



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

ENVIRONMENTAL RESPONSE TEAM

Edison, NJ – Cincinnati, OH – Las Vegas, NV – Research Triangle Park, NC

September 16, 2009

MEMORANDUM

SUBJECT: Drywall Investigations: Fifteen CPSC Drywall Sample Analysis Summary Results

FROM: Raj Singhvi, Chemist
Drywall Investigation Technical Manager
Environmental Response Team

TO: Arnold E. Layne, Director
Drywall Investigation Program Manager
Technology Innovation and Field Services Division
Office of Superfund Remediation and Technology Innovation

A total of 15 drywall samples were received (complete package July 16, 2009) by the U.S. Environmental Protection Agency Environmental Response Team (EPA/ERT) for various analyses from the Consumer Product Safety Commission (CPSC). The requested analyses were performed by the on-site contractor for USEPA/ERT under the Response Engineering and Analytical Contract (REAC). The Total Organic Compound (TOC) analysis on gypsum core samples was performed by U.S.EPA Region II laboratory at the request of USEPA/ERT. As per a conversation with Joanna Matheson of CPSC, ERT did not perform formaldehyde analysis on the 15 drywall samples due to technical difficulties; instead, EPA requested that this analysis be performed under the CPSC chamber study.

Fifteen drywall samples were prepared for analysis as follows: For all 15 unpainted drywall samples, the top and bottom layers of paper were separated from the solid material (gypsum) and placed into separate glass jars. Although the separation was performed as effectively as possible, a small amount of residual gypsum material remained on the paper portion. The paper portion of the drywall samples was analyzed for strontium, elemental sulfur and semi volatile organic (SVOCs). The gypsum portion of drywall samples was analyzed for metals, SVOCs, elemental sulfur volatile organic compounds (VOCs), total acid soluble sulfides, total organic carbon (TOC), sulfate, water soluble chlorides, water soluble fluorides, pH, and loss on ignition (LOI). In addition to these requested analyses, the gypsum core samples were also qualitatively analyzed for metals (calcium, strontium, and iron) using X-Ray Fluorescence (XRF), and mineralogy by X-Ray Diffraction (XRD).

A summary of the analytical results for the 15 drywall samples (gypsum, and paper) is presented in Table 1. The qualitative XRD and XRF results for the gypsum portion of the drywall samples are presented in Table 2. Tentatively identified compounds detected by a GC/MS library search for the SVOC and VOC fractions are presented, with estimated concentrations, in Tables 3 and 4 for the drywall (gypsum and paper) samples. The EPA/ERT/REAC analytical methods were modified to meet the objectives of these analyses.

If there are any questions, please call me at 732-321-6761.

Attachments

Table 1. Target Compounds Analysis Results

Table 2. XRD & XRF Analysis Results

Table 3. SVOC's Tentatively Identified Compounds Analysis Results ($\mu\text{g/kg}$)

Table 4. VOC's Tentatively Identified Compounds Analysis Results ($\mu\text{g/kg}$)

Chain of custody

cc: Barnes Johnson, OSRTI
Jeff Heimerman, OSRTI/TIFSD
Dave Wright, ERT
Harry Compton, ERT

Table 1 Target Compounds Analysis Results															
REAC Sample Number		1		2		3		4		5		6		7	
CPSC Sample #		09-840-9707-01		09-810-7339-04		09-810-8357-08		09-302-1379-05		09-810-7069-03		09-304-6226-03		09-810-8235-10	
%LOI at 750C (Gypsum)		20		25		25		23		23		21		21	
pH (5% w/v) (Gypsum)		6.71		7.84		8.11		8.2		8.31		8.59		7.78	
Sample		Gypsum	Paper	Gypsum	Paper	Gypsum	Paper	Gypsum	Paper	Gypsum	Paper	Gypsum	Paper	Gypsum	Paper
Target Analytes (Units)	Method	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Aluminum	REAC SOP 1811	771J+	NA	845J+	NA	726J+	NA	800J+	NA	1750J+	NA	318J+	NA	289J+	NA
Arsenic	REAC SOP 1811	2.93	NA	<2.29	NA	<2.25	NA	<2.37	NA	<2.29	NA	<2.25	NA	<2.28	NA
Barium	REAC SOP 1811	229	NA	98.1	NA	80.3	NA	38.8	NA	47.4	NA	7.46	NA	13.3	NA
Calcium	REAC SOP 1811	246000	NA	252000	NA	252000	NA	257000	NA	257000	NA	242000	NA	257000	NA
Chromium	REAC SOP 1811	1.87	NA	1.73	NA	1.20	NA	2.11	NA	2.12	NA	<0.676	NA	2.78	NA
Cobalt	REAC SOP 1811	0.744	NA	1.06	NA	0.773	NA	0.56	NA	1.07	NA	<0.451	NA	<0.456	NA
Copper	REAC SOP 1811	4.69	NA	2.86	NA	2.45	NA	1.78	NA	2.41	NA	1.07	NA	1.42	NA
Iron	REAC SOP 1811	1860	NA	2310	NA	1620	NA	1350	NA	1820	NA	683	NA	626	NA
Lead	REAC SOP 1811	16.4	NA	1.96	NA	<1.35	NA	<1.42	NA	<1.38	NA	2.11	NA	<1.37	NA
Magnesium	REAC SOP 1811	5330	NA	17800	NA	18200	NA	7830	NA	4840	NA	471	NA	1010	NA
Manganese	REAC SOP 1811	36.7	NA	101	NA	86.1	NA	70.6	NA	78.4	NA	93.5	NA	9.25	NA
Mercury	REAC SOP 1832	1.24	NA	0.178	NA	0.156	NA	0.119	NA	<0.044	NA	<0.045	NA	0.107	NA
Nickel	REAC SOP 1811	1.31	NA	1.83	NA	1.31	NA	1.30	NA	2.19	NA	1.33	NA	0.955	NA
Potassium	REAC SOP 1811	252	NA	344	NA	280	NA	264	NA	602	NA	340	NA	98.7	NA
Selenium	REAC SOP 1811	<2.2	NA	<2.06	NA	<2.02	NA	<2.13	NA	<2.06	NA	<2.03	NA	3.46	NA
Sodium	REAC SOP 1811	371	NA	553	NA	517	NA	509	NA	284	NA	257	NA	<114	NA
Strontium	REAC SOP 1811	1530	182	3680	553	4310	153	2860	270	4220	110	776	20.1	680	20.3
Vanadium	REAC SOP 1811	1.70	NA	2.6	NA	2.13	NA	2.19	NA	2.65	NA	0.643	NA	3.19	NA
Zinc	REAC SOP 1811	4.43J	NA	2.68J	NA	1.77J	NA	1.24J	NA	2.6J	NA	3.6J	NA	3.99J	NA
Total Sulfate (SO ₄) ²⁻	EPA Method 375.4	587000	NA	504000	NA	517000	NA	569000	NA	482000	NA	587000	NA	605000	NA
Water Soluble Fluoride	REAC Draft SOP	192J	NA	30.1J	NA	18.4J	NA	43.2J	NA	12.2J	NA	<1.15J	NA	54.2J	NA
Water Soluble Chloride	REAC Draft SOP	110J	NA	72J	NA	72J	NA	44J	NA	27J	NA	21J	NA	13J	NA
Total acid soluble sulfide	SW 846 9030/9034	<25.9	NA	<25.9	NA	<25.9	NA	<25.9	NA	<25.9	NA	<25.9	NA	<25.9	NA
Elemental sulfur	Mod. REAC SOP 1805	36	83	182J	207	213	130	175	60J	15	9.84J	<7.78	<40.0	<7.78	<40.0
Total Organic Carbon(TOC)	EPA C-88	4400	NA	6400	NA	2700	NA	3000	NA	2900	NA	2700	NA	2100	NA
Units		ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Trichlorofluoromethane	REAC SOP 1807	<11.5	NA	9.3J	NA	<11.2	NA	<11.4	NA	<11.2	NA	<11.5	NA	<11.6	NA
Acetone	REAC SOP 1807	<46	NA	11.5J	NA	<44.9	NA	<45.5	NA	16.9J	NA	<46	NA	<46.5	NA
Methylene Chloride	REAC SOP 1807	<11.5	NA	<11.2	NA	<11.2	NA	<11.4	NA	<11.2	NA	<11.5	NA	<11.6	NA
Carbon Disulfide	REAC SOP 1807	<11.5	NA	3.64J	NA	<11.2	NA	<11.4	NA	<11.2	NA	<11.5	NA	<11.6	NA
2-Butanone	REAC SOP 1807	<11.5	NA	<11.2	NA	<11.2	NA	<11.4	NA	<11.2	NA	<11.5	NA	<11.6	NA
Trichloroethene	REAC SOP 1807	<11.5	NA	<11.2	NA	<11.2	NA	<11.4	NA	<11.2	NA	<11.5	NA	<11.6	NA
Bromodichloromethane	REAC SOP 1807	<11.5	NA	<11.2	NA	<11.2	NA	<11.4	NA	<11.2	NA	<11.5	NA	<11.6	NA
4-Methyl-2-Pentanone	REAC SOP 1807	<46.0	NA	<44.9	NA	<44.9	NA	<45.5	NA	<44.9	NA	<46.0	NA	<46.5	NA
Toluene	REAC SOP 1807	<11.5	NA	<11.2	NA	<11.2	NA	<11.4	NA	<11.2	NA	<11.5	NA	<11.6	NA
Ethylbenzene	REAC SOP 1807	<11.5	NA	<11.2	NA	<11.2	NA	<11.4	NA	<11.2	NA	<11.5	NA	<11.6	NA
p&m-Xylene	REAC SOP 1807	<23.0	NA	<22.5	NA	<22.5	NA	<22.7	NA	<22.5	NA	<23.0	NA	<23.3	NA
o-Xylene	REAC SOP 1807	<11.5	NA	<11.2	NA	<11.2	NA	<11.4	NA	<11.2	NA	<11.5	NA	<11.6	NA
Styrene	REAC SOP 1807	<11.5	NA	<11.2	NA	<11.2	NA	<11.4	NA	<11.2	NA	<11.5	NA	<11.6	NA
Isopropylbenzene	REAC SOP 1807	<46.0	NA	<44.9	NA	<44.9	NA	<45.5	NA	<44.9	NA	<46.0	NA	<46.5	NA
1,2,3-Trichloropropane	REAC SOP 1807	<11.5	NA	<11.2	NA	<11.2	NA	<11.4	NA	<11.2	NA	<11.5	NA	<11.6	NA
n-Propylbenzene	REAC SOP 1807	<11.5	NA	<11.2	NA	<11.2	NA	<11.4	NA	<11.2	NA	<11.5	NA	<11.6	NA
1,3,5-Trimethylbenzene	REAC SOP 1807	<11.5	NA	<11.2	NA	<11.2	NA	<11.4	NA	<11.2	NA	<11.5	NA	<11.6	NA
1,2,4-Trimethylbenzene	REAC SOP 1807	<11.5	NA	<11.2	NA	<11.2	NA	<11.4	NA	<11.2	NA	<11.5	NA	<11.6	NA
sec-Butylbenzene	REAC SOP 1807	<11.5	NA	<11.2	NA	<11.2	NA	<11.4	NA	<11.2	NA	<11.5	NA	<11.6	NA
1,4-Dichlorobenzene	REAC SOP 1807	<11.5	NA	<11.2	NA	<11.2	NA	<11.4	NA	<11.2	NA	<11.5	NA	<11.6	NA
Diethylphthalate	REAC SOP 1805	<382	<2000	<373	<2000	<373	<2000	<379	<40000	<376	<2000	<384J	<2000	100J	<2000
Di-n-butylphthalate	REAC SOP 1805	150J	1460J	157J	1610J	160J	1570J	4390	263000	351J	2050	112J	1790J	248J	624J
Butylbenzylphthalate	REAC SOP 1805	<382	<2000	<373	<2000	<373	<2000	<379	584J	<376	524J	<384J	526J	<386	614J
3,3'-Dichlorobenzidine	REAC SOP 1805	<382	<2000	<373	<2000	<373	<2000	<379	<40000	<376	<2000	<384J	<2000	<386	<2000
Crysene	REAC SOP 1805	<382	<2000	<373	<2000	<373	<2000	<379	<40000	<376	<2000	<384J	<2000	<386	<2000
Bis-(2-ethylhexyl) phthalate	REAC SOP 1805	318J	1620J	871	1230J	445	1580J	451	3610J	432	1770J	<384J	4200	127J	3150

NA: Not Analyzed or Not reported due to sample size

J: Value estimated

J+: Value estimated high

ND: not detected

Table 1 Target Compounds Analysis Results																	
REAC Sample Number		8		9		10		11		12		13		14		15	
CPSCSample #		09-810-8236-10		09-810-8036-01		09-810-7639-10		09-810-8213-04		09-840-9858-08		09-810-8037-10		09-840-9139-09		09-302-1429-03	
%LOI at 750C (Gypsum)		20		20		22		21		22		18		19		21	
pH (5% w/v) (Gypsum)		7.75		7.03		6.88		7.92		8.24		7.24		8.23		6.86	
Sample		Gypsum	Paper	Gypsum	Paper	Gypsum	Paper	Gypsum	Paper	Gypsum	Paper	Gypsum	Paper	Gypsum	Paper	Gypsum	Paper
Target Analytes (Units)	Method	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Aluminum	REAC SOP 1811	2220J+	NA	485J+	NA	230J+	NA	179J+	NA	216J+	NA	2720J+	NA	1330J+	NA	234J+	NA
Arsenic	REAC SOP 1811	<2.19	NA	3.22	NA	<2.28	NA	<2.24	NA	<2.15	NA	<2.29	NA	5.70	NA	<2.28	NA
Barium	REAC SOP 1811	96.7	NA	5.18	NA	5.74	NA	2.50	NA	13.8	NA	9.51	NA	20.7	NA	17.5	NA
Calcium	REAC SOP 1811	255000	NA	264000	NA	245000	NA	264000	NA	262000	NA	221000	NA	216000	NA	257000	NA
Chromium	REAC SOP 1811	17.7	NA	1.42	NA	2.68	NA	1.40	NA	0.824	NA	2.97	NA	1.09	NA	2.05	NA
Cobalt	REAC SOP 1811	5.4	NA	<0.479	NA	<0.456	NA	<0.447	NA	<0.431	NA	3.20	NA	<0.479	NA	0.537	NA
Copper	REAC SOP 1811	3.3	NA	0.937	NA	1.97	NA	1.62	NA	0.670	NA	6.86	NA	1.12	NA	3.22	NA
Iron	REAC SOP 1811	3270	NA	808	NA	757	NA	533	NA	344	NA	2700	NA	1020	NA	1520	NA
Lead	REAC SOP 1811	<1.32	NA	<1.44	NA	<1.37	NA	<1.34	NA	<1.29	NA	2.38	NA	<1.44	NA	2.02	NA
Magnesium	REAC SOP 1811	3080	NA	943	NA	1720	NA	989	NA	7270	NA	4800	NA	6590	NA	185	NA
Manganese	REAC SOP 1811	65	NA	3.92	NA	14.1	NA	7.39	NA	8.97	NA	73.3	NA	24.9	NA	46	NA
Mercury	REAC SOP 1832	0.112	NA	0.327	NA	0.305	NA	0.261	NA	0.200	NA	<0.047	NA	<0.046	NA	0.119	NA
Nickel	REAC SOP 1811	5.46	NA	0.820	NA	1.86	NA	1.58	NA	<0.646	NA	4.54	NA	0.894	NA	2.45	NA
Potassium	REAC SOP 1811	1320	NA	586	NA	78.5	NA	380	NA	41.4	NA	736	NA	336	NA	388	NA
Selenium	REAC SOP 1811	3.43	NA	12.2	NA	4.93	NA	4.11	NA	12.2	NA	<2.06	NA	<2.16	NA	3.82	NA
Sodium	REAC SOP 1811	<110	NA	<120	NA	162	NA	114	NA	<108	NA	<115	NA	239	NA	131	NA
Strontium	REAC SOP 1811	633	18.5	175	27.9	185	17.9	140	21.2	926	38.5	662	49	2890	83.4	303	31.2
Vanadium	REAC SOP 1811	11.2	NA	0.791	NA	3.6	NA	2.31	NA	2.00	NA	1.98	NA	2.15	NA	2.89	NA
Zinc	REAC SOP 1811	8.52J	NA	<0.838J	NA	6.53J	NA	5.31J	NA	<0.754J	NA	4.22J	NA	1.91J	NA	2.86J	NA
Total Sulfate (SO ₄) ²⁻	EPA Method 375.4	640000	NA	691000	NA	665000	NA	674000	NA	663000	NA	574000	NA	632000	NA	617000	NA
Water Soluble Florida	REAC Draft SOP	54.6J	NA	52.8J	NA	52.4J	NA	270J	NA	103J	NA	3.3J	NA	10.4J	NA	48.8J	NA
Water Soluble Chloride	REAC Draft SOP	<10J	NA	22J	ND	16J	NA	32J	NA	22J	NA	28J	NA	92J	NA	20J	NA
Total acid soluble sulfide	SW 846 9030/9034	<25.9	NA	<25.9	NA	<25.9	NA	<25.9	NA	<25.9	NA	<25.9	NA	<25.9	NA	<25.9	NA
Elemental sulfur	Mod. REAC SOP 1805	<7.78	<40	<7.78	<40	<7.78	<40	<7.78	<80	<7.78	<80	<7.78	<80	<7.78	<80	<7.78	<80
Total Organic Carbon(TOC)	EPA C-88	1600	NA	3600	NA	4800	NA	2600	NA	1100	NA	4000	NA	1800	NA	2700	NA
Units		ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg	ug/Kg
Trichlorofluoromethane	REAC SOP 1807	<11.6	NA	<11.5	NA	<11.6	NA	<11.6	NA	<11.6	NA	<11.2	NA	<11.5	NA	<11.6	NA
Acetone	REAC SOP 1807	<46.5	NA	<46	NA	<46.5	NA	<46.5	NA	<46.5	NA	<44.9	NA	29.7J	NA	<46.5	NA
Methylene Chloride	REAC SOP 1807	<11.6	NA	<11.5	NA	<11.6	NA	<11.6	NA	<11.6	NA	<11.2	NA	<11.5	NA	<11.6	NA
Carbon Disulfide	REAC SOP 1807	<11.6	NA	<11.5	NA	<11.6	NA	<11.6	NA	<11.6	NA	<11.2	NA	<11.5	NA	<11.6	NA
2-Butanone	REAC SOP 1807	<11.6	NA	6.44J	NA	<11.6	NA	<11.6	NA	<11.6	NA	<11.2	NA	<11.5	NA	<11.6	NA
Trichloroethene	REAC SOP 1807	<11.6	NA	<11.5	NA	<11.6	NA	<11.6	NA	<11.6	NA	<11.2	NA	<11.5	NA	<11.6	NA
Bromodichloromethane	REAC SOP 1807	<11.6	NA	<11.5	NA	<11.6	NA	<11.6	NA	<11.6	NA	<11.2	NA	<11.5	NA	<11.6	NA
4-Methyl-2-Pentanone	REAC SOP 1807	<46.5	NA	<46.0	NA	<46.5	NA	<46.5	NA	<46.5	NA	<44.9	NA	<46.0	NA	<46.5	NA
Toluene	REAC SOP 1807	<11.6	NA	<11.5	NA	<11.6	NA	<11.6	NA	<11.6	NA	<11.2	NA	<11.5	NA	<11.6	NA
Ethylbenzene	REAC SOP 1807	<11.6	NA	<11.5	NA	<11.6	NA	<11.6	NA	<11.6	NA	<11.2	NA	<11.5	NA	<11.6	NA
p&m-Xylene	REAC SOP 1807	<23.3	NA	<23.0	NA	<23.3	NA	<23.3	NA	<23.3	NA	<22.5	NA	<23.0	NA	<23.3	NA
o-Xylene	REAC SOP 1807	<11.6	NA	<11.5	NA	<11.6	NA	<11.6	NA	<11.6	NA	<11.2	NA	<11.5	NA	<11.6	NA
Styrene	REAC SOP 1807	<11.6	NA	<11.5	NA	<11.6	NA	<11.6	NA	<11.6	NA	<11.2	NA	<11.5	NA	<11.6	NA
Isopropylbenzene	REAC SOP 1807	<46.5	NA	<46.0	NA	<46.5	NA	<46.5	NA	<46.5	NA	<44.9	NA	<46.0	NA	<46.5	NA
1,2,3-Trichloropropane	REAC SOP 1807	<11.6	NA	<11.5	NA	<11.6	NA	<11.6	NA	<11.6	NA	<11.2	NA	<11.5	NA	<11.6	NA
n-Propylbenzene	REAC SOP 1807	<11.6	NA	<11.5	NA	<11.6	NA	<11.6	NA	<11.6	NA	<11.2	NA	<11.5	NA	<11.6	NA
1,3,5-Trimethylbenzene	REAC SOP 1807	<11.6	NA	<11.5	NA	<11.6	NA	<11.6	NA	<11.6	NA	<11.2	NA	<11.5	NA	<11.6	NA
1,2,4-Trimethylbenzene	REAC SOP 1807	<11.6	NA	<11.5	NA	<11.6	NA	<11.6	NA	<11.6	NA	<11.2	NA	<11.5	NA	<11.6	NA
sec-Butylbenzene	REAC SOP 1807	<11.6	NA	<11.5	NA	<11.6	NA	<11.6	NA	<11.6	NA	<11.2	NA	<11.5	NA	<11.6	NA
1,4-Dichlorobenzene	REAC SOP 1807	<11.6	NA	<11.5	NA	<11.6	NA	<11.6	NA	<11.6	NA	<11.2	NA	<11.5	NA	<11.6	NA
Diethylphthalate	REAC SOP 1805	<386	<2000	<383	<2000	<386	<2000	<389J	<4000	<386	<4000	<375J	<4000	<383	<4000	<386	<4000
Di-n-butylphthalate	REAC SOP 1805	209J	524J	255J	906J	283J	814J	193J	3200J	179J	<4000	<375J	2720J	131J	3130J	221J	2650J
Butylbenzylphthalate	REAC SOP 1805	<386	<2000	<383	<2000	<386	928J	<389J	1300J	<386	<4000	<375J	<4000	<383	<4000	<386	3700J
3,3'-Dichlorobenzidine	REAC SOP 1805	<386	<2000	<383	1070J	<386	<2000J	<389J	<4000	<386	<4000	<375J	<4000	<383	<4000	<386	<4000
Crysene	REAC SOP 1805	162J	<2000	<383	<2000	<386	<2000J	<389J	<4000	<386	<4000	<375J	<4000	<383	<4000	<386	<4000
Bis-(2-ethylhexyl) phthalate	REAC SOP 1805	111J	3210	<383	1910J	148J	3950	174J	5760	<386	2270J	<375J	4890	222J	6800	136J	6540

NA: Not Analyzed or Not reported due to sample size

J: Value estimated

J+: Value estimated high

ND: not detected

Table 2 XRD & XRF Analysis Results

	XRD Analysis (%/wt)							
REAC Sample Number	1	2	3	4	5	6	7	8
CPSCSample #	09-840-9707-01	09-810-7339-04	09-810-8357-08	09-302-1379-05	09-810-7069-03	09-304-6226-03	09-810-8235-10	09-810-8236-10
Ca(SO ₄)(H ₂ O) ₂ (Gypsum)	90.8(5)	74.7(5)	76.9(4)	82.6(4)	78.7(4)	90.0(4)	94.3(4)	96.1(5)
CaCO ₃ (Calcite)		6.0(1)	3.9(1)	5.4(1)	10.3(1)	4.5(1)	0.9(1)	
CaMg(CO ₃) (Dolomite)		12.2(2)	12.8(1)	5.2(1)	5.0(2)		0.8(1)	0.3(1)
SiO ₂ (Quartz)	2.4(1)	1.3(1)	0.8(1)	0.5(1)	1.0(1)	0.5(1)	0.9(1)	0.9(1)
CaSO ₄ (Anhydrite)	2.6(1)	0.9(1)	1.0(1)	0.6(1)	0.6(1)	0.5(1)	0.2(1)	0.4(1)
Ca(SO ₄)(H ₂ O) _{0.5} (Bassanite)	4.2(1)	4.5(1)	2.8(1)	4.0(1)	2.2(1)	4.4(1)	2.9(1)	2.3(1)
K(Al,Fe)(Al,Si ₃ O ₁₀)(OH) ₂ (Muscovite)		0.5(1)	1.7(1)	1.8(1)	2.2(1)			

Note: The number in parentheses is the estimated standard deviation. For example, 74.7(5) represents 74.7 ± 0.5%.

	XRF Analysis (mg/kg)							
REAC Sample Number	1	2	3	4	5	6	7	8
CPSCSample #	09-840-9707-01	09-810-7339-04	09-810-8357-08	09-302-1379-05	09-810-7069-03	09-304-6226-03	09-810-8235-10	09-810-8236-10
Strontium (Sr)	1200	3100	3700	2300	3700	670	550	510
Calcium (Ca)	230000	240000	240000	240000	240000	230000	230000	220000
Iron (Fe)	1200	1600	1300	1100	1600	360	510	1700

Table 2 XRD & XRF Analysis Results

	XRD Analysis (%/wt)						
REAC Sample Number	9	10	11	12	13	14	15
CPSCSample #	09-810-8036-01	09-810-7639-10	09-810-8213-04	09-840-9858-08	09-810-8037-10	09-840-9139-09	09-302-1429-03
Ca(SO ₄)(H ₂ O) ₂ (Gypsum)	87.2(4)	93.5(4)	96.8(4)	91.7(6)	85.6(5)	91.1(5)	92.9(5)
CaCO ₃ (Calcite)		2.0(1)		1.3(1)	0.3(1)		
CaMg(CO ₃) (Dolomite)	0.7(1)						
SiO ₂ (Quartz)		0.3()		0.2(1)	5.3(1)	2.1(1)	2.5(1)
CaSO ₄ (Anhydrite)	1.8(1)	0.3(1)	0.3(1)	1.0(1)	2.7(1)	2.2(1)	0.4(1)
Ca(SO ₄)(H ₂ O) _{0.5} (Bassanite)	10.3(1)	4.0(1)	3.0(1)	4.2(1)	6.1(1)	4.6(1)	3.4(1)
K(Al,Fe)(Al,Si ₃ O ₁₀)(OH) ₂ (Muscovite)				1.5(1)			0.9(1)

Note: The number in parentheses is the e. Note: The number in parentheses is the estimated standard deviation. For example, 87.2(4) represents 87.2 ± 0.4%.

	XRF Analysis (mg/kg)						
REAC Sample Number	9	10	11	12	13	14	15
CPSCSample #	09-810-8036-01	09-810-7639-10	09-810-8213-04	09-840-9858-08	09-810-8037-10	09-840-9139-09	09-302-1429-03
Strontium (Sr)	140	150	110	730	600	2500	250
Calcium (Ca)	500	240000	230000	230000	200000	210000	210000
Iron (Fe)	230000	570	380	200	2100	850	1400

Table 3 SVOC Tentatively Identified Compounds Analysis Results

REAC Sample Number		1		2		3		4		5		6		7		8	
CPSCSample #		09-840-9707-01		09-810-7339-04		09-810-8357-08		09-302-1379-05		09-810-7069-03		09-304-6226-03		09-810-8235-10		09-810-8236-10	
Tentatively Identified Compounds	Retention	Gypsum	Paper	Gypsum	Paper	Gypsum	Paper	Gypsum	Paper	Gypsum	Paper	Gypsum	Paper	Gypsum	Paper	Gypsum	Paper
	Time	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
1-Hexanal	4.639 - 4.639													98			
Disulfide isomer	5.017 - 12.555			427		1268											
2-Pentenoic acid	6.275																
Aniline	7.213 - 7.339									1170							
1-Decene	7.438																
2-Furancarboxylic acid	8.435	234															
Acetophenone	8.466 - 8.597																
o-Toluidine	8.565-8.66																
1-Octanol/C9 Alkyl benzene	8.607																
5-(hydroxymethyl)-2-furfural	10.573		1530														
2-Furancarboxaldehyde, 5-(hydroxymethyl)-	10.605	270															
Quinoline	10.935											234					
Isoquinoline	10.956																
Cyclodecane	10.977																
Decane, 1-chloro-	11.087																
1-Decanol	11.118-11.386																
Tridecane	11.302																
Decane, 1-(ethenloxy)-	11.459																
Unknown	11.606-32.191	233	12730	3938	19650	3061	4726	1675	12670	1104	10539	1232	8086	624	14335	1586	5671
4-Hydroxybenzaldehyde	12.146								1270								
Vanillin	12.612-12.77		2960			553	2940	622	3270	333	3490		2650		4280		2980
1-Dodecanol	13.388-13.43	1670	4210	4240	9100	3030				1340							
1-Dodecanethiol	14.111-14.175	623		1690		2620	2300										
Benzophenone	15.202								797								
1-Tetradecanamine, N,N-dimethyl-	15.548																
Molecular Sulfur	15.82 - 18.494	1944		9270		17070		3879									
Nonyl-phenol isomer	15.936						1140										
Tetradecene	16.114						1870										
2-Propenal, 3-(4-hydroxy-3-methoxyphenyl)-	16.135								908								
Tetradecanethiol	16.172-16.177			970		941											
Molecular Sulfur/Unknown	16.544							384									
n-Octadecane C18H38/Unknown	16.56			447													
Diethylene glycol monododecyl ether	16.581																
Unknown alkane	16.659-32.149	1725	21550	895	32170	820	16280	2002	9251	2554	12726	1902	5990	2759	10988	1308	4495
Phthalate isomer	17.231-22.31		1480	900				333			743						
Unknown phthalate	17.299					1140											
1-Hexadecanamine, N,N-dimethyl-	17.33-17.466				3090												
n-Nonadecane C19H40	17.414															259	
Hexadecanoic acid, methyl ester	17.645							1530									
Hexadecanoic Acid	17.781 - 17.959	1470	6450		8420		6970		2070	298	5560		6870		6810		5060
n-Hexadecanoic acid	17.943																
n-Eicosane C20H42	18.2 - 18.242	393														269	727
n-Icosane C20H42	18.253							11700									
Disulfide compound	18.342 - 18.347			9280		11900											
Unknown ester	18.557				9670												
1-Cyclohexene-1-carboxylic acid, 4-(1,5-dimethyl-2-oxopent-2-en-1-yl)-	18.593	1720															
n-Heneicosane C21H44	18.997 - 19.034										787					340	941
8,11-Octadecadienoic acid, methyl ester	19.013							990	5310								
9-Octadecenoic acid	19.223 - 19.375		3790		6710		5160				3000		5780		6280		4900
Octadecanoic acid , methyl ester	19.259							229									
Linoleic acid	19.343																
cis-9,12-Octadecadienoic acid	19.364																
9-Octadecenoic acid, (E)-	19.374 - 19.38																
Stearic Acid	19.38-19.542		3620		5260		4230		2010		4820		5950		3880		3310
C10 Organic Acid, C10 ester	19.615																
n-Docosane C22H46	19.647 - 19.81						1820	541	2530	461	2910	189	1620	339	2360	302	2310
n-Tricosane C23H48	20.37-20.538			627	3410	549	4380	1150	5410	1070	5070	558	3500	857	5310	438	3500
2(3H)-Furanone, dihydro-5-tetradecyl-	20.622																
2-Furanone, dihydro-5-tetradecyl-	20.732 - 20.732														1270		996
n-Tetracosane C24H50	21.068-21.235	716	5330	1090	11000	963	6530	1940	8030	1990	6460	1290	5740	1670	9390	746	5840
Dimethyl Pyrene Isomer C18H14/Unknown	21.676															302	
n-Pentacosane C25H52	21.739-21.906	836	5620	1110	5930	1340	9760	2400	12100	2050	9750	2330		2400	17600	1100	10600
n-Pentacosane C25H52/Unknown	21.739-21.87											11200					
Diethylene glycol dibenzoate	21.812 - 21.959		5880		6580		7170	283	7960	433	10200		10000	217	15900		11000
Diethylene glycol dibenzoate/Unknown	21.974 - 21.975	263															
n-Hexacosane C26H54	22.383 - 22.551	995	6540	1040	9510	1210	9270	2210	13400	2460	8330	2710	12300	2850	19600	1500	11300

Table 3 SVOC Tentatively Identified Compounds Analysis Results

REAC Sample Number		1		2		3		4		5		6		7		8	
CPSC Sample #		09-840-9707-01		09-810-7339-04		09-810-8357-08		09-302-1379-05		09-810-7069-03		09-304-6226-03		09-810-8235-10		09-810-8236-10	
Tentatively Identified Compounds	Retention	Gypsum	Paper	Gypsum	Paper	Gypsum	Paper	Gypsum	Paper	Gypsum	Paper	Gypsum	Paper	Gypsum	Paper	Gypsum	Paper
	Time	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Unknown//Dehydroabietic acid, methyl ester	22.776-22.782									412							
PAH Isomer C19H14	22.986-23.07															708	
n-Heptacosane C27H56	23.007 - 23.17	1060	7570	1140	8870	1280	10900	2080	14900	2490	8330	2840	14600	3040	20900	1550	12000
Benzonaphtho thiopene -dimethyl isomer	23.427															312	
Sterane (Cholestane) isomer	23.458									480							
Unknown alkane /Unknown	23.495-32.149		2800		4850		1100						8166				
Unknown alkane (CnH2n+2)	23.599									292							
n-Octacosane C28H58	23.605-23.767	1010	6080	1160	6960	1020	5380	1330	5720	1740	4090	1440	4650	1050	7050	1180	6360
Organic Acid/Unknown	23.61	268															
PAH Isomer C20H16	23.862-23.94															756	
C30H50 Alkene	23.867																
Unknown alkane/PAH isomer	24.119															269	
n-Nonacosane C29H60	24.192-24.365	689	5130	859	5700	739	5890	971	5980	1230	4700	1150	5900	1130	6670	991	5740
Unknown sulfide compound/Unknown	24.506			428													
Unknown plant sterane	24.564	310															
Disulfide, didodecyl	24.742				3750												
PAH Isomer C20H12/Unknown alkane	24.758															619	
Disulfide, didodecyl	24.789 - 24.79			1170		966											
n-Hentriacontane C31H64	25.549 - 25.764						5660		5470		5690		6050	1130	4750	757	4360
Hopane isomer	25.99 - 28.113				4520						634						
Binaphthyl Sulfone isomer	26.184 - 27.61	774		943		463				1088		2433		492			
n-Dotriacontane C32H66	26.378 - 26.629				4670		4500	241	4860	277	5380	290	5110	920		528	3350
16-Hentriacontanone	27.274-27.489																700
n-Tritriacontane C33H68	27.348-27.557												5370				
Binaphthyl Sulfone isomer/Unknown	27.557																
Alkane/Unknown	30.042 - 30.052																4880
Stigmast-4-en-3-one	30.576		2030														
Unknown Organic Acid /Alkane	32.144																2450
Unknown ketone/Unknown alkane	32.149													2320			

Table 3 SVOC Tentatively Identified Compound Analysis Results

REAC Sample Number		9		10		11		12		13		14		15	
CPSCSample #		09-810-8036-01		09-810-7639-10		09-810-8213-04		09-840-9858-08		09-810-8037-10		09-840-9139-09		09-302-1429-03	
Tentatively Identified Compounds	Retention	Gypsum	Paper	Gypsum	Paper	Gypsum	Paper	Gypsum	Paper	Gypsum	Paper	Gypsum	Paper	Gypsum	Paper
	Time	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
1-Hexanal	4.639 - 4.639			180											
Disulfide isomer	5.017 - 12.555														
2-Pentenoic acid	6.275					1760									
Aniline	7.213 - 7.339		2610							1270		2640			
1-Decene	7.438													132	
2-Furancarboxylic acid	8.435														
Acetophenone	8.466 - 8.597			159				94	1190						
o-Toluidine	8.565-8.66				674										1760
1-Octanol/C9 Alkyl benzene	8.607											242			
5-(hydroxymethyl)-2-furfural	10.573														
2-Furancarboxaldehyde, 5-(hydroxymethyl)-	10.605														
Quinoline	10.935														
Isoquinoline	10.956											145			
Cyclodecane	10.977														1690
Decane, 1-chloro-	11.087							129							
1-Decanol	11.118-11.386							86						248	
Tridecane	11.302									1240					
Decane, 1-(ethenyloxy)-	11.459											438			
Unknown	11.606-32.191	2208	27430	1281	8773	507	27830	376	18225	1749	43790	2927	44530	1075	28500
4-Hydroxybenzaldehyde	12.146														
Vanillin	12.612-12.77		4440		2740		4300		5190		4520		4850		8170
1-Dodecanol	13.388-13.43														
1-Dodecanethiol	14.111-14.175														
Benzophenone	15.202														
1-Tetradecanamine, N,N-dimethyl-	15.548													4220	
Molecular Sulfur	15.82 - 18.494														
Nonyl-phenol isomer	15.936														
Tetradecene	16.114														
2-Propenal, 3-(4-hydroxy-3-methoxyphenyl)-	16.135														
Tetradecanethiol	16.172-16.177														
Molecular Sulfur/Unknown	16.544														
n-Octadecane C18H38/Unknown	16.56														
Diethylene glycol monododecyl ether	16.581	330													
Unknown alkane	16.659-32.149	2943	19980	992	8345	2529	16660	774	11160	2585	8650	411	11360	918	10290
Phthalate isomer	17.231-22.31	328						152							
Unknown phthalate	17.299														
1-Hexadecanamine, N,N-dimethyl-	17.33-17.466													2610	
n-Nonadecane C19H40	17.414														
Hexadecanoic acid, methyl ester	17.645														
Hexadecanoic Acid	17.781 - 17.959	256	10300	531	7660		5970		7690	906	9790		4840	95	9900
n-Hexadecanoic acid	17.943											282			
n-Eicosane C20H42	18.2 - 18.242														
n-Icosane C20H42	18.253														
Disulfide compound	18.342 - 18.347														
Unknown ester	18.557		2030												
1-Cyclohexene-1-carboxylic acid, 4-(1,5-dimethyl-2-phenyl)-	18.593														
n-Heneicosane C21H44	18.997 - 19.034			163		197				248					
8,11-Octadecadienoic acid, methyl ester	19.013														
9-Octadecenoic acid	19.223 - 19.375		7330		7220	4360			7770		7770		3320		5960
Octadecanoic acid , methyl ester	19.259														
Linoleic acid	19.343	305													
cis-9,12-Octadecadienoic acid	19.364											318			
9-Octadecenoic acid, (E)-	19.374 - 19.38			482						1240					
Stearic Acid	19.38-19.542		11800		4290		4260		3430		7440		4980		8940
C10 Organic Acid, C10 ester	19.615									279					
n-Docosane C22H46	19.647 - 19.81	316		364	2130	448	2640	87	1460	428		194	1810	138	2850
n-Tricosane C23H48	20.37-20.538	729		692	4550	824	7350	253	3150	739	2820	593	2960	368	5430
2(3H)-Furanone, dihydro-5-tetradecyl-	20.622								1070						
2-Furanone, dihydro-5-tetradecyl-	20.732 - 20.732														
n-Tetracosane C24H50	21.068-21.235	1290	3940	1200	8140	1500	13300	515	5880	1440	5240	1190	4590	699	9370
Dimethyl Pyrene Isomer C18H14/Unknown	21.676														
n-Pentacosane C25H52	21.739-21.906	1650		1550	14400	1760	27100	889	12800	1370		1730		983	22000
n-Pentacosane C25H52/Unknown	21.739-21.87		8440							13600		17300			
Diethylene glycol dibenzoate	21.812 - 21.959	286	8460	265	11700	172	18400	283	16400	262	23000		37100	176	23500
Diethylene glycol dibenzoate/Unknown	21.974 - 21.975											245			
n-Hexacosane C26H54	22.383 - 22.551	1790	11100	1460	16500	1730	34500	905	14700	1590	12500	1670	13500	948	26300

Table 3 SVOC Tentatively Identified Compound Analysis Results

[illegible]

REAC Sample Number		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
CPSC Sample #		09-840-9707-01	09-810-7339-04	09-810-8357-08	09-302-1379-05	09-810-7069-03	09-304-6226-03	09-810-8235-10	09-810-8236-10	09-810-8036-01	09-810-7639-10	09-810-8213-04	09-840-9858-08	09-810-8037-10	09-840-9139-09	09-302-1429-03
Tentatively Identified Compounds	Retention	Gypsum	Gypsum	Gypsum	Gypsum	Gypsum	Gypsum	Gypsum	Gypsum	Gypsum	Gypsum	Gypsum	Gypsum	Gypsum	Gypsum	Gypsum
	Time	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg	µg/kg
Pentanal	10.41-10.42							3.09	1.96		6.59			5.81	2.51	
2-Propenoic acid, 2-methyl, methyl ester	10.68							1.97		49.8	27	32.8		43	28.5	
Hexanal	13.13-13.14	2.25	1.93		1.35	14.7	3.58	43.1	26.6	8.95	111	10.7	11.3	41.3	58.1	13.6
2-Propenoic acid, butyl ester	15.26-15.27				4.5			7.05	3.28	2.26	7.08			15.4	9.38	
C7 Ketone/Unknown	15.27					8.08										
Unknown	15.27-26.89	19	21.9	3.53	9.74	12.84	34.03	4.16	12.98	19.17	8.69	3.76	12.36	10.02	6.44	23.41
Heptanal	15.54-15.55					9.01	2.32	5.77	5.21	4	15	2.3		10.1	6.56	2.57
Unknown Aldehyde	16.94-25.81				1.52	16.28	19.66								2.1	
C7 Ketone	17.44					2.38										
Octanal	17.72-17.73	4.86				27.6	12	5.33	7.43	9.64				6.79	11.1	7.77
1-Hexanol, 2-ethyl	18.06	2.68				6.44	18.6	8.25		6.83	6.4	3.72	5.55	5.31	5.08	9.7
1-Hexanol, 2-methyl	18.06				4.14											
2-ethyl-1-Hexanol	18.06								5.09							
Octane, 1-chloro	18.84-23.33									6.3			64.1		7.83	
Octanol	18.96-19.98	16.2				12.3			2.46	10.4				2.65	22.9	3.26
1-Octanol	18.97		21.9													
2-Octenal, (E)-	19.12							6.71								
2-Nonanone	19.68					2.36										
Nonanal	20.05	12.3	5.32			43.3	87.2	13.5	20.5	17.9	10.9			10.7	18.5	57.5
Acetophenone	20.28										2.17		1.92			
Acetic acid, 2-ethylhexyl ester	20.83						59.3	2.98								
Dodecane	21.4						6.19									
C10H18 Cycloalkene	22.06						3.02									
Unknown ester	22.14					1.57										
Decanal	22.31-22.32	4.62	2.6		2.6	17.1	24.7	2.53		12.3			2.53		5.32	31.9
Naphthalene	23.22						1.32									
C10 Alkene/Cycloalkane	23.39					19.9		36.7			4.67	4.72				
Cyclodecane	23.39-23.40	55.9	35.6		14.3		19.7		8.72	42.8			30.5	10.1	40.9	59.5
Unknown cycloalkane	23.4			7.19												
2H-Pyran, 2-(bromomethyl)tetrahydro-	24.83					17.4										
Furan, 2-butyltetrahydro-	25.36					20.2										



U S. CONSUMER PRODUCT SAFETY COMMISSION

4330 EAST WEST HIGHWAY

BETHESDA, MD 20814

Office of Compliance and Field Operations
Defect Investigations Division
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Lead Compliance Officer
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JUN 22 2009

Raj Singhvi
Chemist
Environmental Response Team
U.S. EPA
2890 Woodbridge Avenue
Edison, NJ 08837

Re: CPSC File No PI090017
Drywall

Dear Mr. Singhvi:

Enclosed please find a Chain of Custody Record, along with the following drywall samples, identified by CPSC Sample Number:

09-810-7339-04, cut into 12 subsamples A through L
09-810-8357-08, cut into 12 subsamples A through L
09-840-9707-01, cut into 12 subsamples A through L
09-302-1379 -05
09-810-7069 -03
09-304-6226 -01
09-810-8235-10
09-810-8236-10
09-810-8036-01
09-810-7639-10
09-810-8213-04
09-840-9858-08
09-810-8037-10
09-840-9139-09

These samples have been divided up into the two shipping containers you sent. The remaining samples will be shipped to you shortly in a separate container. Please return any samples not destroyed during testing to my attention.

Thank you for your assistance

Sincerely,

A handwritten signature in black ink, appearing to read "Blake G. Rose". The signature is fluid and cursive, with the first name "Blake" being more prominent.

Blake G. Rose
Lead Compliance Officer
Electrical & Fire Hazards Team

No: 01809
Sheet 01 of 01 (Do not copy)
(for addnl. samples use new form)

Analyses Requested

~~Please see special instructions.
Some Analysis employee for ASDN
Samples at May 7, 2009.~~

Semi volatile organic compounds, formaldehyde, metals, volatile organic compounds, sulfide, water soluble chlorides, total organic carbon, pH, loss on ignition, alkalinity, sulfate. Also optical microscopic examination. Thank you.

SAMPLES TRANSFERRED FROM
CHAIN OF CUSTODY #:

☆ U.S. GPO: 2000-521-151



U.S. CONSUMER PRODUCT SAFETY COMMISSION
4330 EAST WEST HIGHWAY, BETHESDA, MD 20814

Joanna Matheson, PhD
Toxicologist
Directorate for Health Sciences

Tel: 301-504-7043
Fax: 301-504-0079
Email: jmatheson@cpsc.gov

July 16, 2009

Mr. Raj Singhvi
Chemist
Environmental Response Team
U.S. Environmental Protection Agency
2890 Woodbridge Avenue
Edison, NJ 08837

Re: CPSC File No. PI090017
Drywall

Dear Mr. Singhvi:

Enclosed please find a Chain of Custody Record, along with the following drywall sample, the 15th sample, identified by CPSC Sample Number:

09-302-1429 sub 3

Please return any sample not destroyed during testing to Blake Rose's attention.

Thank you for your assistance!

Sincerely,

A handwritten signature in cursive script, reading "Joanna Matheson", is positioned above the printed name.

Joanna Matheson, PhD

* These comments are those of the CPSC staff, have not been reviewed or approved by, and may not necessarily reflect the views of, the Commission

CHAIN OF CUSTODY RECORD

Project Name: _____
Project Number: _____
LM Contact: _____ Phone: _____

No: 01718
Sheet 01 of 01 (Do not copy)
(for addnl. samples use new form)

Sample Identification

Analyses Requested

[illegible]

Matrix:

Special Instructions:

A- Air	PW- Potable Water
AT-Animal Tissue	S- Soil
DL- Drum Liquids	SD- Sediment
DS- Drum Solids	SL- Sludge
GW- Groundwater	SW- Surface Water
O- Oil	TX-TCLP Extract
PR-Product	W- Water
PT-Plant Tissue	X- Other

Semi volatile organic compounds, metals, volatile organic compounds, sulfide, water soluble chlorides, total organic carbon, pH, loss on ignition, alkalinity, sulfate. Also optical microscopic examination. Thank you.

SAMPLES TRANSFERRED FROM
CHAIN OF CUSTODY #:

[illegible]