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Shipping #6

MOUND LABORATORY-MONSANTO
Central File No. 55-7-29

BULK MEASUREMENTS
CONSOLIDATED DATA AND SHIPPING DOCUMENT

ALMD55072900367

Date: July 8, 1955
Submitted by: G. A. Essig

1. Shipping Container Nos. 6,7,8, and 9 Containing 189 Size 4" standard cans, 28 size 6" standard cans and 25 size 2" sampler cans containing Grade A Material from Batch Numbers A-1 to A-8 and A-11 to A-15 inc. (see attached lists).

2. All Cans are cured according to the specifications.

3. All Cans conform to dimensional specifications.

4. Chemical and Isotopic Analysis of the salt used in the above listed items.

a. Oak Ridge Raw Salt Analysis:

(1) $\frac{\text{grams of Lithium}}{\text{grams of salt}}$ = 0.7068

(2) $\frac{\text{grams of Deuterium}}{\text{grams of salt}}$ = 0.2143

(3) $\frac{\text{grams of } OH^-}{\text{grams of salt}}$ = 0.0649 (Karl Fischer Method)

(4) $\frac{\text{grams of } CO_3^{=}}{\text{grams of salt}}$ = 0.0069

(5) Alkali Metals:

Sodium	=	920 p.p.m.
Potassium	=	800 p.p.m.
Calcium	=	400 p.p.m.

(6) Atomic % Li^6 = 94.31
Wt. % Li^6 = 93.42

b. Mound Laboratory Analysis of Same Material:

(1) $\frac{\text{grams of Lithium}}{\text{grams of salt}}$ = 0.6970

(2) $\frac{\text{grams of Deuterium}}{\text{grams of salt}}$ = 0.2115

(3) $\frac{\text{grams of LiOH}}{\text{grams of salt}}$ = 0.020 (Livermore Method)

(a) $\frac{\text{grams of } Li_2O}{\text{grams of salt}}$ = 0.065

(4) $\frac{\text{grams of } CO_3^{=}}{\text{grams of salt}}$ = 0.144

(5) Alkali Metals

Sodium	=	None p.p.m.
Potassium	=	None p.p.m.
Calcium	=	None p.p.m.

(6) $\frac{\text{Deuterium}}{\text{Hydrogen}}$ = $\frac{96.46}{3.54}$

Released through the
MOUND LSDR PROJECT
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Record Copy held at Mound Facility

MOUND DECLASSIFICATION REVIEW
1ST REVIEW-DATE 3/9/98
AUTHORITY ☐ADC ☒ADC ☐ADD
NAME Jim Lanham
2ND REVIEW-DATE 3/9/98
AUTHORITY ☐ADC ☒ADD
NAME Mahaffey

DETERMINATION (CIRCLE NUMBER(S))
1. CLASSIFICATION RETAINED
2. CLASSIFICATION CHANGED TO:
3. CONTAINS NO DOE CLASSIFIED INFO
4. COORDINATE WITH:
5. CLASSIFICATION CANCELLED
6. CLASSIFIED INFO BRACKETED
7. OTHER (SPECIFY):

RESTRICTED DATA

c. Mound Laboratory Analysis of Pressed Cans:

(1) $\frac{\text{grams of Lithium}}{\text{grams of salt}}$ = 0.7085

(2) $\frac{\text{grams of Deuterium}}{\text{grams of salt}}$ = 0.2148 (average value)

(3) $\frac{\text{grams of } OH^{=}}{\text{grams of salt}}$ = See LiOH Content

(4) $\frac{\text{grams of } CO_3^{=}}{\text{grams of salt}}$ = 0.0153

(5) Alkali Metals

Sodium	=	None p.p.m.
Potassium	=	None p.p.m.
Calcium	=	None p.p.m.

(6) $\frac{\text{Deuterium}}{\text{Hydrogen}}$ = $\frac{97.60}{2.40}$

d. Degradation of material resulting from handling and processing ~1%.

5. The density of all fabricated units is equal or greater than 93% of theoretical density (accounting for detectable impurities), and is no greater than ± 1% of the arithmetical mean.

LiOH content of canned blocks curing batches:

Curing Batch No.		Curing Batch No.	
A-1	~ 250 p.p.m.	A-7	~ 250 p.p.m.
A-2	~ 550 p.p.m.	A-8	~ 400 p.p.m.
A-3	~ 300 p.p.m.	A-11	~ 2000 p.p.m.
A-4	~ 500 p.p.m.	A-12	~ 2000 p.p.m.
A-5	~ 350 p.p.m.	A-13	~ 500 p.p.m.
A-6	~ 300 p.p.m.	A-14	~ 2100 p.p.m.
		A-15	~ 700 p.p.m.

Remarks: The Livermore method for hydroxide analysis for the cured batches after number eight containing Grade "A" material from the second 25 kilogram shipment has been very erratic. The vacuum dry-box obtained from Livermore was used for all sampling, and all reactions were checked thoroughly. The "blanks" (rate of LiD dissociation) have been consistently high and the temperature control of the reactions have been difficult. From conversations with Mr. Jack Frazer of Livermore the following assumptions have been made.

1. The condition of the material (impurities, etc.) produces a crystal fatigue which causes the high "blanks". The effect made it necessary to run the reaction at a lower temperature and for a longer period of time.

2. A powdering of the sample during the run causes the erratic reaction curve.

3. The dry-box check which uses cured samples from the impure material has been incorrect because of the high "blanks".

4. There is a possibility that the metal impurities in the salt react with Armco iron of the crucibles.

GAE:vrg

Distribution:
Copy 1 - O. Meadors - University of California
Radiation Laboratory
Livermore, California (1 inc.)
2 - E. A. Walker
3 - E. C. McCarthy
4 - G. A. Essig (1 inc.)
5 - Central Files

LITHIUM DEUTERIDE
(Enriched)

SHIPMENT NUMBER 3

BATCH A-1
Packed in Container No. 6

Can Number	Gross Weight	Net Salt Weight	
A-1241	107.5601	90.7494	4-inch cans
A-1244	107.2506	90.8213	" " "
A-1245	107.5460	90.6473	" " "
A-1246	107.2038	90.4577	" " "
A-1247	107.6035	91.3296	" " "
A-1252	107.8556	90.9241	" " "
A-1253	107.3090	90.9720	" " "
A-1254	107.5789	90.9017	" " "
A-1255	108.1000	90.9456	" " "
A-1256	107.8386	91.0114	" " "
A-1258	108.0030	91.0224	" " "
A-1259	108.5275	91.0157	" " "
A-1260	108.0458	91.0728	" " "
A-1261	107.8686	91.0227	" " "
A-1262	108.5615	91.0029	" " "
A-1265	107.8250	90.7568	" " "
A-1269	107.7410	90.7589	" " "
A-1270	107.5287	90.7920	" " "
A-1271	108.4347	90.7774	" " "
A-1272	106.2041	90.7400	" " "
A- 24	28.3050 (Sample)	22.6964	2-inch cans
A- 25	28.5214 (Sample)	22.6724	" " "
Total	2211.4124	1863.0905	

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LITHIUM DEUTERIDE
(Enriched)

SHIPMENT NUMBER 3

BATCH A-2
Packed in Container No. 6

Can Number	Gross Weight	Net Salt Weight	
A-1211	107.5700	90.9259	4-inch cans
A-1213	108.0516	90.7176	" " "
A-1214	108.2191	90.8372	" " "
A-1215	107.2111	90.7545	" " "
A-1249	107.4665	90.7741	" " "
A-1250	106.5620	90.7511	" " "
A-1276	108.1233	90.8218	" " "
A-1277	108.2430	90.7628	" " "
A-1278	108.0689	90.8456	" " "
A-1279	108.0941	90.7969	" " "
A-1280	107.8244	90.8240	" " "
A-1281	108.3301	90.8969	" " "
A-1282	108.0475	90.5952	" " "
A-1283	108.5804	90.7815	" " "
A-1286	108.1747	90.8115	" " "
A-1287	108.1628	90.6922	" " "
A-1288	108.0537	90.7875	" " "
A-1289	107.4909	90.7838	" " "
A-1291	107.8777	90.7708	" " "
A-1294	107.7350	90.6650	" " "
A-1295	108.5139	90.8903	" " "
A-1296	107.5602	90.7675	" " "
A-1297	107.7879	90.7618	" " "
A-1298	108.0608	90.8080	" " "
A-1299	107.9770	90.7046	" " "
A- 21	28.6526 (Sample)	22.6896	2-inch cans
A- 23	28.3805 (Sample)	22.7204	" " "
Total	2754.8197	2314.9381	

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LITHIUM DEUTERIDE
(Enriched)

SHIPMENT NUMBER 3

BATCH A-3
Packed in Container No. 6

Can Number	Gross Weight	Net Salt Weight	
A-1300	107.8470	90.8818	4-inch cans
A-1301	106.2332	90.8963	" " "
A-1302	108.0778	90.8479	" " "
A-1303	108.0786	90.9255	" " "
A-1304	107.7404	90.8312	" " "
A-1305	107.8884	90.8751	" " "
A-1306	106.6585	90.8646	" " "
A-1307	105.7186	90.8955	" " "
A-1308	105.6448	90.8940	" " "
A-1309	106.8975	90.7883	" " "
A-1310	105.7523	90.8598	" " "
A-1311	106.4409	90.8276	" " "
A-1312	107.2160	90.7897	" " "
A-1313	108.1192	90.8905	" " "
A-1314	107.4957	90.9502	" " "
A-1315	106.2429	90.9399	" " "
A-1316	107.0866	90.8342	" " "
A-1317	106.6807	90.8646	" " "
Packed in Container No. 7			
A-1318	106.1360	90.9196	" " "
A-1319	106.7556	90.9922	" " "
A-1320	108.1197	90.9296	" " "
A-1321	107.9272	90.9758	" " "
A-1323	107.9164	91.0474	" " "
A-1324	107.5084	90.8804	" " "
Packed in Container No. 6			
A- 27	28.6729 (Sample)	22.7199	2-inch cans
A- 28	28.4885 (Sample)	22.7386	" " "
Total	2627.3438	2226.8602	

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LITHIUM DEUTERIDE
(Enriched)

SHIPMENT NUMBER 3

BATCH A-4
Packed in Container No. 7

Can Number	Gross Weight	Net Salt Weight	
A-1292	107.1606	90.8480	4-inch cans
A-1293	106.9293	90.8655	" " "
A-1329	107.0044	90.1112	" " "
A-1330	107.7280	90.8542	" " "
A-1331	107.7649	90.7905	" " "
A-1332	107.7714	90.7426	" " "
A-1333	107.6446	90.7710	" " "
A-1334	107.7975	90.8392	" " "
A-1335	107.0126	90.7944	" " "
A-1336	107.7862	90.9827	" " "
A-1339	106.9760	90.8170	" " "
A-1340	105.9027	90.8880	" " "
A-1341	107.2684	90.8363	" " "
A-1342	107.9491	90.9137	" " "
A-1343	108.0632	90.0116	" " "
A-1344	107.3017	90.9400	" " "
A-1345	106.1495	90.6761	" " "
A-1352	107.1932	90.5495	" " "
A-1353	106.9178	90.9367	" " "
A-1354	107.1331	90.9343	" " "
A-1355	106.6276	90.7636	" " "
A-1356	107.4350	90.9287	" " "
A-1357	106.9039	90.8880	" " "
A-1358	107.0930	90.8626	" " "
A-1359	106.7504	90.8492	" " "
A-1360	106.8130	90.8973	" " "
A-1361	108.7384	90.7842	
A- 40	28.7157 (Sample)	22.7150	2-inch cans
A- 41	28.7111 (Sample)	22.7180	" " "
Total	2953.2423	2496.5091	

LITHIUM DEUTERIDE
(Enriched)

SHIPMENT NUMBER 3

BATCH A-5
Packed in Container No. 7

Can Number	Gross Weight	Net Salt Weight	
A-1346	107.5320	90.5673	4-inch cans
A-1347	107.7649	90.8966	" " "
A-1348	107.6706	90.8411	" " "
A-1349	107.6201	90.7026	" " "
A-1351	106.9118	90.8118	" " "
A-1364	108.1957	90.7565	" " "
A-1365	107.6568	90.6543	" " "
A-1367	107.6743	90.7202	" " "
A-1369	108.5622	90.8149	" " "
A-1370	108.5376	90.7289	" " "
A-1371	108.0163	90.8028	" " "
A-1373	107.8290	90.7937	" " "
A-1374	107.4425	90.8468	" " "
A-1375	106.3066	90.7454	" " "
A-1376	107.0250	90.7529	" " "
A-1394	108.4519	90.8191	" " "
A-1398	107.6524	90.7994	" " "
A-1400	108.1345	90.8517	" " "
A-1401	107.4353	90.9745	" " "
A-1402	108.7034	90.8686	" " "
A-1403	108.7867	91.2111	" " "
A- 33	29.0579	22.7381	2-inch cans
A- 61	28.7597	22.6436	" " "
Total	2321.7272	1952.3419	

LITHIUM DEUTERIDE
(Enriched)

SHIPMENT NUMBER 3

BATCH A-6
Packed in Container No. 7

Can Number	Gross Weight	Net Salt Weight	
A-1407	107.4330	90.8434	4-inch cans
A-1408	106.9582	90.8058	" " "
A-1410	106.4461	89.1737	" " "
A-1411	107.8538	90.4889	" " "
A-1412	107.7300	90.8426	" " "
A-1413	107.3896	91.2170	" " "
A-1414	108.0931	90.8347	" " "
A-1415	107.3388	90.8512	" " "
A-1419	107.6890	90.8333	" " "

Packed in Container No. 8

A-1420	106.9430	89.9727	" " "
A-1423	106.2455	90.2143	" " "
A-1425	107.2234	90.9886	" " "
A-1427	108.1280	90.8852	" " "
A-1428	107.8649	90.9831	" " "
A-1454	107.2280	91.3386	" " "
A-1455	106.6986	90.7101	" " "
A-1456	107.4742	90.9480	" " "
A-1457	107.8598	90.7479	" " "
A-1458	107.5588	90.8557	" " "
A-1459	108.0501	90.8480	" " "
A-1462	107.8629	90.9232	" " "
A-1463	108.1585	90.8335	" " "
A-1464	108.4794	90.8141	" " "
A-1465	107.7484	91.1592	" " "
A-1466	108.3677	90.8027	" " "

Packed in Container No. 7

A- 42	28.2784 (Sample)	22.7071	2-inch cans
A- 43	28.4345 (Sample)	22.6974	" " "
Total	2745.5357	2314.2560	

LITHIUM DEUTERIDE
(Enriched)

SHIPMENT NUMBER 3

BATCH A-7
Packed in Container No. 8

Can Number	Gross Weight		Net Salt Weight	
A-1433	107.6147		91.1927	4-inch cans
A-1467	108.4315		91.0995	" " "
A-1468	108.0955		91.1583	" " "
A-1469	108.0132		91.2366	" " "
A-1471	107.1076		90.3673	" " "
A-1472	107.8949		91.5213	" " "
A-1473	108.4696		91.0524	" " "
A-1474	108.6661		91.0667	" " "
A-1475	107.6940		91.0799	" " "
A-1476	109.2115		91.1721	" " "
A-1477	108.4206		91.0741	" " "
A-1478	108.6819		91.1291	" " "
A-1479	108.4556		91.1850	" " "
A-1480	108.9980		91.1699	" " "
A-1481	108.3155		90.9315	" " "
A-1482	108.3487		91.1486	" " "
A-1483	107.9591		91.1328	" " "
A-1485	108.6124		91.0748	" " "
A-1486	109.2895		91.2041	" " "
A-1487	108.3070		91.0866	" " "
A-1488	108.9504		90.1224	" " "
A-1490	108.5643		91.1109	" " "
A-1491	107.6237		91.0968	" " "
A-1492	108.3192		91.1334	" " "
A-1499	107.4848		91.1605	" " "
A- 34	28.9733	(Sample)	22.8135	2-inch cans
A- 35	29.1436	(Sample)	22.8539	" " "
Total	2765.6462		2322.3747	

LITHIUM DEUTERIDE
(Enriched)

SHIPMENT NUMBER 3

BATCH A-8
Packed in Container No. 8

Can Number	Gross Weight		Net Salt Weight	
A-1380	107.9796		91.2014	4-inch cans
A-1381	108.7039		90.9329	" " "
A-1382	107.9536		90.7936	" " "
A-1383	108.0070		91.1950	" " "
A-1384	109.0981		91.2317	" " "
A-1385	108.4732		91.4865	" " "
A-1387	109.1258		91.4024	" " "
A-1388	109.4531		91.2166	" " "
A-1390	108.4152		91.1898	" " "
A-1434	108.1800		91.2040	" " "
A-1461	108.5679		91.1533	" " "
A-1511	107.4047		91.2179	" " "
A-1513	108.8943		91.1932	" " "
A-1514	107.7807		91.1881	" " "
A-1516	108.4032		90.9601	" " "
A-1518	109.0076		91.1778	" " "
A-1519	107.1194		91.1052	" " "
A-1520	108.9957		91.1884	" " "
A-1522	106.3724		91.1486	" " "
A- 39	28.9178	(Sample)	22.7761	2-inch cans
A- 48	28.4660	(Sample)	22.8005	" " "
Total	2115.3192		1777.7631	

LITHIUM DEUTERIDE
(Enriched)

SHIPMENT NUMBER 3

BATCH A-11
Packed in Container No. 9

Can Number	Gross Weight	Net Salt Weight	
A-2002	237.8700	204.6269	6-inch cans
A-2005	240.7427	205.5988	" " "
A-2006	236.1778	204.4314	" " "
A-2010	240.1616	204.3340	" " "
A-2012	235.5276	203.5922	" " "

Packed in Container No. 8

A-1377	107.8697	90.7974	4-inch cans
A-1426	107.7410	90.8238	" " "
A-1435	107.3025	90.9978	" " "
A- 62	28.5521 (Sample)	22.8448	2-inch cans
A- 70	28.3843 (Sample)	22.4424	" " "
Total	1570.3293	1340.4895	

LITHIUM DEUTERIDE
(Enriched)

SHIPMENT NUMBER 3

BATCH A-12
Packed in Container No. 9

Can Number		Gross Weight	Net Salt Weight	
A-2008		239.354	205.4508	6-inch cans
A-2009		238.237	205.4075	" " "
A-2014		238.870	205.3427	" " "
A-2020		238.125	205.3601	" " "
	Total	954.586	821.5611	

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LITHIUM DEUTERIDE
(Enriched)

SHIPMENT NUMBER 3

BATCH A-13
Packed in Container No. 9

Can Number	Gross Weight	Net Salt Weight	
A-2046	235.8594	205.4263	6-inch cans
A-2048	236.3494	206.5636	" " "
A-2049	235.2652	205.2925	" " "
A-2050	236.6114	205.2328	" " "
A-2051	237.7783	205.2989	" " "
A-2052	236.4205	205.1482	" " "
A-2053	235.6906	205.4345	" " "
A-2054	236.4023	204.9407	" " "
A-2055	235.5544	205.2972	" " "
A-2057	233.7871	204.9959	" " "
A- 58	28.4672 (Sample)	22.8057	2-inch can
Total	2388.1858	2076.4363	

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LITHIUM DEUTERIDE
(Enriched)

SHIPMENT NUMBER 3

BATCH A-14
Packed in Container No. 9

Can Number		Gross Weight		Net Salt Weight	
A-2031		237.5340		205.3831	6-inch cans
A-2032		236.7935		205.3409	" " "
A-2033		239.3424		205.3058	" " "
A-2060		237.6245		205.2401	" " "
A-2063		240.9350		205.3447	" " "
A- 69		28.5555	(Sample)	22.8865	2-inch cans
A- 73		28.2628	(Sample)	22.8453	" " "
	Total	1249.0477		1072.3464	

LITHIUM DEUTERIDE
(Enriched)

SHIPMENT NUMBER 3

BATCH A-158
Packed in Container No. 9

Can Number		Gross Weight		Net Salt Weight	
A-2040		235.8640		205.2125	6-inch cans
A-2041		235.9800		202.9113	" " "
A-2043		234.8880		205.1410	" " "
A-2045		233.5750		205.1676	" " "
A- 85		28.4462	(Sample)	22.7916	2-inch cans
A- 88		28.8924	(Sample)	22.7910	" " "
A- 91		27.9101	(Sample)	22.7935	" " "
	Total	1025.5557		886.8085	