

INTDS NEWSLETTER

The Masters Series

International Nuclear Target Development Society



Hermann Wirth
1928-2008

July 2009
Volume 34
Number 3

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www.intds.org

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Cover Photo

Photo courtesy of Anna Stolarz showing Hermann Wirth.

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Letter to the Board

Dear Board Members:

I did not wish to bring this matter up during the recent INTDS Conference, because it was not an urgent subject, but it is still important to me, and I have discussed it briefly already.

I feel that it is a disservice to the membership of INTDS for the Board to permit persons to submit their written manuscripts long after an INTDS Conference is over, for talks given at the Conference. This then requires the deadlines for completion of reviewing to slip, and delays the final submission of the papers to the publisher. The result, so obvious for the 2006 Conference, is that the publication of the Proceedings is delayed. I received my copy of the 2006 Proceedings less than two months before the 2008 Conference.

This kind of delay has several bad effects: The 2006 reports were not available in time for research planning for the 2008 Conference nor for preparation of papers for it, for most members. The 2006 reports appeared in print more than two years after most of the work was done for them, so in any case they were out of date by the time that they appeared. Although INTDS Conference publications may nevertheless be useful, persons outside our fields are not brought up to date by them. Furthermore, the (known) lateness of INTDS Conference publications tempts INTDS members to quicker publication elsewhere. I know three investigators who have done this. There may be more. This lowers the quality and usefulness of the INTDS Conference reports and lowers the value of the INTDS in the eyes of persons who do not know this Society well.

I am familiar with arguments to the effect that some persons cannot otherwise submit papers to a Conference. Every situation is unique. It is a huge job to organize a meeting – I know because I have done it. A very large amount of work has been done for every INTDS Conference that I have attended. But I have published in Conference proceedings by two different well-known organizations for which submitting the written version of a paper before the talk was absolutely required. So I know it can be done if the will is there.

I look forward to receiving a copy of the 2008 INTDS Conference Proceedings. The date of my receipt of those Proceedings will determine in part whether I submit a paper to the 2010 Conference, or whether I choose a more-rapid vehicle for publication.

John Stoner

The Masters Series

Hermann Wirth



Hermann Wirth
11 December 1928 – 16 November 2008

Dr. Hermann Wirth can be considered as one of the first target makers in Germany and one of the earliest in the world. He started his target making career in 1964 at the Max Planck-Institute in Heidelberg and as a head of the target laboratory, he not only made many targets while inventing methods for their production, but profusely, during nearly 30 years, shared his knowledge and taught many people how to make targets in Germany (Berlin, Köln, Bonn, Darmstadt) as well as worldwide, just to mention Strasbourg - France and Rehovoth – Israel.

In 1971, Dr. Wirth had the first contact to the international community of target makers during the 3rd International Symposium on Research Materials and Nuclear Measurements organised by Oak Ridge National Laboratory, USA. When our Society was established a few years later, he was among the first members.

When Dr. Wirth officially retired at the end of 1993, his target laboratory was closed down, but he stayed active. Some years earlier, he joined the Cosmo Physics and was involved in the installation of several Cherenkov detectors on Canary Island - La Palma. Although retired and engaged in a new activity, he was still helping people to solve problems related to target preparation. In his former institute, he kept his office and a phone with the same, known to many of us, number. Admittedly, he was not publishing much, but target makers knew his ideas. They knew that he can provide suggestions on how to solve their problems, so they keep calling him with the usual question: Hermann, what do you think, how can I prepare such or such target?

There are no more answers coming from Dr Hermann Wirth.

Anna Stolarz

News of the INTDS

MINUTES OF THE 2008 INTDS BOARD MEETING

(Held in Caen, France and Dated: 14 September 2008)

Present: K.Eberhardt, D.Gilliam, J.Greene, W.Loowski, A.Stolarz, S.Zeisler

Absent: J.Comor, B.Lommel, J.Stoner

Following the agenda distributed previously via email;

- 0.) **Welcome** address given by D.Gilliam.
- 1.) **Changes or additions to the Agenda** (Gilliam)
- 2.) **Minutes of the 2007 INTDS Board Meeting** (Greene)
- 3.) **INTDS Financial and Membership Status Report** (Loowski)
- 4.) **Status of the 2008 Conference, adjustments to the schedule, proxy presentations for absentees, other issues** (Stodel)
- 5.) **Approval of sponsoring speakers and attendees** (Gilliam)
- 6.) **Status of the INTDS Newsletter** (Greene)
- 7.) **Status of the INTDS Database** (Stolarz)
- 8.) **Host and site of the INTDS Conference 2010** (Zeisler)
- 9.) **Discussion about the terms of Officers, filing vacancies(VP, Rec. Sec., Newsletter Editor?, Treasurer/Corresp. Sec.?, Webmaster?)**
- 10.) **Kind and location for the 2009 Board Meeting**
- 11.) **Karasek Memorial Fund**
- 12.) **Other business (Presentations, Awards, CAARI?)**
- 13.) **Official (but informal) Inauguration of the new Officers**
- 14.) **Adjournment**

MINUTES OF THE 2008 INTDS MEMBERSHIP MEETING

(Held in Caen, France and Dated: 18 September 2008)

Following the agenda displayed via overhead;

Agenda

1. **Membership report**
2. **Call for election**
3. **Minutes of the pre-conference Board meeting at 14 September 2008**
4. **Financial report**
5. **Miscellaneous**

Election results and introduction of the all members of the INTDS Board

THE 2010 INTDS WORLD CONFERENCE

Dear INTDS Members:

It is my pleasure to invite you to the 25th World Conference of the International Nuclear Target Development Society, which will be held at TRIUMF in Vancouver, British Columbia, Canada from September 12 to 17, 2010.

This conference will be co-hosted by TRIUMF, Canada's National Laboratory for Particle and Nuclear Physics, and Advanced Applied Physics Solutions, a TRIUMF company funded through a Centre of Excellence for Commercialization and Research.

Detailed information on the conference venue, travel to Vancouver and to TRIUMF, accommodation, conference topics and guidelines for submission of abstracts can be found on our website:

<http://intds2010.triumf.ca/index.html>.

Registration is now open! Please register early as it facilitates our preparations. Thank you.

For inquiries about registration, please contact the TRIUMF Conference Coordinator, Ms. Sandi Miller, conferences@triumf.ca. Please include INTDS-2010 in the subject line.

For inquiries about the scientific / technical program, conference topics and travel support, please email me at zeisler@triumf.ca.

I am looking forward to welcoming you to TRIUMF in September!

With very best regards,

Stefan Zeisler
Chairman, Local Organizing Committee
INTDS-2010



[Home](#)

Recent Developments in Nuclear Target Preparation and Stripper Foil Technology

[Location](#)

The 25th World Conference of the International Nuclear Target Development Society (INTDS-2010) will be co-hosted by TRIUMF and Advanced Applied Physics Solutions.

[Registration](#)

Topics include:

[Travel Support](#)

[Program](#)

[Participant List](#)

[Accommodation](#)

[Travel](#)

- Preparation techniques for thin films and foils
- Stripper foils
- High power targets
- Radioactive targets
- Liquid and gas targets
- Isotopic enrichment and materials
- Target Characterization
- Targets and coatings for medical radioisotope production and special applications

INTDS ELECTRONIC MAILING LIST

Powell Barber
Florida State University, Tallahassee, USA
(originally submitted 24 January 2003)

Introduction

An electronic mailing list has been established for use by all members of the INTDS. The list allows any member to contact all subscribers using a single e-mail address - intds@lists.fsu.edu - facilitating discussion among members. Subscription is limited to INTDS members and select others with board approval. The list is served by Florida State University Academic Computing and Network Services and administered by Powell Barber.

Privacy Issues

Subscription to the list requires administrator approval. All INTDS members listed in the 2002 conference materials will be automatically approved upon receipt of a subscription request. Subscription requests from those unknown to the administrator will be submitted to the board for approval. Only subscribers may post to the list.

Messages of the list are archived and available for viewing by any html client software. The archives are not restricted to INTDS members and may be viewed by anyone. The mailing list software strips e-mail addresses from header information prior to posting to the archives. However, e-mail addresses imbedded in the text are not stripped. Those concerned about this should avoid using signature files or including e-mail address information in the body of the message.

How to Subscribe

Subscription and account management may be accomplished through either web or e-mail interfaces, or by contacting the administrator directly. For the web interface, simply access <http://lists.fsu.edu/mailman/listinfo/intds> with any forms capable web browser. A link from the INTDS home page, <http://www.intds.org> is available. Simple instructions are given that allow one to access the archives, subscribe, unsubscribe, and edit account options.

Alternatively, one may request information on the e-mail interface by sending e-mail to intds-request@lists.fsu.edu and including the word **help** in the subject line. This may obviously be done prior to subscription.

While the web interface is certainly the easiest way to subscribe and manage your account, any request may also be processed through the administrator by sending e-mail to barber@nucmar.physics.fsu.edu.

Technical Details

The mailing list server is maintained by Florida State University's Academic Computing and Network Services, which are located in Innovation Park, Tallahassee, FL, USA. The server software is Mailman, the GNU Mailing List Manager. Additional information on this software is available from <http://www.list.org/>.

Technical Contributions

ROLLED ISOTOPICALLY ENRICHED FOIL INVENTORY

Joe Heagney, Joanne Heagney

Microfoils Co., 18218 18th Ave. NW, Arlington, WA 98223 USA

(submitted 31 March 2009)

We have started a new business, Microfoils (domain name Microfoils.com) in order to make available the isotopically enriched and natural rolled foils and stable isotopes we have accumulated over the 40 years we have been in business (as Micromatter). The XRF calibration standards aspect of Micromatter Co. was sold to AAPS in TRIUMF, Vancouver, B.C., Canada. We will continue to offer for sale the VAC-3 and VAC-4 vacuum shipping containers as before.

The following is a listing of the rolled isotopically enriched foils we have in stock, which also includes rolling scrap. There are, in addition, many natural foils available, but they need to be characterized and have yet to be compiled into a listing. If you are interested in any of the foils presented below, please feel free to contact us for a quotation.

46Ti(86.1%)	Sample 102846	Irreg. will cover	
Size (cm)	Thickness(mg/cm2)	1.4cm dia. aper.	1.3
3.5mg scrap		Irreg. will cover	
		1.1cm dia. aper,	1.3
46Ti(83.8%)	Sample 191(c)	2.4 x 3.5	2
Size (cm)	Thickness(mg/cm2)	1.6 x 2.2	2.63
0.7 x 1.6	0.21	15.3 mg scrap	
0.51 x 2.3	0.21		
0.9 x 2.05	0.215	48Ti(99.36%)	Sample 103040
1.65 x 2.2	0.46	Size (cm)	Thickness(mg/cm2)
0.9 x 0.95	0.75	2.8 x 3.7	0.248
0.7 x 1.1	0.75	2.1 X 2.95	0.28
0.9 x 2.1	1.64	1.2 X 1.3	1
1.3 x 1.5	2.5	0.6 X 2.1	1
0.5 x 1.1	3	0.65 X 2	1
0.3 x 0.9	3	0.7 X 1.9	1
3 mg bead		48Ti(99.36%)	Sample 103040(cont)
47Ti(80.10%)	Sample 131540	0.8+ x 2.6	1
Size (cm)	Thickness(mg/cm2)	Irreg. will cover	
0.8 x 1.6	0.25	1.1cm dia. aper.	4.6
2 x 2.5	0.25	Irreg. 0.9-1.2 x 3.3+ 5.7	
Irreg. will cover			
1.1cm dia. aper.	0.28	48Ti(99.10%	Sample 92340
2 x 1.5	0.28	Size (cm)	Thickness(mg/cm2)
Irreg. will cover		1.2 x 1.8	1.1
1.1cm dia. aper.	0.51	2.65 x 4	3
Irreg. will cover		28 mg scrap	
1.1cm dia.aper.	1		
0.8 x 2	1		

49Ti(81.61%)	Sample 151640	57Fe(90.24%)	Sam. 200401, 200440
Size (cm)	Thickness(mg/cm²)	Size (cm)	Thickness(mg/cm²)
Irreg. will cover		1.3 x 1.4	2
1cm dia. aper.	0.6	1.15 x 1.7	2.5
0.7 x 2.6	1.04	4.35 x 4.5	3.3
1.8 x 2.1	1.61	2.6 x 2.6	~ 8
1.66 mg scrap		thick piece	
		for re-roll	2.74
		2.6 mg scrap	
50Ti(83.20%)	Sample 103240	58Ni(99.927%)	Sample 175301
Size (cm)	Thickness(mg/cm²)	Size (cm)	Thickness(mg/cm²)
0.8 x 1.3	0.225	2 x 2.6	0.300
Irreg. will cover		0.9 x 1.1	1
1.4cm dia. aper.	1.04	0.35 x 1.8	1
2.9 x 3	0.25	1.1 x 1.7	1.67
1 x 2	0.25	1.3-1.6 x 2.7	1.67
5.1 mg scrap		1.35 x 3.85	2.2
		1.35 x 1.7	2.56
54Fe(99.92%)	Sample 457-1	2.1cm dia.	2.75
Size (cm)	Thickness(mg/cm²)	1.65 x 2.55	4.8
1.25 x 1.25	0.28	1.3 x 2.5	5
1.6 x 2-2.6(irreg.)	0.56	1.3 x 2.5	10
1.2 x 1.2	1	1.25 x 1.25	10
1.8 x 2.4	3	2.35 x 2.55	22.6 (135.8 mg)
2.5 x 2,5	5.3	29 mg scrap	
		58Ni(99.89%)	Sample 121426
54Fe(97.60%)	Sample 166690	Size (cm)	Thickness(mg/cm²)
Size (cm)	Thickness(mg/cm²)	1 x 5	0.275
5 x 5.7	1.17	1 x 2.3	0.275
1.8 x 3.3	1.17	0.9 x 0.9	0.288
		1 x 2.2	0.3
54Fe(96.66%)	Sample No. Unknown	1.5 x 2.2	0.3
6.6 mg scrap		2.45 x 2.8	0.3
		1.2 x 1.2	0.382
56Fe(99.93%)	Sample 154901	1 x 1	0.53
Size (cm)	Thickness(mg/cm²)	Irreg. will cover	
1.7 x 2.1	0.57	1.4cm dia. aper.	1
1 x 0.9-1.4 (irreg.)	0.776	1 x 2.4	1.1
1.1 x 2.7	0.776	1 x 1.3	2.3
1.4 x 1.84	0.776	2.7 x 3.2+	4
0.6-1.8 x 2.55(irreg.)	7.3	3.1 x 3.5	10
115 mg scrap		Large piece	12.6 (234 mg)
		2.5 x 2.5	20
57Fe(95.7%)	Sample No. Unknown	2 x 3	20
Size (cm)	Thickness(mg/cm²)	218 mg heavy foil scrap	
1.2 x 2.2	1.4	63 mg thin foil scrap	
0.6 x 2.6	1.5		
0.8 x 2.2	1.8		
1.5-2.25 x 2.85(irreg.)	2.5		
32.6 mg scrap			

60Ni(99.79%)	Sample 1445871
Size (cm)	Thickness(mg/cm²)
1.1 x 1.2	0.3
1.2 x 1.9	0.435
1.4 x 1.45	0.5
1.5 x 2.2	0.744
2.1 x 2.4	0.744
0.8 x 2.6	1
0.85-1.8 x 2.6(irreg.)	1.35
2.5 x 3.5	2.85
1 x 2 Irreg. will cover	
1.4cm dia. aper.	4
57 mg scrap	

60Ni(99.72%)	Sample 145890
Size (cm)	Thickness(mg/cm²)
0.75-1.2 x 3.5 (irreg.)	2.17
0.875 x 2.5	3.4
1.3 x 2.3	6.7
1.6 x 2.4	11.8
2.5 x 4	18.6 (186 mg)
391 mg scrap (some heavy)	

60Ni(99.1%)	Sample 845(A) 84501
Size (cm)	Thickness(mg/cm²)
1.3 x 3.2	0.189
2.7 x 3.5	0.256
1.4 x 3.3	0.436
1.4 x 3.2	0.65

61Ni(92.92%)	Sample 175501
Size (cm)	Thickness(mg/cm²)
0.85 x 1.6	0.356
1.1 x 2.35	0.356
1.55 x 1.55	0.383

61Ni(99.54%)	Sample 1278(b)
Size (cm)	Thickness(mg/cm²)
1.9 x 3.4 (will cover	
2.6cm dia. aper.)	1.33
1.25 x 1.9	1
1.9 x 3.2	1
6.3 mg rolling scrap	

62Ni(98.83%)	Sample 175601
Size (cm)	Thickness(mg/cm²)
1.25 x 1.4	0.404
0.9 x 1.3	1
2.7 x 2.95	1.2

64Ni(97.92%)	Sample 15301
Size (cm)	Thickness(mg/cm²)
Irreg. will cover	
1cm dia. aper.	4
4.4 mg rolling scrap	

64Ni(96.48%)	Sample 195701
Size (cm)	Thickness(mg/cm²)
0.7 x 2.8	1

64Ni(98.15%)	Sample 1461(A)
Size (cm)	Thickness(mg/cm²)
3.4 mg consolidated rolling scrap	

64Ni Unknown Enrich. & Sample No.	Thickness(mg/cm²)
Size (cm)	Thickness(mg/cm²)
2 ea. 1.1 x 1.2	2 -2.2

63Cu(99.89%)	Sample 165601
Size (cm)	Thickness(mg/cm²)
1.25 x 1.25	4.24
2.1 x 3.4	15
129.8 mg rolling scrap	

63Cu(99.62%)	Sample 106490
Size (cm)	Thickness(mg/cm²)
0.9 x 1.93	0.458
1.3 x 1.8	0.562
1.6 x 3.2	0.58
1.95 x 2	0.617
1.6 x 2	0.63
1 x 1.4	0.775
1.8 x 1.8	1.05
2.2 x 3.3	1.07
1.9 x 2.9	1.14
1.4 x 3.05	1.2
1.9 x 3	1.2
1.3 x 1.8	1.24
(irr)1.6-2 x 1.8	2.5
3.3 x 3.4	12.3
1.6 mg scrap	

65Cu(99.69%)	Sample 165701
Size (cm)	Thickness(mg/cm²)
1.8 x 1.8	0.362
1 x 1.5	0.75
2 x 3	0.75
1.6 x 2.2	3
2.15 x 3.8	5.56
3.25 x 3.7	12.8
1-1.6 x 3.3	21 (83.2 mg metal)

64Zn(99.85%)	Sample 114901	0.7 x 3	10.1
Size (cm)	Thickness(mg/cm2)	56.3 mg med. rolling scrap	
1.5 x 2	0.756	170.2 mg thin rolling scrap	
0.9 x 1.2	1		
1.6 x 2,5	1		
8 mg scrap			
64Zn(99.4%)	Sample 51-7a	91Zr(88.5%)	Sample 157541
27.5 mg metal		Size (cm)	Thickness(mg/cm2)
		3 x 3.3 oval	0.22
		1.1-1.5 x 2.4 (irreg.)	0.253
		1.7 x 4.3	1
		1.1 x 1.2	1.78
		1.1 x 1.8	1.93
66Zn(98.8%)	Sam. 115001, 115040	91Zr(88.5%)	Sample 157541(cont)
Size (cm)	Thickness(mg/cm2)	Size (cm)	Thickness(mg/cm2)
1.6 x 2.65	2.34	2.2 x 4.05	1.95
1.12 x 2.18	2.5	1.1 x 2.8	3.1
1.18 x 1.27	2.7	1.5 dia.	3.28
34 mg scrap		0.6 x 2.6	3.44
		1.5 dia.	6.15
		3 mg scrap	
66Zn(98.22%)	Sample 157091	92Zr(95.13%)	Sample 157641
Size (cm)	Thickness(mg/cm2)	Size (cm)	Thickness(mg/cm2)
1.25 x 2.43(Irreg.)	1.23	1.5 x 1.75	0.317
6.8 mg metal		Irreg. will cover	
		1.1 cm dia. aper.	0.333
		1.5 cm dia.	1.12
		3 cm dia. 1/2 circle	~1.13
		1.2 cm dia.	~1.13
		1.5 cm dia.	~3.67
		1.5 cm dia.	~4.9
		1.2 x 1.35	5.1
		2.5 x 3.15	5.38 (42.35 mg)
		2.55 x 2.7-3.1(irreg.)	6.85 (52.1 mg)
		6.3 mg foil scrap	
67Zn(92.06%)	Sample 157101	94Zr(97.60%)	Sample 201A
6.3 mg metal		Size (cm)	Thickness(mg/cm2)
		1.25 x 2.54	0.517
		94Zr(96.49%)	Sample 125241
		Size (cm)	Thickness(mg/cm2)
		2.9 x 4.8	0.2
		Irreg. cover	
		1.1 cm dia. aper.	0.2
		Irreg. cover	
		1 cm dia aper.	0.2
		2.4 x 2.9	0.28
		0.8 x 2.55	0.341
		1.25 x 1.25	0.35
		1 x 1.5	0.35
		3.3 x 3.5	0.385
68Zn(98.46%)	Sample 157290		
Size (cm)	Thickness(mg/cm2)		
0.9 x 2.6	1.12 (corner notch)		
16.3 mg virgin metal			
70Zn(99.72%)	Sample 202901		
2 mg virgin metal			
70Zn(71.4%)	Sam. 176-3 (TRACE)		
1.6 mg metal			
90Zr(97.62%)	Sample 157440		
Size (cm)	Thickness(mg/cm2)		
1 x 1.3	0.196		
1-1.45 x 1.5 (irreg.)	0.226		
1.4-1.9 x 3.7 “	0.25		
1.3-1.65 x 2.1 “	0.275		
1.1 x 1.5	0.286		
0.9-1 x 1.3	0.291		
0.9 x 1.85	0.32		
1.3 x 2.4	0.333		
1.4 x 1.8	0.41		
1.3 x 1.4	0.41		
0.87 x 1.8	0.425		
1.2 x 1.3	0.558		
0.65-1.05 x 1.35			
(irreg.)	0.69		

1.6 x 3.05	0.452
2.5 x 2.5	0.472
1.9 x 3.3	0.494
1.95 x 2	0.516
2.4 x 2.5	0.574
1.2-2 x 2.8 (irreg.)	0.59
1.25 x 1.9	0.592

94Zr(96.49%)	Sample 125241
Size (cm)	Thickness(mg/cm2)
1.8 x 2	0.719
0.8 x 1.1	0.719
1.9 x 2.7	1
1.2 x 2.8	1.94
4.3 x 7.6	3.8 (127.24mg)
2.6 x 2.7	7.5
16 mg scrap	

94Zr(96.07%)	Sample 157740
Size (cm)	Thickness(mg/cm2)
1 x 3.3	0.303
2.65 x 2.75	0.592
3 x 3.5	1.16
1.5 x 2.7	4.28
4.6 mg scrap	

92Mo(98.27%)	Sample 159301
Size (cm)	Thickness(mg/cm2)
1.25 x 1.25	0.441
1-1.4 x 2.6-3.1(irreg.)	0.482
1 x 1	0.5
0.9 x 3.1	0.5
1.2 x 3.3	4
1.45 mg scrap	

92Mo(97.37%)	Sample S-00145
Size (cm)	Thickness(mg/cm2)
1.3 x 1.6	0.47
Irreg. will cover	
1.3cm dia. aper.	0.6
1.7 x 1.8	2
0.7 x 3.2	2.1
Irreg. will cover	
1.4cm dia. aper.	2.6
Irreg. ~1.3 x ~2	2.9
1 x 5.9	3.29
0.95 x 2.7	3.4
1.2 x 2.2	3.8
0.8 x 1.7	5.2
0.7-0.85 x 2 (irreg.)	5.2
Irreg. cover 1.6cm	
dia. aper.	10

92Mo(97.37%)	Sample S-00145
Size (cm)	Thickness(mg/cm2)
Irreg. cover 1.2cm	
dia. aper.	11.2
31mg thin rolling scrap	
73 mg thick rolling scrap	

94Mo(91.59%)	Sample 159490
Size (cm)	Thickness(mg/cm2)
3 x 3.7	2.15

94Mo(93.90%)	Sample 134101
Size (cm)	Thickness(mg/cm2)
1 x 2	0.78
0.8 x 2	0.78
1.2 x 2.6	2.16
1.5 x 3.1	2.24
2.15 x 3.05	2.3
1.7 x 2.5	2.35
1.3 x 2.45	3.2
1.1-2.2 x 3.6 (irreg.)	3.6
0.9 x 1.2	4.3
Irreg. cover 1.9cm	
dia. aper.	6.5
1.2 x 3.35	10.7
34.6 mg scrap	

95Mo(96.8%)	Sample 134201
Size (cm)	Thickness(mg/cm2)
1.2 x 2	0.34
2.05 x 3.8	1.2
223 mg scrap	

96Mo(96.8%)	S. #134340 & 134390
Size (cm)	Thickness(mg/cm2)
Irreg. cover 1.6cm	
dia. aper.	0.6
1.5 x 1.5	0.815
1.8 x 1.9 corner off	1
2.8 x 3	1.24
2.5 x 3.5	1.4
1.1 x 1.23	1.6
1.9 x 2.4	2
1.75 x 2.3	2.8
2.8 x 3.5	3.5
433 mg scrap	

97Mo(94.25%)	Sample 159701
Size (cm)	Thickness(mg/cm2)
1 x 1.7	1
0.7 x 1.4	1.9
1.9-2.1 x 2.75 (irreg.)	4.6

1.25 x 1.25	4.98	0.9 x 2.2	1.37
1.25 x 2.5	4.98	2.6 x 2.6	4.9
1.9 x 2.2	5.9	1.2 x 2.3	4.98
2.9 mg scrap		4.2 mg scrap	

98Mo(98.78%)	Sample 159801
Size (cm)	Thickness(mg/cm²)
1.25 x 1.25	0.28
1.1 x 1.3	0.44
0.9 x 1.6	0.619
Irreg. will cover	
1.4cm dia. aper.	0.66
1.5 x 1.5	0.875
Irreg. will cover	
1cm dia. aper.	1
1.2 x 1.5	1
Irreg. will cover	
1.1cm dia. aper.	1
2 x 3	1
1.5 x 1.5	1.07
2.1 x 2.8	1.54
1.7 x 2.1	1.6
1.7 x 1.8	1.6
3 x 5.9	2
2.9 x 2.9	2.3
1.7 x 2.1	2.45
1.1-1.6 x 1.8-2(Irreg.)	2.54
1.25 x 1.25	4.67

98Mo(97.01%)	Sample 172380
Size (cm)	Thickness(mg/cm²)
0.8 x 1.5	1
16.9 mg rolling scrap	

100Mo(97.42%)	Sample 159901
Size (cm)	Thickness(mg/cm²)
1.3 x 2.5 (Irreg.)	0.25
1.4 x 1.45	0.365
1.7 x 2.3	0.376
1.35 x 1.8	0.495
0.9 x 1.4	0.571

100Mo(97.42%)	Sample 159901
Size (cm)	Thickness(mg/cm²)
1 x 4.1	0.604
1.1 x 2.4	0.625
1 x 1.3	0.7
0.95 x 1.2	0.706
0.9-1.4 x 2.2 (Irreg.)	0.711
1.15 x 1.9	1.1
2.6 x 3.6	1.1
1 x 2.05	1.16

104Pd(95.25%)	Sample 191101
Size (cm)	Thickness(mg/cm²)
0.6-0.9 x 1.5 (Irreg.)	0.444
2.2 x 1.3-2.1 (Irreg.)	0.52
1.7 x 0.65	0.52
1.2 x 1.2	0.55
1.6 x 3.3	1.5
1 x 1.55	1.7
1.05 x 2.5	4.7

104Pd(90.5%)	Sample Unknown
Size (cm)	Thickness(mg/cm²)
Will cover	
1.25cm dia. aper.	0.498

105Pd(93.8%)	Cert. #907 (TRACE)
Size (cm)	Thickness(mg/cm²)
1.7 x 1.7	2
0.9-1.13 x 2.3(Irreg.)	3.3
0.3 x 2	3.3

106Pd(96.66%)	Sample 165001
Size (cm)	Thickness(mg/cm²)
1.15 x 1.4	0.48
1 x 1.15	0.577
1.25 x 1.45	0.7
2.55 x 3.13	3.76
7 mg scrap	

108Pd(98.79%)	Sample 214201
10.3 mg scrap	

108Pd(94.19%)	Sample 77401
Size (cm)	Thickness(mg/cm²)
0.45 x 2	0.625
~2.75 x 3 (Irreg.)	2 (corner off)

110Pd(97.73%)	Sample 191501
Size (cm)	Thickness(mg/cm²)
2.45 x 2.85	0.54
1.1 x 1.8	0.57
2.4 x 2.5	0.57
1.15 x 2.25	0.58
3-3.3 x 3-3.8(Irreg.)	0.85
0.95 x 2	1.411
5.6 mg scrap	
20 mg consolidated scrap	

110Pd(96.98%) Sample 165240
Size (cm) Thickness(mg/cm²)
 ~2 mg/cm² foil scrap (4.8mg total wt.)

114Cd(99.09%) Sample LT1419(b)
Size (cm) Thickness(mg/cm²)
 1.3 x 2.3 1.1
 1.65 x 2.4 1.3
 1.1 x 1.2 4.2**
 **whole piece is larger (8.718 mg total)

118Sn(97.79%) Sample 194201
Size (cm) Thickness(mg/cm²)
 1 x 2.6 5
 0.75 x 1.9 5

119Sn(85.9%) Sample IJ1005(a)
Size (cm) Thickness(mg/cm²)
 1.5 x 2.3 3.5

120Sn(98.39%) Sample 126691
Size (cm) Thickness(mg/cm²)
 1.4 x 3.15 2.5
 1.9 cm dia., 987µg/cm² on 9.9mg/cm² Au

194Pt(97.41%) Sample 186202
Size (cm) Thickness(mg/cm²)
 1.1 x 1.1 1.14
 1.95 x 2.75 1.92
 2 x 2 5
 1 mg scrap

195Pt(97.28%) Sample 186340
Size (cm) Thickness(mg/cm²)
 1-1.5 x 1.65 (irreg.) 2.2
 2.05 x 2.5 2.6
 1.6 x 1.75 5.5
 1.4-1.7 x 2.2 (Irreg.) 11.3 (40.73 mg)
 0.6 mg rolling scrapb

196Pt(97.51%) Sample 186401
Size (cm) Thickness(mg/cm²)
 0.8 x 1.15 0.862
 1.55 x 2.5 1.06
 ~3.2 x 4.3 2 (small corner off)
 0.8 x 2 9.48
 1.07mg scrap

162Dy(96.26%) Sample 171540
Size (cm) Thickness(mg/cm²)
 1.1-1.3 x 2.8 (Irreg.) 3.5
 1 x 3.5 3.5

