311	Hydrogen reduced	18	6,999	99.83	6,987	3,169.30	X		=	

Item	Location	Lot	Description	# of Units	Bulk Wt. (lbs)	W Content (%)	W Content (lbsW)	W Content (kgW)		Offered Unit Price ($ / kgW)		Total Offered Price ($)
517	New Haven, IN	6312	Hydrogen reduced	24	9,499	99.83	9,483	4,301.35	X		=	
518	New Haven, IN	6315	Hydrogen reduced	20	9,999	99.83	9,982	4,527.76	X		=	
519	New Haven, IN	6316	Hydrogen reduced	19	9,499	99.90	9,490	4,304.37	X		=	
520	New Haven, IN	6321	Hydrogen reduced	24	11,999	99.87	11,983	5,435.58	X		=	
521	New Haven, IN	U-140	Hydrogen reduced	25	24,876	99.55	24,764	11,232.70	X		=	
522	New Haven, IN	U-142	Hydrogen reduced	25	24,999	99.46	24,864	11,278.12	X		=	
523	New Haven, IN	U-143	Hydrogen reduced	25	24,967	99.23	24,775	11,237.73	X		=	
524	New Haven, IN	U-1375	Hydrogen reduced	8	7,874	99.76	7,855	3,563.01	X		=	
525	New Haven, IN	U-1383	Hydrogen reduced	8	6,895	99.78	6,880	3,120.64	X		=	
526	New Haven, IN	U-1394	Hydrogen reduced	5	4,687	99.71	4,673	2,119.82	X		=	
527	New Haven, IN	U-1408	Hydrogen reduced	8	7,842	99.81	7,827	3,550.31	X		=	
528	New Haven, IN	U-1414	Hydrogen reduced	4	3,733	99.68	3,721	1,687.84	X		=	
529	New Haven, IN	U-1415	Hydrogen reduced	3	3,063	99.85	3,058	1,387.27	X		=	
530	New Haven, IN	U-1416	Hydrogen reduced	3	3,334	99.63	3,322	1,506.68	X		=	
531	New Haven, IN	U-1417	Hydrogen reduced	8	7,847	99.72	7,825	3,549.37	X		=	
532	New Haven, IN	U-1419	Hydrogen reduced	5	5,947	99.93	5,943	2,695.63	X		=	
533	New Haven, IN	U-1430	Hydrogen reduced	8	7,999	99.58	7,966	3,613.16	X		=	
534	New Haven, IN	U-1459	Hydrogen reduced	8	7,932	98.96	7,850	3,560.48	X		=	
535	New Haven, IN	U-1462	Hydrogen reduced	8	8,024	99.81	8,009	3,632.71	X		=	
536	New Haven, IN	U-1463	Hydrogen reduced	6	5,152	99.62	5,132	2,328.03	X		=	
537	New Haven, IN	U-1467	Hydrogen reduced	8	7,948	99.81	7,933	3,598.30	X		=	
538	New Haven, IN	U-1468	Hydrogen reduced	7	8,056	99.84	8,043	3,648.29	X		=	
546	New Haven, IN	ZU-46	Hydrogen reduced	2	2,007	99.58	1,999	906.54	X		=	
547	New Haven, IN	ZU-47	Hydrogen reduced	1	1,002	99.62	998	452.77	X		=	
					384,675		**383,070**	**173,757.68**				
561	Pt. Pleasant, WV	715	Rods	53	**8,709**	99.97	**8,706**	**3,948.98**	X		=	
571	New Haven, IN	35-W	Hardcores	102	**9,489**	82.27	**7,807**	**3,541.00**	X		=	
					769,998		**764,744**	**346,881.92**				

Note: Gray item number = Hazmat shipment…DOT: Metal powder, flammable, n.o.s. (tungsten), 4.1, UN 3089, PG II or III.

Company Name

Name and Title of Person Submitting Offer

Signature and Date

J.1 Analysis -- Tungsten Metal Powder (Carbon & Hydrogen Reduced Powder + Fabricated Materials) (AUG 05)

TUNGSTEN METAL (C-REDUCED) ANALYSES

Percent

Item #	Lot #	Depot	W	O	C	Fe	Si	Mn	Mo	Ca	Al	S	P	Ta	Cr	Ni	Cu	Na	Particle Size (microns)
338	CF-12	Pt.Pleasant, WV	99.45	0.22	0.13	0.050	0.007	0.001	0.050	<0.002	<0.001	0.002	<0.005	<0.005	0.030	0.050	<0.001	0.001	*
339	CF-13	Pt.Pleasant, WV	99.35	0.29	0.15	0.050	0.015	0.001	0.050	<0.002	0.003	0.003	<0.005	<0.005	0.030	0.050	<0.001	0.003	*
342	CF-9	Pt.Pleasant, WV	99.58	0.20	0.14	0.020	<0.001	<0.001	0.020	<0.002	<0.001	0.002	<0.005	<0.005	0.015	0.005	<0.001	0.005	*
365	CF-14	New Haven, IN	99.65	0.15	0.10	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.02	<0.01	0.02	*
366	CF-15	New Haven, IN	99.65	0.14	0.11	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.03	<0.01	0.02	*
367	CF-16	New Haven, IN	99.67	0.14	0.10	0.02	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	0.02	<0.01	<0.01	*
368	CF-18	New Haven, IN	99.69	0.13	0.08	0.03	<0.01	0.02	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	*
369	CF-19	New Haven, IN	99.68	0.15	0.08	0.03	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	*
370	CF-20	New Haven, IN	99.58	0.21	0.09	0.03	<0.01	0.03	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	*
372	CF-22	New Haven, IN	99.62	0.19	0.11	0.02	<0.01	<0.01	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	*
374	2604	New Haven, IN	97.73	2.10	0.10	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**
375	2608	New Haven, IN	99.24	0.63	0.07	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	**

			Percent																
Item #	**Lot #**	**Depot**	**W**	**O**	**C**	**Fe**	**Si**	**Mn**	**Mo**	**Ca**	**Al**	**S**	**P**	**Ta**	**Cr**	**Ni**	**Cu**	**Na**	**Particle Size (microns)**
376	2609	New Haven, IN	99.24	0.64	0.07	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	* *
377	2610	New Haven, IN	99.50	0.37	0.08	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	* *
378	2614	New Haven, IN	99.23	0.62	0.08	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	* *
379	2615	New Haven, IN	99.42	0.42	0.08	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	* *
380	2621	New Haven, IN	99.46	0.39	0.08	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	* *
381	2622	New Haven, IN	99.43	0.39	0.09	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	* *
382	2623	New Haven, IN	99.48	0.38	0.08	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	* *
383	2628	New Haven, IN	99.45	0.37	0.10	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	0.02	<0.01	<0.01	0.02	<0.01	<0.01	<0.01	* *
384	2629	New Haven, IN	99.47	0.36	0.09	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	* *
385	2630	New Haven, IN	99.46	0.38	0.09	0.03	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01	* *

* Stockpile Purchase Spec. P-102:

Retained on No. 60 U.S. Standard Sieve -- 2% max
Passing No. 60 but retained on No. 100 -- 20%-50%
Passing No. 100 but retained on No. 200 -- 30%-80%
Passing No. 200 -- 25% max

* * Lots 2608-2630 = 1.71-2.15; Lot 2604 = 11.0

Gray **item** number = Hazmat shipment...DOT: Metal powder, flammable, n.o.s. (tungsten), 4.1, UN 3089, PG III.

TUNGSTEN METAL (H-REDUCED) ANALYSES

Percent

Item #	Lot #	Depot	W	O	Fe	Mo	Ni	Sb	Al	Cu	Si	Ca	Mg	Na	K	Ta	Cr	Other Met	NonVol Res	Particle Size* (microns)
501	001	New Haven, IN	98.81	0.64	0.01	0.02	<0.01	<0.01	<0.01	<0.01	0.07	<0.01	<0.01	<0.01	0.12	<0.01	<0.01	None	0.31	Type VIII
502	002	New Haven, IN	99.22	0.35	0.02	0.02	<0.01	<0.01	<0.01	<0.01	0.08	0.01	<0.01	0.01	0.11	<0.01	<0.01	None	0.16	Type VIII
503	003	New Haven, IN	98.92	0.64	0.03	0.02	<0.01	<0.01	<0.01	<0.01	0.08	0.01	<0.01	<0.01	0.12	<0.01	<0.01	None	0.16	Type VIII
504	004	New Haven, IN	99.23	0.34	0.02	0.02	<0.01	<0.01	<0.01	<0.01	0.07	<0.01	<0.01	0.01	0.10	<0.01	<0.01	None	0.20	Type VIII
505	005	New Haven, IN	99.24	0.31	0.01	0.02	<0.01	<0.01	<0.01	<0.01	0.07	<0.01	<0.01	0.01	0.09	<0.01	<0.01	None	0.23	Type VIII
506	006	New Haven, IN	99.48	0.24	0.02	0.02	<0.01	<0.01	<0.01	<0.01	0.07	0.01	<0.01	<0.01	0.04	<0.01	<0.01	None	0.10	Type VIII
507	1/10	New Haven, IN	99.61	0.37	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	None	0.02	Type VIII
508	11/17	New Haven, IN	99.77	0.21	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	None	0.02	Type VIII
509	29/39	New Haven, IN	99.82	0.15	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	None	0.03	Type VIII
510	51/57	New Haven, IN	99.62	0.36	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	None	0.02	Type V
512	6301	New Haven, IN	99.77	0.16	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	None	0.03	Type V
513	6306	New Haven, IN	99.79	0.18	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	None	0.02	Type VI
514	6307	New Haven, IN	99.71	0.18	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	None	0.06	Type VI
515	6308	New Haven, IN	99.75	0.18	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	None	0.03	Type VI
516	6311	New Haven, IN	99.83	0.15	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	None	0.03	Type VII
517	6312	New Haven, IN	99.83	0.11	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	None	0.03	Type VII
518	6315	New Haven, IN	99.83	0.15	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	None	0.02	Type X
519	6316	New Haven, IN	99.90	0.06	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	None	0.02	Type X
520	6321	New Haven, IN	99.87	0.06	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	None	0.03	Type X
521	U-140	New Haven, IN	99.55	0.26	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	0.01	<0.01	<0.01	None	0.11	Type VIII
522	U-142	New Haven, IN	99.46	0.26	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	0.01	<0.01	<0.01	None	0.19	Type VIII

Percent

Item #	Lot #	Depot	W	O	Fe	Mo	Ni	Sb	Al	Cu	Si	Ca	Mg	Na	K	Ta	Cr	Other Met	NonVol Res	Particle Size* (microns)
523	U-143	New Haven, IN	99.23	0.53	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.03	0.01	<0.01	<0.01	None	0.16	Type VIII
524	U-1375	New Haven, IN	99.76	0.18	<0.01	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	None	0.03	Type VIII
525	U-1383	New Haven, IN	99.78	0.16	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	None	0.04	Type VIII
526	U-1394	New Haven, IN	99.71	0.16	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	None	0.09	Type VIII
527	U-1408	New Haven, IN	99.81	0.07	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	None	0.10	Type VIII
528	U-1414	New Haven, IN	99.68	0.26	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	None	0.04	Type VIII
529	U-1415	New Haven, IN	99.85	0.08	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	None	0.04	Type VIII
530	U-1416	New Haven, IN	99.63	0.28	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	None	0.06	Type VIII
531	U-1417	New Haven, IN	99.72	0.22	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	None	0.03	Type VIII
532	U-1419	New Haven, IN	99.93	0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	None	0.03	Type VIII
533	U-1430	New Haven, IN	99.58	0.40	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	None	0.02	Type VIII
534	U-1459	New Haven, IN	98.96	0.98	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	None	0.04	Type VII
535	U-1462	New Haven, IN	99.81	0.14	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	None	0.03	Type VII
536	U-1463	New Haven, IN	99.62	0.31	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	None	0.03	Type VII
537	U-1467	New Haven, IN	99.81	0.13	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	None	0.04	Type VII
538	U-1468	New Haven, IN	99.84	0.10	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	None	0.04	Type VII
546	ZU-46	New Haven, IN	99.58	0.35	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	None	0.04	Type VI
547	ZU-47	New Haven, IN	99.62	0.33	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	None	0.03	Type VI

* Type designation per Stockpile Purchase Spec. P-89-R2:

Type IV: 1.0-1.2
Type V: 1.3-1.6
Type VI: 1.7-2.1
Type VII: 2.5-3.0
Type VIII: 3.6-4.3
Type X: 5.7-6.5

TUNGSTEN METAL (FABRICATED) ANALYSES

					Percent																																
Item	Depot	Lot	Type	W	O	C	Al	As	Ba	Be	Bi	Ca	Cd	Co	Cr	Cu	Fe	K	Mg	Mn	Sn	Mo	Na	Nb/Cb	Ni	P	N	S	Sb	Si	Ta	Ti	V	Zn	Th	U
561	Pt. Pleasant, WV	715	Rods	99.9656	0.0329	0.001	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.001	0.0005	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.005	<0.005
571	New Haven, IN	35-W	Hardcores																																	
		C'Less Ground Core:		82.1970	0.012	4.92	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	12.01	0.01	<0.01	0.50	<0.01	<0.01	0.03	0.04	<0.01	<0.01	0.01	0.03	<0.01	0.007	0.024	<0.01	0.02	0.17	0.02	<0.01	<0.01	<0.005	<0.005
		Core to be Reworked:		82.6987	0.0143	4.95	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	11.44	<0.01	<0.01	0.53	<0.01	<0.01	0.03	0.04	<0.01	<0.01	0.01	0.03	<0.01	0.008	0.029	<0.01	0.02	0.17	0.03	<0.01	<0.01	<0.005	<0.005
		Finished Core:		82.2785	0.0155	4.99	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	12.10	<0.01	<0.01	0.30	<0.01	<0.01	0.02	0.01	<0.01	<0.01	0.01	0.03	<0.01	0.009	0.017	<0.01	0.02	0.17	0.03	<0.01	<0.01	<0.005	<0.005
		CAA-1-29:		82.2868	0.0162	5.05	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	12.05	0.03	<0.01	0.23	<0.01	<0.01	0.03	0.01	<0.01	<0.01	0.01	0.03	<0.01	0.008	0.019	<0.01	<0.01	0.18	0.05	<0.01	<0.01	<0.005	<0.005
		Sintered Core:		82.2405	0.0155	5.10	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	12.05	0.01	<0.01	0.27	<0.01	<0.01	0.03	0.01	<0.01	<0.01	0.01	0.03	<0.01	0.009	0.015	<0.01	<0.01	0.16	0.05	<0.01	<0.01	<0.005	<0.005
		Special Batch:		82.26	0.0144	4.85	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	12.05	<0.01	<0.01	0.50	<0.01	<0.01	0.03	0.04	<0.01	<0.01	0.01	<0.01	<0.01	0.006	0.019	<0.01	0.02	0.18	0.02	<0.01	<0.01	<0.005	<0.005
		(Weighted Average)		82.2661																																

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

DEFENSE LOGISTICS AGENCY
DEFENSE NATIONAL STOCKPILE CENTER
8725 JOHN J. KINGMAN ROAD
SUITE 3339
FORT BELVOIR, VA 22060-6223

EMERGENCY TELEPHONE NUMBER:
1-800-424-9300 (NORTH AMERICA)
1-703-527-3887 (INTERNATIONAL)

SUBSTANCE: TUNGSTEN METAL POWDER, CARBON REDUCED (GS-00P-22924)

TRADE NAMES/SYNONYMS:
TUNGSTEN; WOLFRAM; TUNGSTEN ELEMENT; W; 00229900; RTECS YO7175000

CHEMICAL FAMILY: metal

CREATION DATE: May 28 2003
REVISION DATE: Jun 16 2005

2. COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: TUNGSTEN
CAS NUMBER: 7440-33-7
EC NUMBER (EINECS): 231-143-9
PERCENTAGE: 100

3. HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=1 FIRE=0 REACTIVITY=0

EMERGENCY OVERVIEW:
COLOR: white to gray or black
PHYSICAL FORM: powder
MAJOR HEALTH HAZARDS: No significant target effects reported.
PHYSICAL HAZARDS: Negligible fire and explosion hazard in bulk form. Dust/air mixtures may ignite or explode.

POTENTIAL HEALTH EFFECTS:
INHALATION:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: lung damage

SKIN CONTACT:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: irritation
EYE CONTACT:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: irritation
INGESTION:
SHORT TERM EXPOSURE: irritation, nausea, vomiting
LONG TERM EXPOSURE: no information on significant adverse effects

CARCINOGEN STATUS:
OSHA: No
NTP: No
IARC: No

4. FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.

SKIN CONTACT: Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.

EYE CONTACT: Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

INGESTION: If a large amount is swallowed, get medical attention.

5. FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Negligible fire and explosion hazard in bulk form. Dust/air mixtures may ignite or explode.

EXTINGUISHING MEDIA: dolomite, dry powder for metal fires, dry sand, graphite, soda ash, sodium chloride

FIRE FIGHTING: Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Use extinguishing agents appropriate for surrounding fire. Avoid inhalation of material or combustion by-products.

6. ACCIDENTAL RELEASE MEASURES

OCCUPATIONAL RELEASE:
Collect spilled material in appropriate container for disposal.

7. HANDLING AND STORAGE

STORAGE: Store and handle in accordance with all current regulations and standards. Keep separated from incompatible substances.

HANDLING: Use methods to minimize dust.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:
TUNGSTEN METAL POWDER, CARBON REDUCED (GS-00P-22924):
TUNGSTEN AND INSOLUBLE COMPOUNDS (as W):
5 mg/m3 OSHA TWA (vacated by 58 FR 35338, June 30, 1993)
10 mg/m3 OSHA STEL (vacated by 58 FR 35338, June 30, 1993)
5 mg/m3 ACGIH TWA
10 mg/m3 ACGIH STEL
5 mg/m3 NIOSH recommended TWA 10 hour(s)
10 mg/m3 NIOSH recommended STEL
5 mg/m3 UK WEL TWA
10 mg/m3 UK WEL STEL

MEASUREMENT METHOD: Particulate filter; Acid; Atomic absorption spectrometry; NIOSH III # 7074

VENTILATION: Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing.

GLOVES: Wear appropriate chemical resistant gloves.

RESPIRATOR: The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.
Measurement Element:
Tungsten (W)
50 mg/m3
Any air-purifying respirator with a high-efficiency particulate filter.
Any supplied-air respirator.
Any self-contained breathing apparatus with a full facepiece.
Escape -
Any air-purifying respirator with a full facepiece and a high-efficiency particulate filter.
Any appropriate escape-type, self-contained breathing apparatus.
For Unknown Concentrations or Immediately Dangerous to Life or Health -
Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.
Any self-contained breathing apparatus with a full facepiece.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: solid
COLOR: white to gray or black
PHYSICAL FORM: powder
ODOR: Not available
MOLECULAR WEIGHT: 183.85
MOLECULAR FORMULA: W
BOILING POINT: 10220 F (5660 C)
MELTING POINT: 6134-6206 F (3390-3430 C)
VAPOR PRESSURE: Not applicable
VAPOR DENSITY: Not applicable
SPECIFIC GRAVITY (water=1): 19.35
WATER SOLUBILITY: insoluble
PH: Not applicable
VOLATILITY: Not applicable
ODOR THRESHOLD: Not available
EVAPORATION RATE: Not applicable
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available
SOLVENT SOLUBILITY:
Soluble: nitric acid/hydrofluoric acid mixtures, fused sodium hydroxide/sodium nitrate, fused potassium hydroxide, sodium carbonate
Very Slightly Soluble: nitric acid, aqua regia, sulfuric acid
Insoluble: hydrogen fluoride, potassium hydroxide solutions

10. STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressure.

CONDITIONS TO AVOID: None reported.

INCOMPATIBILITIES: acids, halogens, reducing agents, oxidizing materials, bases

TUNGSTEN:
ALKALI AND ALKALINE-EARTH METALS WITH HALOCARBONS: May explode with heat or on impact.
AQUA REGIA: Attacked superficially.
BROMINE PENTAFLUORIDE: Violent reaction and possible ignition.
BROMINE TRIFLUORIDE: Violent reaction.
CHLORINE TRIFLUORIDE: Violent reaction.
FLUORINE: Incandescent reaction.
HYDROGEN SULFIDE: Incandescent reaction.
IODINE PENTAFLUORIDE: Incandescent reaction when heated.
LEAD(IV) DIOXIDE: Incandescent reaction when heated.
NITRIC ACID: Attacked superficially.
NITRYL FLUORIDE: Incandescent reaction when heated.
OXIDIZERS (STRONG): Fire and explosion hazard.
OXYGEN DIFLUORIDE: Explodes at 400 C.
POTASSIUM DICHROMATE: Combustion attains a temperature of 1700 C in 0.1-0.2

seconds.
SODIUM PEROXIDE: Incandescent reaction when heated.

HAZARDOUS DECOMPOSITION:
Thermal decomposition products: miscellaneous decomposition products

POLYMERIZATION: Will not polymerize.

11. TOXICOLOGICAL INFORMATION

TUNGSTEN METAL POWDER, CARBON REDUCED (GS-00P-22924):
IRRITATION DATA:
500 mg/24 hour(s) skin-rabbit mild; 500 mg/24 hour(s) eyes-rabbit mild
TOXICITY DATA:
5 gm/kg intraperitoneal-rat LD50
ACUTE TOXICITY LEVEL: Insufficient Data.
REPRODUCTIVE EFFECTS DATA:
1210 ug/kg oral-rat TDLo 35 week(s) pre pregnancy continuous; 1160 ug/kg oral-rat TDLo 30 week(s) pre pregnancy/1-20 day(s) pregnant female continuous

HEALTH EFFECTS:
INHALATION:
ACUTE EXPOSURE:
TUNGSTEN: May cause irritation and coughing.

CHRONIC EXPOSURE:
TUNGSTEN: Prolonged or repeated exposure has been reported to cause pulmonary fibrosis. Intratracheal injection into the lungs of experimental animals revealed the metallic dust to be inert, with the only pulmonary effect being areas of pigmentation. One conflicting study found the dust to cause interstitial pneumonitis and bronchiolitis in guinea pigs after intratracheal injection of 50 mg a week for 3 weeks. After one year, slight residual lesions in the form of minor atrophic emphysema were present.

SKIN CONTACT:
ACUTE EXPOSURE:
TUNGSTEN: Application of 500 mg to the skin of rabbits caused mild irritation. May cause redness.

CHRONIC EXPOSURE:
TUNGSTEN: May cause dermatitis.

EYE CONTACT:
ACUTE EXPOSURE:
TUNGSTEN: Application of 500 mg to the eyes of rabbits caused mild irritation. May cause redness and conjunctivitis.

CHRONIC EXPOSURE:
TUNGSTEN: May cause conjunctivitis.

INGESTION:
ACUTE EXPOSURE:
TUNGSTEN: May cause nausea, vomiting, and irritation of the gastrointestinal tract.

CHRONIC EXPOSURE:
TUNGSTEN: When rats were fed 2%, 5% or 10% powdered tungsten in their diets, the females gained 15.4% less weight than the control females; there was no difference between tungsten-fed and control males. The sex specific effect was suggested to depend on metabolic utilization of foodstuffs. Reproductive effects have been reported in animals.

12. ECOLOGICAL INFORMATION

Not available

13. DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations.

14. TRANSPORT INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION: No classification assigned.

CANADIAN TRANSPORTATION OF DANGEROUS GOODS: No classification assigned.

LAND TRANSPORT ADR: No classification assigned.

LAND TRANSPORT RID: No classification assigned.

AIR TRANSPORT IATA: No classification assigned.

AIR TRANSPORT ICAO: No classification assigned.

MARITIME TRANSPORT IMDG: No classification assigned.

15. REGULATORY INFORMATION

U.S. REGULATIONS:
CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4): Not regulated.

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30): Not regulated.

SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.40): Not regulated.

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):
ACUTE: No
CHRONIC: No
FIRE: No
REACTIVE: No

SUDDEN RELEASE: No

SARA TITLE III SECTION 313 (40 CFR 372.65): Not regulated.

OSHA PROCESS SAFETY (29CFR1910.119): Not regulated.

STATE REGULATIONS:
California Proposition 65: Not regulated.

CANADIAN REGULATIONS:
WHMIS CLASSIFICATION: Not determined.

EUROPEAN REGULATIONS:
EC CLASSIFICATION (CALCULATED): Not determined.

GERMAN REGULATIONS:
WATER HAZARD CLASS (WGK):
STATE OF CLASSIFICATION: VwVwS
CLASSIFICATION UNDER HAZARD TO WATER: 0

NATIONAL INVENTORY STATUS:
U.S. INVENTORY (TSCA): Listed on inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

16. OTHER INFORMATION

MSDS SUMMARY OF CHANGES
8. EXPOSURE CONTROLS, PERSONAL PROTECTION

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

DEFENSE LOGISTICS AGENCY
DEFENSE NATIONAL STOCKPILE CENTER
8725 JOHN J. KINGMAN ROAD
SUITE 3339
FORT BELVOIR, VA 22060-6223

EMERGENCY TELEPHONE NUMBER:
1-800-424-9300 (NORTH AMERICA)
1-703-527-3887 (INTERNATIONAL)

SUBSTANCE: TUNGSTEN METAL POWDER, CARBON REDUCED (NSP-33, NSP-34 & 02059)

TRADE NAMES/SYNONYMS:
TUNGSTEN; WOLFRAM; TUNGSTEN ELEMENT; W; DLA76955; RTECS YO7175000

CHEMICAL FAMILY: metal

CREATION DATE: Oct 01 1992
REVISION DATE: Jun 16 2005

2. COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: TUNGSTEN
CAS NUMBER: 7440-33-7
EC NUMBER (EINECS): 231-143-9
PERCENTAGE: 100

3. HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=1 FIRE=3 REACTIVITY=0

EMERGENCY OVERVIEW:
COLOR: white to gray or black
PHYSICAL FORM: powder
MAJOR HEALTH HAZARDS: No significant target effects reported.
PHYSICAL HAZARDS: Negligible fire and explosion hazard in bulk form. Dust/air mixtures may ignite or explode.

POTENTIAL HEALTH EFFECTS:
INHALATION:
SHORT TERM EXPOSURE: irritation

LONG TERM EXPOSURE: lung damage
SKIN CONTACT:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: irritation
EYE CONTACT:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: irritation
INGESTION:
SHORT TERM EXPOSURE: irritation, nausea, vomiting
LONG TERM EXPOSURE: no information on significant adverse effects

CARCINOGEN STATUS:
OSHA: No
NTP: No
IARC: No

4. FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.

SKIN CONTACT: Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.

EYE CONTACT: Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

INGESTION: If a large amount is swallowed, get medical attention.

5. FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Negligible fire and explosion hazard in bulk form. Dust/air mixtures may ignite or explode.

EXTINGUISHING MEDIA: dolomite, dry powder for metal fires, dry sand, graphite, soda ash, sodium chloride

FIRE FIGHTING: Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Use extinguishing agents appropriate for surrounding fire. Avoid inhalation of material or combustion by-products.

6. ACCIDENTAL RELEASE MEASURES

OCCUPATIONAL RELEASE:
Avoid heat, flames, sparks and other sources of ignition. Do not touch spilled material. Small spills: Collect

spilled material in appropriate container for disposal. Move containers away from spill to a safe area. Large spills: Wet down area with water. Dike for later disposal. Remove sources of ignition. Keep unnecessary people away, isolate hazard area and deny entry. Clean up residue with a high-efficiency particulate filter vacuum.

7. HANDLING AND STORAGE

STORAGE: Store and handle in accordance with all current regulations and standards. Keep separated from incompatible substances.

HANDLING: Use methods to minimize dust.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:
TUNGSTEN METAL POWDER, CARBON REDUCED (NSP-33, NSP-34 & 02059):
TUNGSTEN AND INSOLUBLE COMPOUNDS (as W):
5 mg/m3 OSHA TWA (vacated by 58 FR 35338, June 30, 1993)
10 mg/m3 OSHA STEL (vacated by 58 FR 35338, June 30, 1993)
5 mg/m3 ACGIH TWA
10 mg/m3 ACGIH STEL
5 mg/m3 NIOSH recommended TWA 10 hour(s)
10 mg/m3 NIOSH recommended STEL
5 mg/m3 UK WEL TWA
10 mg/m3 UK WEL STEL

MEASUREMENT METHOD: Particulate filter; Acid; Atomic absorption spectrometry; NIOSH III # 7074

VENTILATION: Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing.

GLOVES: Wear appropriate chemical resistant gloves.

RESPIRATOR: The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.
Measurement Element:
Tungsten (W)
50 mg/m3
Any air-purifying respirator with a high-efficiency particulate filter.
Any supplied-air respirator.
Any self-contained breathing apparatus with a full facepiece.
Escape -
Any air-purifying respirator with a full facepiece and a high-efficiency particulate filter.
Any appropriate escape-type, self-contained breathing apparatus.

For Unknown Concentrations or Immediately Dangerous to Life or Health -
Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.
Any self-contained breathing apparatus with a full facepiece.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: solid
COLOR: white to gray or black
PHYSICAL FORM: powder
ODOR: Not available
MOLECULAR WEIGHT: 183.85
MOLECULAR FORMULA: W
BOILING POINT: 10220 F (5660 C)
MELTING POINT: 6134-6206 F (3390-3430 C)
VAPOR PRESSURE: Not applicable
VAPOR DENSITY: Not applicable
SPECIFIC GRAVITY (water=1): 19.35
WATER SOLUBILITY: insoluble
PH: Not applicable
VOLATILITY: Not applicable
ODOR THRESHOLD: Not available
EVAPORATION RATE: Not applicable
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available
SOLVENT SOLUBILITY:
Soluble: nitric acid/hydrofluoric acid mixtures, fused sodium hydroxide/sodium nitrate, fused potassium hydroxide, sodium carbonate
Very Slightly Soluble: nitric acid, aqua regia, sulfuric acid
Insoluble: hydrogen fluoride, potassium hydroxide solutions

10. STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressure.

CONDITIONS TO AVOID: Avoid generating dust. Avoid heat, flames, sparks and other sources of ignition.

INCOMPATIBILITIES: acids, halogens, reducing agents, oxidizing materials, bases

TUNGSTEN:
ALKALI AND ALKALINE-EARTH METALS WITH HALOCARBONS: May explode with heat or on impact.
AQUA REGIA: Attacked superficially.
BROMINE PENTAFLUORIDE: Violent reaction and possible ignition.
BROMINE TRIFLUORIDE: Violent reaction.
CHLORINE TRIFLUORIDE: Violent reaction.
FLUORINE: Incandescent reaction.
HYDROGEN SULFIDE: Incandescent reaction.
IODINE PENTAFLUORIDE: Incandescent reaction when heated.

LEAD(IV) DIOXIDE: Incandescent reaction when heated.
NITRIC ACID: Attacked superficially.
NITRYL FLUORIDE: Incandescent reaction when heated.
OXIDIZERS (STRONG): Fire and explosion hazard.
OXYGEN DIFLUORIDE: Explodes at 400 C.
POTASSIUM DICHROMATE: Combustion attains a temperature of 1700 C in 0.1-0.2 seconds.
SODIUM PEROXIDE: Incandescent reaction when heated.

HAZARDOUS DECOMPOSITION:
Thermal decomposition products: miscellaneous decomposition products

POLYMERIZATION: Will not polymerize.

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11. TOXICOLOGICAL INFORMATION

TUNGSTEN METAL POWDER, CARBON REDUCED (NSP-33, NSP-34 & 02059):
IRRITATION DATA:
500 mg/24 hour(s) skin-rabbit mild; 500 mg/24 hour(s) eyes-rabbit mild
TOXICITY DATA:
5 gm/kg intraperitoneal-rat LD50
ACUTE TOXICITY LEVEL: Insufficient Data.
REPRODUCTIVE EFFECTS DATA:
1210 ug/kg oral-rat TDLo 35 week(s) pre pregnancy continuous; 1160 ug/kg oral-rat TDLo 30 week(s) pre pregnancy/1-20 day(s) pregnant female continuous

HEALTH EFFECTS:
INHALATION:
ACUTE EXPOSURE:
TUNGSTEN: May cause irritation and coughing.

CHRONIC EXPOSURE:
TUNGSTEN: Prolonged or repeated exposure has been reported to cause pulmonary fibrosis. Intratracheal injection into the lungs of experimental animals revealed the metallic dust to be inert, with the only pulmonary effect being areas of pigmentation. One conflicting study found the dust to cause interstitial pneumonitis and bronchiolitis in guinea pigs after intratracheal injection of 50 mg a week for 3 weeks. After one year, slight residual lesions in the form of minor atrophic emphysema were present.

SKIN CONTACT:
ACUTE EXPOSURE:
TUNGSTEN: Application of 500 mg to the skin of rabbits caused mild irritation. May cause redness.

CHRONIC EXPOSURE:
TUNGSTEN: May cause dermatitis.

EYE CONTACT:
ACUTE EXPOSURE:
TUNGSTEN: Application of 500 mg to the eyes of rabbits caused mild irritation. May cause redness and conjunctivitis.

CHRONIC EXPOSURE:
TUNGSTEN: May cause conjunctivitis.

INGESTION:
ACUTE EXPOSURE:
TUNGSTEN: May cause nausea, vomiting, and irritation of the gastrointestinal tract.

CHRONIC EXPOSURE:
TUNGSTEN: When rats were fed 2%, 5% or 10% powdered tungsten in their diets, the females gained 15.4% less weight than the control females; there was no difference between tungsten-fed and control males. The sex specific effect was suggested to depend on metabolic utilization of foodstuffs. Reproductive effects have been reported in animals.

12. ECOLOGICAL INFORMATION

Not available

13. DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001.

14. TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:
PROPER SHIPPING NAME: Metal powders, flammable, n.o.s.
ID NUMBER: UN3089
HAZARD CLASS OR DIVISION: 4.1
PACKING GROUP: III
LABELING REQUIREMENTS: 4.1

CANADIAN TRANSPORTATION OF DANGEROUS GOODS:
SHIPPING NAME: Metal powder, flammable, n.o.s.
UN NUMBER: UN3089
CLASS: 4.1
PACKING GROUP/RISK GROUP: III

LAND TRANSPORT ADR:
PROPER SHIPPING NAME: Metal powder, flammable, n.o.s.
UN NUMBER: UN3089
CLASS: 4.1
CLASSIFICATION CODE: F3
PACKING GROUP: III
LABELS: 4.1

LAND TRANSPORT RID:
PROPER SHIPPING NAME: Metal powder, flammable, n.o.s.
UN NUMBER: UN3089

CLASS: 4.1
CLASSIFICATION CODE: F3
PACKING GROUP: III
LABELS: 4.1

AIR TRANSPORT IATA:
PROPER SHIPPING NAME: Metal powder, flammable, n.o.s.
UN/ID NUMBER: UN3089
CLASS OR DIVISION: 4.1
HAZARD LABELS: 4.1
PACKING GROUP: III

AIR TRANSPORT ICAO:
PROPER SHIPPING NAME: Metal powder, flammable, n.o.s.
UN NUMBER: UN3089
CLASS OR DIVISION: 4.1
LABELS: 4.1
UN PACKING GROUP: III

MARITIME TRANSPORT IMDG:
PROPER SHIPPING NAME: Metal powder, flammable, n.o.s.
UN NUMBER: UN3089
CLASS OR DIVISION: 4.1
PACKING GROUP: III

15. REGULATORY INFORMATION

U.S. REGULATIONS:
CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4): Not regulated.

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30): Not regulated.

SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.40): Not regulated.

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):
ACUTE: No
CHRONIC: No
FIRE: Yes
REACTIVE: No
SUDDEN RELEASE: No

SARA TITLE III SECTION 313 (40 CFR 372.65): Not regulated.

OSHA PROCESS SAFETY (29CFR1910.119): Not regulated.

STATE REGULATIONS:
California Proposition 65: Not regulated.

CANADIAN REGULATIONS:
WHMIS CLASSIFICATION: Not determined.

EUROPEAN REGULATIONS:
EC CLASSIFICATION (CALCULATED): Not determined.

GERMAN REGULATIONS:
WATER HAZARD CLASS (WGK):
STATE OF CLASSIFICATION: VwVwS
CLASSIFICATION UNDER HAZARD TO WATER: 0

NATIONAL INVENTORY STATUS:
U.S. INVENTORY (TSCA): Listed on inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

16. OTHER INFORMATION

MSDS SUMMARY OF CHANGES
8. EXPOSURE CONTROLS, PERSONAL PROTECTION

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

DEFENSE LOGISTICS AGENCY
DEFENSE NATIONAL STOCKPILE CENTER
8725 JOHN J. KINGMAN ROAD
SUITE 3339
FORT BELVOIR, VA 22060-6223

EMERGENCY TELEPHONE NUMBER:
1-800-424-9300 (NORTH AMERICA)
1-703-527-3887 (INTERNATIONAL)

SUBSTANCE: TUNGSTEN METAL POWDER, HYDROGEN REDUCED (TYPE IV)

TRADE NAMES/SYNONYMS:
TUNGSTEN; WOLFRAM; TUNGSTEN ELEMENT; W; 00229901; RTECS YO7175000

CHEMICAL FAMILY: metal

CREATION DATE: May 28 2003
REVISION DATE: Jun 16 2005

2. COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: TUNGSTEN
CAS NUMBER: 7440-33-7
EC NUMBER (EINECS): 231-143-9
PERCENTAGE: 100

3. HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=1 FIRE=3 REACTIVITY=0

EMERGENCY OVERVIEW:
COLOR: white to gray or black
PHYSICAL FORM: powder
MAJOR HEALTH HAZARDS: No significant target effects reported.
PHYSICAL HAZARDS: Negligible fire and explosion hazard in bulk form. Dust/air mixtures may ignite or explode.

POTENTIAL HEALTH EFFECTS:
INHALATION:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: lung damage

SKIN CONTACT:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: irritation
EYE CONTACT:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: irritation
INGESTION:
SHORT TERM EXPOSURE: irritation, nausea, vomiting
LONG TERM EXPOSURE: no information on significant adverse effects

CARCINOGEN STATUS:
OSHA: No
NTP: No
IARC: No

4. FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.

SKIN CONTACT: Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.

EYE CONTACT: Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

INGESTION: If a large amount is swallowed, get medical attention.

5. FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Negligible fire and explosion hazard in bulk form. Dust/air mixtures may ignite or explode.

EXTINGUISHING MEDIA: dolomite, dry powder for metal fires, dry sand, graphite, soda ash, sodium chloride

FIRE FIGHTING: Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Use extinguishing agents appropriate for surrounding fire. Avoid inhalation of material or combustion by-products.

6. ACCIDENTAL RELEASE MEASURES

OCCUPATIONAL RELEASE:
Avoid heat, flames, sparks and other sources of ignition. Do not touch spilled material. Small spills: Collect spilled material in appropriate container for disposal. Move containers away from spill to a safe area. Large

spills: Wet down area with water. Dike for later disposal. Remove sources of ignition. Keep unnecessary people away, isolate hazard area and deny entry. Clean up residue with a high-efficiency particulate filter vacuum.

7. HANDLING AND STORAGE

STORAGE: Store and handle in accordance with all current regulations and standards. Keep separated from incompatible substances.

HANDLING: Use methods to minimize dust.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:
TUNGSTEN METAL POWDER, HYDROGEN REDUCED (TYPE IV):
TUNGSTEN AND INSOLUBLE COMPOUNDS (as W):
5 mg/m3 OSHA TWA (vacated by 58 FR 35338, June 30, 1993)
10 mg/m3 OSHA STEL (vacated by 58 FR 35338, June 30, 1993)
5 mg/m3 ACGIH TWA
10 mg/m3 ACGIH STEL
5 mg/m3 NIOSH recommended TWA 10 hour(s)
10 mg/m3 NIOSH recommended STEL
5 mg/m3 UK WEL TWA
10 mg/m3 UK WEL STEL

MEASUREMENT METHOD: Particulate filter; Acid; Atomic absorption spectrometry; NIOSH III # 7074

VENTILATION: Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing.

GLOVES: Wear appropriate chemical resistant gloves.

RESPIRATOR: The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.
Measurement Element:
Tungsten (W)
50 mg/m3
Any air-purifying respirator with a high-efficiency particulate filter.
Any supplied-air respirator.
Any self-contained breathing apparatus with a full facepiece.
Escape -
Any air-purifying respirator with a full facepiece and a high-efficiency particulate filter.
Any appropriate escape-type, self-contained breathing apparatus.
For Unknown Concentrations or Immediately Dangerous to Life or Health -

Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.
Any self-contained breathing apparatus with a full facepiece.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: solid
COLOR: white to gray or black
PHYSICAL FORM: powder
ODOR: Not available
MOLECULAR WEIGHT: 183.85
MOLECULAR FORMULA: W
BOILING POINT: 10220 F (5660 C)
MELTING POINT: 6134-6206 F (3390-3430 C)
VAPOR PRESSURE: Not applicable
VAPOR DENSITY: Not applicable
SPECIFIC GRAVITY (water=1): 19.35
WATER SOLUBILITY: insoluble
PH: Not applicable
VOLATILITY: Not applicable
ODOR THRESHOLD: Not available
EVAPORATION RATE: Not applicable
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available
SOLVENT SOLUBILITY:
Soluble: nitric acid/hydrofluoric acid mixtures, fused sodium hydroxide/sodium nitrate, fused potassium hydroxide, sodium carbonate
Very Slightly Soluble: nitric acid, aqua regia, sulfuric acid
Insoluble: hydrogen fluoride, potassium hydroxide solutions

10. STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressure.

CONDITIONS TO AVOID: Avoid generating dust. Avoid heat, flames, sparks and other sources of ignition.

INCOMPATIBILITIES: acids, halogens, reducing agents, oxidizing materials, bases

TUNGSTEN:
ALKALI AND ALKALINE-EARTH METALS WITH HALOCARBONS: May explode with heat or on impact.
AQUA REGIA: Attacked superficially.
BROMINE PENTAFLUORIDE: Violent reaction and possible ignition.
BROMINE TRIFLUORIDE: Violent reaction.
CHLORINE TRIFLUORIDE: Violent reaction.
FLUORINE: Incandescent reaction.
HYDROGEN SULFIDE: Incandescent reaction.
IODINE PENTAFLUORIDE: Incandescent reaction when heated.
LEAD(IV) DIOXIDE: Incandescent reaction when heated.

NITRIC ACID: Attacked superficially.
NITRYL FLUORIDE: Incandescent reaction when heated.
OXIDIZERS (STRONG): Fire and explosion hazard.
OXYGEN DIFLUORIDE: Explodes at 400 C.
POTASSIUM DICHROMATE: Combustion attains a temperature of 1700 C in 0.1-0.2 seconds.
SODIUM PEROXIDE: Incandescent reaction when heated.

HAZARDOUS DECOMPOSITION:
Thermal decomposition products: miscellaneous decomposition products

POLYMERIZATION: Will not polymerize.

11. TOXICOLOGICAL INFORMATION

TUNGSTEN METAL POWDER, HYDROGEN REDUCED (TYPE IV):
IRRITATION DATA:
500 mg/24 hour(s) skin-rabbit mild; 500 mg/24 hour(s) eyes-rabbit mild
TOXICITY DATA:
5 gm/kg intraperitoneal-rat LD50
ACUTE TOXICITY LEVEL: Insufficient Data.
REPRODUCTIVE EFFECTS DATA:
1210 ug/kg oral-rat TDLo 35 week(s) pre pregnancy continuous; 1160 ug/kg oral-rat TDLo 30 week(s) pre pregnancy/1-20 day(s) pregnant female continuous

HEALTH EFFECTS:
INHALATION:
ACUTE EXPOSURE:
TUNGSTEN: May cause irritation and coughing.

CHRONIC EXPOSURE:
TUNGSTEN: Prolonged or repeated exposure has been reported to cause pulmonary fibrosis. Intratracheal injection into the lungs of experimental animals revealed the metallic dust to be inert, with the only pulmonary effect being areas of pigmentation. One conflicting study found the dust to cause interstitial pneumonitis and bronchiolitis in guinea pigs after intratracheal injection of 50 mg a week for 3 weeks. After one year, slight residual lesions in the form of minor atrophic emphysema were present.

SKIN CONTACT:
ACUTE EXPOSURE:
TUNGSTEN: Application of 500 mg to the skin of rabbits caused mild irritation. May cause redness.

CHRONIC EXPOSURE:
TUNGSTEN: May cause dermatitis.

EYE CONTACT:
ACUTE EXPOSURE:
TUNGSTEN: Application of 500 mg to the eyes of rabbits caused mild irritation. May cause redness and conjunctivitis.

CHRONIC EXPOSURE:

TUNGSTEN: May cause conjunctivitis.

INGESTION:
ACUTE EXPOSURE:
TUNGSTEN: May cause nausea, vomiting, and irritation of the gastrointestinal tract.

CHRONIC EXPOSURE:
TUNGSTEN: When rats were fed 2%, 5% or 10% powdered tungsten in their diets, the females gained 15.4% less weight than the control females; there was no difference between tungsten-fed and control males. The sex specific effect was suggested to depend on metabolic utilization of foodstuffs. Reproductive effects have been reported in animals.

12. ECOLOGICAL INFORMATION

Not available

13. DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001.

14. TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:
PROPER SHIPPING NAME: Metal powders, flammable, n.o.s.
ID NUMBER: UN3089
HAZARD CLASS OR DIVISION: 4.1
PACKING GROUP: II
LABELING REQUIREMENTS: 4.1

CANADIAN TRANSPORTATION OF DANGEROUS GOODS:
SHIPPING NAME: Metal powder, flammable, n.o.s.
UN NUMBER: UN3089
CLASS: 4.1
PACKING GROUP/RISK GROUP: II

LAND TRANSPORT ADR:
PROPER SHIPPING NAME: Metal powder, flammable, n.o.s.
UN NUMBER: UN3089
CLASS: 4.1
CLASSIFICATION CODE: F3
PACKING GROUP: II
LABELS: 4.1

LAND TRANSPORT RID:
PROPER SHIPPING NAME: Metal powder, flammable, n.o.s.
UN NUMBER: UN3089
CLASS: 4.1

CLASSIFICATION CODE: F3
PACKING GROUP: II
LABELS: 4.1

AIR TRANSPORT IATA:
PROPER SHIPPING NAME: Metal powder, flammable, n.o.s.
UN/ID NUMBER: UN3089
CLASS OR DIVISION: 4.1
HAZARD LABELS: 4.1
PACKING GROUP: II

AIR TRANSPORT ICAO:
PROPER SHIPPING NAME: Metal powder, flammable, n.o.s.
UN NUMBER: UN3089
CLASS OR DIVISION: 4.1
LABELS: 4.1
UN PACKING GROUP: II

MARITIME TRANSPORT IMDG:
PROPER SHIPPING NAME: Metal powder, flammable, n.o.s.
UN NUMBER: UN3089
CLASS OR DIVISION: 4.1
PACKING GROUP: II

15. REGULATORY INFORMATION

U.S. REGULATIONS:
CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4): Not regulated.

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30): Not regulated.

SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.40): Not regulated.

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):
ACUTE: No
CHRONIC: No
FIRE: Yes
REACTIVE: No
SUDDEN RELEASE: No

SARA TITLE III SECTION 313 (40 CFR 372.65): Not regulated.

OSHA PROCESS SAFETY (29CFR1910.119): Not regulated.

STATE REGULATIONS:
California Proposition 65: Not regulated.

CANADIAN REGULATIONS:

WHMIS CLASSIFICATION: Not determined.

EUROPEAN REGULATIONS:
EC CLASSIFICATION (CALCULATED): Not determined.

GERMAN REGULATIONS:
WATER HAZARD CLASS (WGK):
STATE OF CLASSIFICATION: VwVwS
CLASSIFICATION UNDER HAZARD TO WATER: 0

NATIONAL INVENTORY STATUS:
U.S. INVENTORY (TSCA): Listed on inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

16. OTHER INFORMATION

MSDS SUMMARY OF CHANGES
8. EXPOSURE CONTROLS, PERSONAL PROTECTION

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

DEFENSE LOGISTICS AGENCY
DEFENSE NATIONAL STOCKPILE CENTER
8725 JOHN J. KINGMAN ROAD
SUITE 3339
FORT BELVOIR, VA 22060-6223

EMERGENCY TELEPHONE NUMBER:
1-800-424-9300 (NORTH AMERICA)
1-703-527-3887 (INTERNATIONAL)

SUBSTANCE: TUNGSTEN METAL POWDER, HYDROGEN REDUCED (TYPES V, VI, VII)

TRADE NAMES/SYNONYMS:
TUNGSTEN; WOLFRAM; TUNGSTEN ELEMENT; W; 00229902; RTECS YO7175000

CHEMICAL FAMILY: metal

CREATION DATE: May 28 2003
REVISION DATE: Jun 16 2005

2. COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: TUNGSTEN
CAS NUMBER: 7440-33-7
EC NUMBER (EINECS): 231-143-9
PERCENTAGE: 100

3. HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=1 FIRE=3 REACTIVITY=0

EMERGENCY OVERVIEW:
COLOR: white to gray or black
PHYSICAL FORM: powder
MAJOR HEALTH HAZARDS: No significant target effects reported.
PHYSICAL HAZARDS: Negligible fire and explosion hazard in bulk form. Dust/air mixtures may ignite or explode.

POTENTIAL HEALTH EFFECTS:
INHALATION:
SHORT TERM EXPOSURE: irritation

LONG TERM EXPOSURE: lung damage
SKIN CONTACT:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: irritation
EYE CONTACT:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: irritation
INGESTION:
SHORT TERM EXPOSURE: irritation, nausea, vomiting
LONG TERM EXPOSURE: no information on significant adverse effects

CARCINOGEN STATUS:
OSHA: No
NTP: No
IARC: No

4. FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.

SKIN CONTACT: Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.

EYE CONTACT: Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

INGESTION: If a large amount is swallowed, get medical attention.

5. FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Negligible fire and explosion hazard in bulk form. Dust/air mixtures may ignite or explode.

EXTINGUISHING MEDIA: dolomite, dry powder for metal fires, dry sand, graphite, soda ash, sodium chloride

FIRE FIGHTING: Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Use extinguishing agents appropriate for surrounding fire. Avoid inhalation of material or combustion by-products.

6. ACCIDENTAL RELEASE MEASURES

OCCUPATIONAL RELEASE:
Avoid heat, flames, sparks and other sources of ignition. Do not touch spilled material. Small spills: Collect

spilled material in appropriate container for disposal. Move containers away from spill to a safe area. Large spills: Wet down area with water. Dike for later disposal. Remove sources of ignition. Keep unnecessary people away, isolate hazard area and deny entry. Clean up residue with a high-efficiency particulate filter vacuum.

7. HANDLING AND STORAGE

STORAGE: Store and handle in accordance with all current regulations and standards. Keep separated from incompatible substances.

HANDLING: Use methods to minimize dust.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:
TUNGSTEN METAL POWDER, HYDROGEN REDUCED (TYPES V, VI, VII):
TUNGSTEN AND INSOLUBLE COMPOUNDS (as W):
5 mg/m3 OSHA TWA (vacated by 58 FR 35338, June 30, 1993)
10 mg/m3 OSHA STEL (vacated by 58 FR 35338, June 30, 1993)
5 mg/m3 ACGIH TWA
10 mg/m3 ACGIH STEL
5 mg/m3 NIOSH recommended TWA 10 hour(s)
10 mg/m3 NIOSH recommended STEL
5 mg/m3 UK WEL TWA
10 mg/m3 UK WEL STEL

MEASUREMENT METHOD: Particulate filter; Acid; Atomic absorption spectrometry; NIOSH III # 7074

VENTILATION: Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing.

GLOVES: Wear appropriate chemical resistant gloves.

RESPIRATOR: The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.
Measurement Element:
Tungsten (W)
50 mg/m3
Any air-purifying respirator with a high-efficiency particulate filter.
Any supplied-air respirator.
Any self-contained breathing apparatus with a full facepiece.
Escape -
Any air-purifying respirator with a full facepiece and a high-efficiency particulate filter.
Any appropriate escape-type, self-contained breathing apparatus.

For Unknown Concentrations or Immediately Dangerous to Life or Health -
Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.
Any self-contained breathing apparatus with a full facepiece.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: solid
COLOR: white to gray or black
PHYSICAL FORM: powder
ODOR: Not available
MOLECULAR WEIGHT: 183.85
MOLECULAR FORMULA: W
BOILING POINT: 10220 F (5660 C)
MELTING POINT: 6134-6206 F (3390-3430 C)
VAPOR PRESSURE: Not applicable
VAPOR DENSITY: Not applicable
SPECIFIC GRAVITY (water=1): 19.35
WATER SOLUBILITY: insoluble
PH: Not applicable
VOLATILITY: Not applicable
ODOR THRESHOLD: Not available
EVAPORATION RATE: Not applicable
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available
SOLVENT SOLUBILITY:
Soluble: nitric acid/hydrofluoric acid mixtures, fused sodium hydroxide/sodium nitrate, fused potassium hydroxide, sodium carbonate
Very Slightly Soluble: nitric acid, aqua regia, sulfuric acid
Insoluble: hydrogen fluoride, potassium hydroxide solutions

10. STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressure.

CONDITIONS TO AVOID: Avoid generating dust. Avoid heat, flames, sparks and other sources of ignition.

INCOMPATIBILITIES: acids, halogens, reducing agents, oxidizing materials, bases

TUNGSTEN:
ALKALI AND ALKALINE-EARTH METALS WITH HALOCARBONS: May explode with heat or on impact.
AQUA REGIA: Attacked superficially.
BROMINE PENTAFLUORIDE: Violent reaction and possible ignition.
BROMINE TRIFLUORIDE: Violent reaction.
CHLORINE TRIFLUORIDE: Violent reaction.
FLUORINE: Incandescent reaction.
HYDROGEN SULFIDE: Incandescent reaction.
IODINE PENTAFLUORIDE: Incandescent reaction when heated.

LEAD(IV) DIOXIDE: Incandescent reaction when heated.
NITRIC ACID: Attacked superficially.
NITRYL FLUORIDE: Incandescent reaction when heated.
OXIDIZERS (STRONG): Fire and explosion hazard.
OXYGEN DIFLUORIDE: Explodes at 400 C.
POTASSIUM DICHROMATE: Combustion attains a temperature of 1700 C in 0.1-0.2 seconds.
SODIUM PEROXIDE: Incandescent reaction when heated.

HAZARDOUS DECOMPOSITION:
Thermal decomposition products: miscellaneous decomposition products

POLYMERIZATION: Will not polymerize.

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11. TOXICOLOGICAL INFORMATION

TUNGSTEN METAL POWDER, HYDROGEN REDUCED (TYPES V, VI, VII):
IRRITATION DATA:
500 mg/24 hour(s) skin-rabbit mild; 500 mg/24 hour(s) eyes-rabbit mild
TOXICITY DATA:
5 gm/kg intraperitoneal-rat LD50
ACUTE TOXICITY LEVEL: Insufficient Data.
REPRODUCTIVE EFFECTS DATA:
1210 ug/kg oral-rat TDLo 35 week(s) pre pregnancy continuous; 1160 ug/kg oral-rat TDLo 30 week(s) pre pregnancy/1-20 day(s) pregnant female continuous

HEALTH EFFECTS:
INHALATION:
ACUTE EXPOSURE:
TUNGSTEN: May cause irritation and coughing.

CHRONIC EXPOSURE:
TUNGSTEN: Prolonged or repeated exposure has been reported to cause pulmonary fibrosis. Intratracheal injection into the lungs of experimental animals revealed the metallic dust to be inert, with the only pulmonary effect being areas of pigmentation. One conflicting study found the dust to cause interstitial pneumonitis and bronchiolitis in guinea pigs after intratracheal injection of 50 mg a week for 3 weeks. After one year, slight residual lesions in the form of minor atrophic emphysema were present.

SKIN CONTACT:
ACUTE EXPOSURE:
TUNGSTEN: Application of 500 mg to the skin of rabbits caused mild irritation. May cause redness.

CHRONIC EXPOSURE:
TUNGSTEN: May cause dermatitis.

EYE CONTACT:
ACUTE EXPOSURE:
TUNGSTEN: Application of 500 mg to the eyes of rabbits caused mild irritation. May cause redness and conjunctivitis.

CHRONIC EXPOSURE:
TUNGSTEN: May cause conjunctivitis.

INGESTION:
ACUTE EXPOSURE:
TUNGSTEN: May cause nausea, vomiting, and irritation of the gastrointestinal tract.

CHRONIC EXPOSURE:
TUNGSTEN: When rats were fed 2%, 5% or 10% powdered tungsten in their diets, the females gained 15.4% less weight than the control females; there was no difference between tungsten-fed and control males. The sex specific effect was suggested to depend on metabolic utilization of foodstuffs. Reproductive effects have been reported in animals.

12. ECOLOGICAL INFORMATION

Not available

13. DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): D001.

14. TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:
PROPER SHIPPING NAME: Metal powders, flammable, n.o.s.
ID NUMBER: UN3089
HAZARD CLASS OR DIVISION: 4.1
PACKING GROUP: III
LABELING REQUIREMENTS: 4.1

CANADIAN TRANSPORTATION OF DANGEROUS GOODS:
SHIPPING NAME: Metal powder, flammable, n.o.s.
UN NUMBER: UN3089
CLASS: 4.1
PACKING GROUP/RISK GROUP: III

LAND TRANSPORT ADR:
PROPER SHIPPING NAME: Metal powder, flammable, n.o.s.
UN NUMBER: UN3089
CLASS: 4.1
CLASSIFICATION CODE: F3
PACKING GROUP: III
LABELS: 4.1

LAND TRANSPORT RID:
PROPER SHIPPING NAME: Metal powder, flammable, n.o.s.
UN NUMBER: UN3089

CLASS: 4.1
CLASSIFICATION CODE: F3
PACKING GROUP: III
LABELS: 4.1

AIR TRANSPORT IATA:
PROPER SHIPPING NAME: Metal powder, flammable, n.o.s.
UN/ID NUMBER: UN3089
CLASS OR DIVISION: 4.1
HAZARD LABELS: 4.1
PACKING GROUP: III

AIR TRANSPORT ICAO:
PROPER SHIPPING NAME: Metal powder, flammable, n.o.s.
UN NUMBER: UN3089
CLASS OR DIVISION: 4.1
LABELS: 4.1
UN PACKING GROUP: III

MARITIME TRANSPORT IMDG:
PROPER SHIPPING NAME: Metal powder, flammable, n.o.s.
UN NUMBER: UN3089
CLASS OR DIVISION: 4.1
PACKING GROUP: III

15. REGULATORY INFORMATION

U.S. REGULATIONS:
CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4): Not regulated.

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30): Not regulated.

SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.40): Not regulated.

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):
ACUTE: No
CHRONIC: No
FIRE: Yes
REACTIVE: No
SUDDEN RELEASE: No

SARA TITLE III SECTION 313 (40 CFR 372.65): Not regulated.

OSHA PROCESS SAFETY (29CFR1910.119): Not regulated.

STATE REGULATIONS:
California Proposition 65: Not regulated.

CANADIAN REGULATIONS:
WHMIS CLASSIFICATION: Not determined.

EUROPEAN REGULATIONS:
EC CLASSIFICATION (CALCULATED): Not determined.

GERMAN REGULATIONS:
WATER HAZARD CLASS (WGK):
STATE OF CLASSIFICATION: VwVwS
CLASSIFICATION UNDER HAZARD TO WATER: 0

NATIONAL INVENTORY STATUS:
U.S. INVENTORY (TSCA): Listed on inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

16. OTHER INFORMATION

MSDS SUMMARY OF CHANGES
8. EXPOSURE CONTROLS, PERSONAL PROTECTION

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

DEFENSE LOGISTICS AGENCY
DEFENSE NATIONAL STOCKPILE CENTER
8725 JOHN J. KINGMAN ROAD
SUITE 3339
FORT BELVOIR, VA 22060-6223

EMERGENCY TELEPHONE NUMBER:
1-800-424-9300 (NORTH AMERICA)
1-703-527-3887 (INTERNATIONAL)

SUBSTANCE: TUNGSTEN METAL POWDER, HYDROGEN REDUCED (TYPES VIII, IX, X)

TRADE NAMES/SYNONYMS:
TUNGSTEN; WOLFRAM; TUNGSTEN ELEMENT; W; 00229903; RTECS YO7175000

CHEMICAL FAMILY: metal

CREATION DATE: May 28 2003
REVISION DATE: Jun 16 2005

2. COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: TUNGSTEN
CAS NUMBER: 7440-33-7
EC NUMBER (EINECS): 231-143-9
PERCENTAGE: 100

3. HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=1 FIRE=0 REACTIVITY=0

EMERGENCY OVERVIEW:
COLOR: white to gray or black
PHYSICAL FORM: powder
MAJOR HEALTH HAZARDS: No significant target effects reported.
PHYSICAL HAZARDS: Negligible fire and explosion hazard in bulk form. Dust/air mixtures may ignite or explode.

POTENTIAL HEALTH EFFECTS:
INHALATION:
SHORT TERM EXPOSURE: irritation

LONG TERM EXPOSURE: lung damage
SKIN CONTACT:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: irritation
EYE CONTACT:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: irritation
INGESTION:
SHORT TERM EXPOSURE: irritation, nausea, vomiting
LONG TERM EXPOSURE: no information on significant adverse effects

CARCINOGEN STATUS:
OSHA: No
NTP: No
IARC: No

4. FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.

SKIN CONTACT: Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.

EYE CONTACT: Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

INGESTION: If a large amount is swallowed, get medical attention.

5. FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Negligible fire and explosion hazard in bulk form. Dust/air mixtures may ignite or explode.

EXTINGUISHING MEDIA: dolomite, dry powder for metal fires, dry sand, graphite, soda ash, sodium chloride

FIRE FIGHTING: Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Use extinguishing agents appropriate for surrounding fire. Avoid inhalation of material or combustion by-products.

6. ACCIDENTAL RELEASE MEASURES

OCCUPATIONAL RELEASE:
Collect spilled material in appropriate container for disposal.

7. HANDLING AND STORAGE

STORAGE: Store and handle in accordance with all current regulations and standards. Keep separated from incompatible substances.

HANDLING: Use methods to minimize dust.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:
TUNGSTEN METAL POWDER, HYDROGEN REDUCED (TYPES VIII, IX, X):
TUNGSTEN AND INSOLUBLE COMPOUNDS (as W):
5 mg/m3 OSHA TWA (vacated by 58 FR 35338, June 30, 1993)
10 mg/m3 OSHA STEL (vacated by 58 FR 35338, June 30, 1993)
5 mg/m3 ACGIH TWA
10 mg/m3 ACGIH STEL
5 mg/m3 NIOSH recommended TWA 10 hour(s)
10 mg/m3 NIOSH recommended STEL
5 mg/m3 UK WEL TWA
10 mg/m3 UK WEL STEL

MEASUREMENT METHOD: Particulate filter; Acid; Atomic absorption spectrometry; NIOSH III # 7074

VENTILATION: Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing.

GLOVES: Wear appropriate chemical resistant gloves.

RESPIRATOR: The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.
Measurement Element:
Tungsten (W)
50 mg/m3
Any air-purifying respirator with a high-efficiency particulate filter.
Any supplied-air respirator.
Any self-contained breathing apparatus with a full facepiece.
Escape -
Any air-purifying respirator with a full facepiece and a high-efficiency particulate filter.
Any appropriate escape-type, self-contained breathing apparatus.
For Unknown Concentrations or Immediately Dangerous to Life or Health -
Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.
Any self-contained breathing apparatus with a full facepiece.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: solid
COLOR: white to gray or black
PHYSICAL FORM: powder
ODOR: Not available
MOLECULAR WEIGHT: 183.85
MOLECULAR FORMULA: W
BOILING POINT: 10220 F (5660 C)
MELTING POINT: 6134-6206 F (3390-3430 C)
VAPOR PRESSURE: Not applicable
VAPOR DENSITY: Not applicable
SPECIFIC GRAVITY (water=1): 19.35
WATER SOLUBILITY: insoluble
PH: Not applicable
VOLATILITY: Not applicable
ODOR THRESHOLD: Not available
EVAPORATION RATE: Not applicable
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available
SOLVENT SOLUBILITY:
Soluble: nitric acid/hydrofluoric acid mixtures, fused sodium hydroxide/sodium nitrate, fused potassium hydroxide, sodium carbonate
Very Slightly Soluble: nitric acid, aqua regia, sulfuric acid
Insoluble: hydrogen fluoride, potassium hydroxide solutions

10. STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressure.

CONDITIONS TO AVOID: None reported.

INCOMPATIBILITIES: acids, halogens, reducing agents, oxidizing materials, bases

TUNGSTEN:
ALKALI AND ALKALINE-EARTH METALS WITH HALOCARBONS: May explode with heat or on impact.
AQUA REGIA: Attacked superficially.
BROMINE PENTAFLUORIDE: Violent reaction and possible ignition.
BROMINE TRIFLUORIDE: Violent reaction.
CHLORINE TRIFLUORIDE: Violent reaction.
FLUORINE: Incandescent reaction.
HYDROGEN SULFIDE: Incandescent reaction.
IODINE PENTAFLUORIDE: Incandescent reaction when heated.
LEAD(IV) DIOXIDE: Incandescent reaction when heated.
NITRIC ACID: Attacked superficially.
NITRYL FLUORIDE: Incandescent reaction when heated.
OXIDIZERS (STRONG): Fire and explosion hazard.
OXYGEN DIFLUORIDE: Explodes at 400 C.

POTASSIUM DICHROMATE: Combustion attains a temperature of 1700 C in 0.1-0.2 seconds.
SODIUM PEROXIDE: Incandescent reaction when heated.

HAZARDOUS DECOMPOSITION:
Thermal decomposition products: miscellaneous decomposition products

POLYMERIZATION: Will not polymerize.

11. TOXICOLOGICAL INFORMATION

TUNGSTEN METAL POWDER, HYDROGEN REDUCED (TYPES VIII, IX, X):
IRRITATION DATA:
500 mg/24 hour(s) skin-rabbit mild; 500 mg/24 hour(s) eyes-rabbit mild
TOXICITY DATA:
5 gm/kg intraperitoneal-rat LD50
ACUTE TOXICITY LEVEL: Insufficient Data.
REPRODUCTIVE EFFECTS DATA:
1210 ug/kg oral-rat TDLo 35 week(s) pre pregnancy continuous; 1160 ug/kg oral-rat TDLo 30 week(s) pre pregnancy/1-20 day(s) pregnant female continuous

HEALTH EFFECTS:
INHALATION:
ACUTE EXPOSURE:
TUNGSTEN: May cause irritation and coughing.

CHRONIC EXPOSURE:
TUNGSTEN: Prolonged or repeated exposure has been reported to cause pulmonary fibrosis. Intratracheal injection into the lungs of experimental animals revealed the metallic dust to be inert, with the only pulmonary effect being areas of pigmentation. One conflicting study found the dust to cause interstitial pneumonitis and bronchiolitis in guinea pigs after intratracheal injection of 50 mg a week for 3 weeks. After one year, slight residual lesions in the form of minor atrophic emphysema were present.

SKIN CONTACT:
ACUTE EXPOSURE:
TUNGSTEN: Application of 500 mg to the skin of rabbits caused mild irritation. May cause redness.

CHRONIC EXPOSURE:
TUNGSTEN: May cause dermatitis.

EYE CONTACT:
ACUTE EXPOSURE:
TUNGSTEN: Application of 500 mg to the eyes of rabbits caused mild irritation. May cause redness and conjunctivitis.

CHRONIC EXPOSURE:
TUNGSTEN: May cause conjunctivitis.

INGESTION:
ACUTE EXPOSURE:

TUNGSTEN: May cause nausea, vomiting, and irritation of the gastrointestinal tract.

CHRONIC EXPOSURE:
TUNGSTEN: When rats were fed 2%, 5% or 10% powdered tungsten in their diets, the females gained 15.4% less weight than the control females; there was no difference between tungsten-fed and control males. The sex specific effect was suggested to depend on metabolic utilization of foodstuffs. Reproductive effects have been reported in animals.

12. ECOLOGICAL INFORMATION

Not available

13. DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations.

14. TRANSPORT INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION: No classification assigned.

CANADIAN TRANSPORTATION OF DANGEROUS GOODS: No classification assigned.

LAND TRANSPORT ADR: No classification assigned.

LAND TRANSPORT RID: No classification assigned.

AIR TRANSPORT IATA: No classification assigned.

AIR TRANSPORT ICAO: No classification assigned.

MARITIME TRANSPORT IMDG: No classification assigned.

15. REGULATORY INFORMATION

U.S. REGULATIONS:
CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4): Not regulated.

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30): Not regulated.

SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.40): Not regulated.

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):
ACUTE: No
CHRONIC: No
FIRE: No

REACTIVE: No
SUDDEN RELEASE: No

SARA TITLE III SECTION 313 (40 CFR 372.65): Not regulated.

OSHA PROCESS SAFETY (29CFR1910.119): Not regulated.

STATE REGULATIONS:
California Proposition 65: Not regulated.

CANADIAN REGULATIONS:
WHMIS CLASSIFICATION: Not determined.

EUROPEAN REGULATIONS:
EC CLASSIFICATION (CALCULATED): Not determined.

GERMAN REGULATIONS:
WATER HAZARD CLASS (WGK):
STATE OF CLASSIFICATION: VwVwS
CLASSIFICATION UNDER HAZARD TO WATER: 0

NATIONAL INVENTORY STATUS:
U.S. INVENTORY (TSCA): Listed on inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

16. OTHER INFORMATION

MSDS SUMMARY OF CHANGES
8. EXPOSURE CONTROLS, PERSONAL PROTECTION

MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

DEFENSE LOGISTICS AGENCY
DEFENSE NATIONAL STOCKPILE CENTER
8725 JOHN J. KINGMAN ROAD
SUITE 3339
FORT BELVOIR, VA 22060-6223

EMERGENCY TELEPHONE NUMBER:
1-800-424-9300 (NORTH AMERICA)
1-703-527-3887 (INTERNATIONAL)

SUBSTANCE: TUNGSTEN METAL SCRAP

TRADE NAMES/SYNONYMS:
TUNGSTEN; WOLFRAM; TUNGSTEN ELEMENT; W; 00229897; RTECS YO7175000

CHEMICAL FAMILY: metal

CREATION DATE: May 28 2003
REVISION DATE: Jun 16 2005

2. COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: TUNGSTEN
CAS NUMBER: 7440-33-7
EC NUMBER (EINECS): 231-143-9
PERCENTAGE: 100

3. HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=1 FIRE=0 REACTIVITY=0

EMERGENCY OVERVIEW:
COLOR: white to gray or black
PHYSICAL FORM: solid
MAJOR HEALTH HAZARDS: No significant target effects reported.
PHYSICAL HAZARDS: Negligible fire and explosion hazard in bulk form. Dust/air mixtures may ignite or explode.

POTENTIAL HEALTH EFFECTS:
INHALATION:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: lung damage

SKIN CONTACT:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: irritation
EYE CONTACT:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: irritation
INGESTION:
SHORT TERM EXPOSURE: irritation, nausea, vomiting
LONG TERM EXPOSURE: no information on significant adverse effects

CARCINOGEN STATUS:
OSHA: No
NTP: No
IARC: No

4. FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.

SKIN CONTACT: Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.

EYE CONTACT: Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

INGESTION: If a large amount is swallowed, get medical attention.

5. FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Negligible fire and explosion hazard in bulk form. Dust/air mixtures may ignite or explode.

EXTINGUISHING MEDIA: dolomite, dry powder for metal fires, dry sand, graphite, soda ash, sodium chloride

FIRE FIGHTING: Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Use extinguishing agents appropriate for surrounding fire. Avoid inhalation of material or combustion by-products.

6. ACCIDENTAL RELEASE MEASURES

OCCUPATIONAL RELEASE:
Collect spilled material in appropriate container for disposal.

7. HANDLING AND STORAGE

STORAGE: Store and handle in accordance with all current regulations and standards. Keep separated from incompatible substances.

HANDLING: Use methods to minimize dust.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:
TUNGSTEN METAL SCRAP:
TUNGSTEN AND INSOLUBLE COMPOUNDS (as W):
5 mg/m3 OSHA TWA (vacated by 58 FR 35338, June 30, 1993)
10 mg/m3 OSHA STEL (vacated by 58 FR 35338, June 30, 1993)
5 mg/m3 ACGIH TWA
10 mg/m3 ACGIH STEL
5 mg/m3 NIOSH recommended TWA 10 hour(s)
10 mg/m3 NIOSH recommended STEL
5 mg/m3 UK WEL TWA
10 mg/m3 UK WEL STEL

MEASUREMENT METHOD: Particulate filter; Acid; Atomic absorption spectrometry; NIOSH III # 7074

VENTILATION: Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing.

GLOVES: Wear appropriate chemical resistant gloves.

RESPIRATOR: The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.
Measurement Element:
Tungsten (W)
50 mg/m3
Any air-purifying respirator with a high-efficiency particulate filter.
Any supplied-air respirator.
Any self-contained breathing apparatus with a full facepiece.
Escape -
Any air-purifying respirator with a full facepiece and a high-efficiency particulate filter.
Any appropriate escape-type, self-contained breathing apparatus.
For Unknown Concentrations or Immediately Dangerous to Life or Health -
Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.
Any self-contained breathing apparatus with a full facepiece.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: solid
COLOR: white to gray or black
ODOR: Not available
MOLECULAR WEIGHT: 183.85
MOLECULAR FORMULA: W
BOILING POINT: 10220 F (5660 C)
MELTING POINT: 6134-6206 F (3390-3430 C)
VAPOR PRESSURE: Not applicable
VAPOR DENSITY: Not applicable
SPECIFIC GRAVITY (water=1): 19.35
WATER SOLUBILITY: insoluble
PH: Not applicable
VOLATILITY: Not applicable
ODOR THRESHOLD: Not available
EVAPORATION RATE: Not applicable
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available
SOLVENT SOLUBILITY:
Soluble: nitric acid/hydrofluoric acid mixtures, fused sodium hydroxide/sodium nitrate, fused potassium hydroxide, sodium carbonate
Very Slightly Soluble: nitric acid, aqua regia, sulfuric acid
Insoluble: hydrogen fluoride, potassium hydroxide solutions

10. STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressure.

CONDITIONS TO AVOID: None reported.

INCOMPATIBILITIES: acids, halogens, reducing agents, oxidizing materials, bases

TUNGSTEN:
ALKALI AND ALKALINE-EARTH METALS WITH HALOCARBONS: May explode with heat or on impact.
AQUA REGIA: Attacked superficially.
BROMINE PENTAFLUORIDE: Violent reaction and possible ignition.
BROMINE TRIFLUORIDE: Violent reaction.
CHLORINE TRIFLUORIDE: Violent reaction.
FLUORINE: Incandescent reaction.
HYDROGEN SULFIDE: Incandescent reaction.
IODINE PENTAFLUORIDE: Incandescent reaction when heated.
LEAD(IV) DIOXIDE: Incandescent reaction when heated.
NITRIC ACID: Attacked superficially.
NITRYL FLUORIDE: Incandescent reaction when heated.
OXIDIZERS (STRONG): Fire and explosion hazard.
OXYGEN DIFLUORIDE: Explodes at 400 C.
POTASSIUM DICHROMATE: Combustion attains a temperature of 1700 C in 0.1-0.2 seconds.

SODIUM PEROXIDE: Incandescent reaction when heated.

HAZARDOUS DECOMPOSITION:
Thermal decomposition products: miscellaneous decomposition products

POLYMERIZATION: Will not polymerize.

11. TOXICOLOGICAL INFORMATION

TUNGSTEN METAL SCRAP:
IRRITATION DATA:
500 mg/24 hour(s) skin-rabbit mild; 500 mg/24 hour(s) eyes-rabbit mild
TOXICITY DATA:
5 gm/kg intraperitoneal-rat LD50
ACUTE TOXICITY LEVEL: Insufficient Data.
REPRODUCTIVE EFFECTS DATA:
1210 ug/kg oral-rat TDLo 35 week(s) pre pregnancy continuous; 1160 ug/kg oral-rat TDLo 30 week(s) pre pregnancy/1-20 day(s) pregnant female continuous

HEALTH EFFECTS:
INHALATION:
ACUTE EXPOSURE:
TUNGSTEN: May cause irritation and coughing.

CHRONIC EXPOSURE:
TUNGSTEN: Prolonged or repeated exposure has been reported to cause pulmonary fibrosis. Intratracheal injection into the lungs of experimental animals revealed the metallic dust to be inert, with the only pulmonary effect being areas of pigmentation. One conflicting study found the dust to cause interstitial pneumonitis and bronchiolitis in guinea pigs after intratracheal injection of 50 mg a week for 3 weeks. After one year, slight residual lesions in the form of minor atrophic emphysema were present.

SKIN CONTACT:
ACUTE EXPOSURE:
TUNGSTEN: Application of 500 mg to the skin of rabbits caused mild irritation. May cause redness.

CHRONIC EXPOSURE:
TUNGSTEN: May cause dermatitis.

EYE CONTACT:
ACUTE EXPOSURE:
TUNGSTEN: Application of 500 mg to the eyes of rabbits caused mild irritation. May cause redness and conjunctivitis.

CHRONIC EXPOSURE:
TUNGSTEN: May cause conjunctivitis.

INGESTION:
ACUTE EXPOSURE:
TUNGSTEN: May cause nausea, vomiting, and irritation of the gastrointestinal tract.

CHRONIC EXPOSURE:
TUNGSTEN: When rats were fed 2%, 5% or 10% powdered tungsten in their diets, the females gained 15.4% less weight than the control females; there was no difference between tungsten-fed and control males. The sex specific effect was suggested to depend on metabolic utilization of foodstuffs. Reproductive effects have been reported in animals.

12. ECOLOGICAL INFORMATION

Not available

13. DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations.

14. TRANSPORT INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION: No classification assigned.

CANADIAN TRANSPORTATION OF DANGEROUS GOODS: No classification assigned.

LAND TRANSPORT ADR: No classification assigned.

LAND TRANSPORT RID: No classification assigned.

AIR TRANSPORT IATA: No classification assigned.

AIR TRANSPORT ICAO: No classification assigned.

MARITIME TRANSPORT IMDG: No classification assigned.

15. REGULATORY INFORMATION

U.S. REGULATIONS:
CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4): Not regulated.

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30): Not regulated.

SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.40): Not regulated.

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):
ACUTE: No
CHRONIC: No
FIRE: No
REACTIVE: No
SUDDEN RELEASE: No

SARA TITLE III SECTION 313 (40 CFR 372.65): Not regulated.

OSHA PROCESS SAFETY (29CFR1910.119): Not regulated.

STATE REGULATIONS:
California Proposition 65: Not regulated.

CANADIAN REGULATIONS:
WHMIS CLASSIFICATION: Not determined.

EUROPEAN REGULATIONS:
EC CLASSIFICATION (CALCULATED): Not determined.

GERMAN REGULATIONS:
WATER HAZARD CLASS (WGK):
STATE OF CLASSIFICATION: VwVwS
CLASSIFICATION UNDER HAZARD TO WATER: 0

NATIONAL INVENTORY STATUS:
U.S. INVENTORY (TSCA): Listed on inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed.

16. OTHER INFORMATION

MSDS SUMMARY OF CHANGES
8. EXPOSURE CONTROLS, PERSONAL PROTECTION