U.S. Department of Transportation
Pipeline and Hazardous Materials Safety Administration

1200 New Jersey Avenue, SE
Washington, DC 20590

NOV 2 5 2009

Mr. Paul D. Johnson
Director of Environmental Affairs
Kinbursky Brothers Supply, Inc.
1314 N. Anaheim Blvd.
Anaheim, CA 92801

Ref. No. 09-0090R

Dear Mr. Johnson:

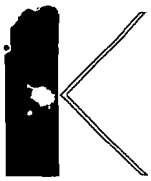
Recently, our Office issued several letters, including our June 23, 2009 letter (Ref. No. 09-0090) responding to your request, regarding the applicability of the Hazardous Materials Regulations (HMR; 49 CFR Parts 171-180) to the transport of used or spent dry cell batteries. This letter supersedes the response given in our June 23, 2009 letter.

After further consideration and analysis of dry battery chemistries and sizes and based on information available to us, it is the opinion of this Office that used or spent dry, sealed batteries of both non-rechargeable and rechargeable designs, described as "Batteries, dry, sealed, n.o.s." in the Hazardous Materials Table in § 172.101 of the HMR and not specifically covered by another proper shipping name, with a marked rating up to 9-volt are not likely to generate a dangerous quantity of heat, short circuit, or create sparks in transportation. Therefore, used or spent batteries of the type "Batteries, dry, sealed, n.o.s." with a marked rating of 9-volt or less that are combined in the same package and transported by highway or rail for recycling, reconditioning, or disposal are not subject to the HMR. Note that batteries utilizing different chemistries (i.e., those battery chemistries specifically covered by another proper shipping name) as well as dry, sealed batteries with a marked rating greater than 9-volt may not be combined with used or spent batteries of the type "Batteries, dry, sealed, n.o.s." in the same package. Note also, that the clarification provided in this letter does not apply to batteries that have been reconditioned for reuse.

I hope this information is helpful. If you have further questions, please contact this office.

Sincerely,

Charles E. Betts,
Chief, Standards Development
Office of Hazardous Materials Standards



KINSBURSKY
BROTHERS INC

Eichenlaub
§172.102 SP 130
§173.21
Battery
09-0090

April 16, 2009

U.S. DOT
PHMSA Office of Hazardous Materials Standards
Attn: PHH–10 U.S. Department of Transportation
East Building
1200 New Jersey Avenue, SE.
Washington, DC 20590–0001

RE: 49 CFR §172.102 Special Provision 130, §173.21.

Dear Sirs,

I am writing on behalf of Kinsbursky Brothers Inc (KBI) and Toxco Inc (Toxco) to requests the Department's interpretation and applicability of 49 CFR §172.102 Special Provision 130 and 173.21 to spent alkaline dry cell batteries being shipped for recycling or disposal.

Background

Each year KBI and Toxco receive, sort, and package more than one million pounds of spent, used, dry cell alkaline batteries from households, businesses, municipalities, government offices and commercial retail operations in the US and Canada. These batteries power a variety of portable electronic products including, calculators, keyboards, radios, toys, flashlights and cameras.

These batteries are sorted and repackaged for shipment by truck or rail for recycling, metal recovery, or waste management at offsite facilities. These dry-cell batteries are currently shipped using one of the following classifications described in the Hazardous Materials Regulations (HMR; 49 CFR Subtitle B, Chapter I, Subchapter C, part 172.101):

Proper shipping name	Hazard class	ID	Packing group
Batteries dry containing potassium hydroxide solid	8	UN3028	III
Batteries, dry, sealed, n.o.s. *	--	--	--
*applicable when special provision 130 is met. [1]			

Impact of special Provision 130 on the battery recycling industry

It appears that the HMR does not expressly take into account the low risk associated with spent dry cell alkaline batteries collected for recycling and disposal. Spent dry cell alkaline batteries are by definition used and inherently contain low electrical energy density (even when fully charged). Our observations and experience is that spent alkaline batteries contain only low voltages if measurable at all.

[1] *It is worth noting that by insulating any one terminal of any single battery cell you effectively eliminate the possibility of a circuit since at least three batteries oriented in series (positive to negative) are necessary to create a circuit.*

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The requirements of SP 130 are significantly problematic for interim handlers and processors of end of life spent alkaline batteries being sent for disposal or recycling. Excessive tape, plastic bags, and coatings commonly applied to these types of cells often require removal of the insulation to identify the chemistry during the receiving and sortation process. Once batteries are un-insulated, identified and sorted; and material is to be prepared for transport to a destination recycling/disposal facility the batteries must be insulated once again for transportation. During sorting large format or multiple cell batteries and other chemistries are removed and segregated from the dry cell alkaline batteries. This ensures the segregated material is appropriate for the specific processors and that the material being shipped will not contain any of the battery chemistries that represent a potential transportation risk.

Upon receipt at the final recycling facility the processing facility may be required remove the insulation from each battery cell prior to introduction to a furnace or a chemical process since the added tape, plastic and coating may not conform to pollution control requirements or end-process tolerances at the destination facility.

Supporting Data

On March 24th, 2009 KBI technicians conducted experiments mimicking a worst case scenario of a short circuit of dry cell alkaline batteries during transportation. Using common dry cell alkaline batteries a circuit was created in an attempt to determine if dry cell alkaline batteries are capable of generating a dangerous amount of heat during transportation. It was determined that this type of battery, when subjected to conditions incidental to transportation without insulation of the cell terminals is not capable of creating a dangerous evolution of heat.

Our tests were conducted using 12 new D cell batteries fastened end-to-end (positive to negative) on an adhesive strip and placed in-series. A ten gauge insulated copper wire (see figs 1 and 2 below), was then affixed to the positive side of the battery chain, and the negative side of the battery chain. Additional tests using randomly selected spent batteries were also conducted yielding equivalent results (though expectedly producing less voltage and no measurable heat increase). As the data indicate neither test group produced significant voltage nor generated enough heat to pose a risk during transportation.

Fig1. New, fully charged batteries

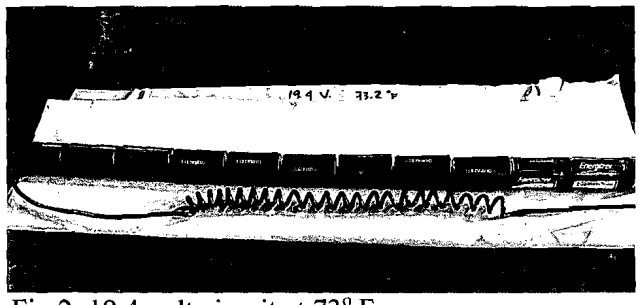

Fig 2. 19.4 volt circuit at 73° F.

During the tests the voltages were periodically measured using a standard hand held electricians volt meter; the temperature was monitored throughout the experiment using a hand-held Raytek Ryanger thermal-meter. The tests were conducted on a steel table and voltage and temperature were monitored for a period of 80 minutes.

Once the batteries were aligned in series and the 10guage wire was connected the voltage of circuit immediately decreased from 19.4 to .6v and the temperature of the cells began to slowly increase. This is recorded in Table 1 below. The temperature of the cells increased, peaking 19 minutes into the experiment, until reaching a maximum temperature at cell numbers 5, 6 and 8 of 229 degrees F at which point continued thermal reading indicated a steady declination of the cell temperatures until the conclusion of the test 61 minutes later.

Table 1

12 new D cell alkaline batteries ambient temperature 73 degree Fahrenheit 19.4 volt circuit at start												
Time	10:21	10:24	10:26	10:30	10:35	10:40	10:45	10:50	11:05	11:22	11:30	11:41
Circuit Voltage	0.6v	0.5v	0.2v	0.2v	0.2v	0.2v	0.2v	0.2v	0.2v	0.2v	0.2v	0.2v
Temp cell 1	79	104	124	165	202	207	170	144	126	97	90	90
Temp cell 2	82	109	131	175	195	180	178	120	133	106	99	98
Temp cell 3	83	107	127	173	189	170	107	151	135	109	101	101
Temp cell 4	84	109	127	168	208	208	185	160	160	104	106	88
Temp cell 5	85	109	120	174	209	229	155	130	160	106	100	91
Temp cell 6	84	109	125	170	209	229	150	132	130	101	96	89
Temp cell 7	84	103	125	170	205	216	135	150	137	106	96	90
Temp cell 8	87	109	130	175	210	229	150	149	131	104	96	88
Temp cell 9	85	109	130	177	207	220	135	130	122	98	91	88
Temp cell 10	88	109	126	180	213	225	198	178	122	108	99	90
Temp cell 11	88	111	131	176	203	210	178	160	124	105	99	90
Temp cell 12	90	103	125	171	203	200	185	154	114	93	90	85

An additional experiment was conducted using spent dry cell batteries randomly selected from the containers received at KBI (see fig 3 below). The test was conducted under identical parameters however, the circuit created by the used batteries had an initial voltage of 0.0v and remained constant throughout the experiment.

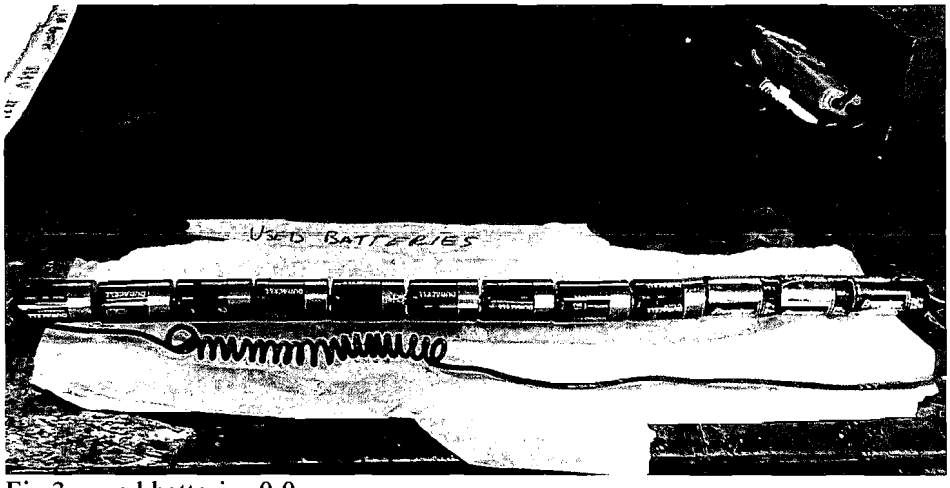

Fig 3. used batteries 0.0 v.

Used cells displayed an individual voltage ranging from 0.0 to 1.5 volts. Test 2 was conducted later in the day when the ambient temperature measured approximately 80° F. During this phase of the experiment the used cells had a cell surface temperature ranging from 73 and 75 degrees and showed only negligible indications of increasing through out the duration of the tests (some of which can be attributed to the rising ambient temperature). Since no significant increase in temperature was observed the test was concluded after 13 minutes. See table 2.

Table 2

12 D cell spent alkaline batteries ambient temperature 79 degree Fahrenheit 0.0 volt circuit at start			
Time	11:17	11:23	11:30
Circuit Voltage	0.0v	0.0v	0.0v
Temp cell 1	75	75	75
Temp cell 2	74	77	77
Temp cell 3	75	75	75
Temp cell 4	74	75	75
Temp cell 5	74	74	74
Temp cell 6	74	75	75
Temp cell 7	74	74	74
Temp cell 8	74	74	74
Temp cell 9	74	74	74
Temp cell 10	73	74	74
Temp cell 11	74	74	74
Temp cell 12	75	77	77

Further tests using a mixture of new and used batteries were conducted on April 8th during a demonstration for transportation inspectors and similar; if not identical results to test number two were obtained. That is to say that a mixture of new and used dry cell alkaline batteries did not result in a significant increase in temperature and did not generate any measurable voltage after the initial measurement of the circuit.

Conclusions

1) The above battery test shows that if a long chain of spent battery cells were to align positive to negative, as demonstrated in our experiment, the resulting circuit does not result in the dangerous evolution of heat. Furthermore, as the results of these experiments and the assembled data contained herein indicate, even brand new batteries purposely wired in such a circuit do not produce enough heat to ignite any of the constituents of dry cell alkaline batteries or any plastic or paper packaging that may be associated with the container.

2) Based on the experiences of receiving, handling and shipping millions of pounds of spent dry cell alkaline batteries over the past 20 years; we strongly believe that alkaline batteries do not represent a safety risk during transportation. Typically, spent batteries are offered for over the road transportation in containers ranging from 5 to 55 gallons in volume. During conditions incidental to transportation these containers are certainly subjected to vibrations and jostling within the transport vehicle. This movement makes it implausible that an adequate number of battery cells could link together end-to-end during the random orientation of cells within a container to create a similar, or larger, circuit as the one demonstrated in our experiments. During the handling of spent dry cell alkaline batteries within the facility KBI stores the cells in large cubic yard tote bins prior to insulation and packaging for off-site shipment.

KBI has monitored these bins with the same hand held thermal meter used in our experiments and even when thoroughly agitated by dumping or shoveling the batteries, there is no measurable increase in temperature.

3) The transportation of dry cell batteries being shipped for recycling or disposal are subject to wide variations of temperatures in the mode of transportation. Dry cell batteries are commonly stored in steel drums and in direct sunlight. In certain geographic areas high ambient temperatures can surpass 120 degrees F. It is reasonable that a 55 gallon steel drum of dry cell batteries being stored or transported in temperatures of 120 degrees or greater can have an internal temperature closer to 200 degrees. Even If the internal temperature of a container exceeds 100 degrees F, it has exceeded the temperature of the spent test batteries used in this test.

Request for Concurrence

KBI seeks the department's concurrence that based on the above testing, and the design and chemical composition of spent dry cell alkaline batteries that spent batteries, by design are incapable of generating a dangerous evolution of heat, when being transported for disposal and or recycling.

As shown by the test data, if you concur, then our interpretation of 49 CFR 173.21(c) and Special Provision 130 allow for the shipment of spent dry cell alkaline batteries without further preventative measures as spent dry cell alkaline batteries do not represent a risk of the dangerous evolution of heat during transportation and that adequate safety measures as prescribed by 49 CFR 173.21(c) and Special Provision 130 are met by the inherent design characteristics of these spent batteries.

Please contact my office with any comments or questions.

Sincerely,

Paul D. Johnson
Director of Environmental Affairs
Kinsbursky Brothers Supply Inc.