C46 Bad Science From Big Brother

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After attending this presentation, attendees will have an appreciation for the need to critically evaluate published research, particularly that done by authoritative agencies.

This presentation will impact the forensic community and/or humanity by illustrating the importance of preventing unreliable reports from being used as the basis of opinions in litigation.

It is essential that we, as scientists and engineers, do good science. It is especially important when this science is the basis of our opinions that we present to lay people in the course of litigation. It is also incumbent upon us to be vigilant in detecting bad science that may become current and the basis of opinions in the future, particularly if the bad science carries the imprimatur of a federal regulatory agency.

As part of a project to develop standards addressing the potential hazards of clothes dryer fires, the Consumer Product Safety Commission conducted a program that resulted in the publication, "Final Report on Electric Clothes Dryers and Lint Ignition Characteristics," May 2003. In the test program, a great deal of effort was put into establishing some of the operating characteristics of several electric clothes dryers and demonstrating certain conditions under which lint, taken from a clothes dryer lint screen, will burn when positioned on or near an energized clothes dryer heater unit that had been removed from a dryer and placed in a special test chamber. Very little of the report was devoted to lint accumulation, apparently because very little accumulated during their testing. The report indicates that: 1) lint collects on the heater unit housing in locations and at densities similar to the samples tested, 2) large clumps of lint can become located within a few inches of the heater unit entrance along its longitudinal axis , and 3) the lint so located could ignite and create larger fires in the cabinet or downstream of the heater unit in the clothes-filled tumbler drum, at the lint screen, and/or in the exhaust vent. There was nothing in the report that established that lint, similar in density and quantity to that used in the lint ignition tests, could become positioned relative to the heater unit as it was in the tests. In fact, our experience in laboratory testing under realistic operating conditions and examining dryers after years of service in homes contradict the first two items. Thus, the report gives a false impression relative to the hazard of dryer fires.

In addition to not establishing the lint accumulation, the test conditions for ignition of that accumulated lint were not valid.

The test chamber for lint ignition tests was essentially a horizontal wind tunnel with the dryer heater unit mounted with its longitudinal axis and internal air flow vector horizontal and its sides isolated from the test chamber walls. In most dryers the unit is oriented vertically and one of its sides is in contact with the metal tumbler support bulkhead. Neither the flow field nor the heater unit surface temperature distribution were documented in the actual dryer, therefore the flow fields and distributions created in the test chamber could not be validated.

Our testing has shown that, in operating dryers of the type tested by CPSC, the flow is downward in the cabinet, opposite to that used in their ignition tests. The downward flow continues past the heater inlet with only a portion of air being drawn into the heater. The general downward flow prevents any lint that is more than a few inches below the inlet from possibly being drawn into the heater unit. Thus, no lint accumulated on the bottom of the cabinet can be drawn to the heater. Also, the orientation of the gravity vector in the test chamber is incorrect. A clump of lint that is somehow located in the limited in-draft at the entrance to the heater unit may be too dense to be drawn into the unit if the unit is oriented vertically but not if it is located horizontally. These factors make their testing and conclusions relative to lint ingestion problematic, if not invalid.

The configuration used for the ignition of materials downstream of the heater has no relationship to an actual dryer. The target material, lint or cotton toweling, was placed immediately downstream of the horizontal heater unit in a 4-inch diameter duct. The air flow speed across the target material, which restricted the cross-section of the duct, was not reported, but was probably significantly higher than the 800 sfpm at the heater inlet. This air flow would, and did, fan any smoldering embers into flames. In an actual dryer, the exhaust of the heater passes through a perforated metal wall before reaching toweling-type materials, then traverses the tumbler plenum and, in some designs, another perforated metal wall to reach lint on the collection screen, and then pass through a centrifugal blower to reach any lint deposits in the exhaust vent. The perforated metal walls act as spark arresters eliminating most, if not all, of the lint embers. The directed airflow goes to essentially zero in the plenum chamber of the drum. The only air movement would be due to the tumbling clothes, which would probably beat any surviving embers out of existence. The survival rate for lint embers reaching the lint screen or beyond would be negligible. No explanation is given as to how lumps of lint could make their way into the heater unit. Even if one accepts that somehow clumps of lint are ingested into the heater unit, it must be demonstrated in an actual dryer that embers from it will survive in sufficient size and quantity to cause ignition of material downstream of the heater unit.

The report covers a large number of tests which are described in great detail; many data are presented which are analyzed and discussed extensively. The extent of the discussion and the fairly attractive

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presentation of the voluminous data divert the readers' attention from the fact that, though what is presented follows the two subjects mentioned in the title of the report, "Electric Clothes Dryers" and "Lint Ignition Characteristics," no valid connection is made between the two. The testing program and report are examples of bad science.

Dryers, Flint Fires, CPA Safe

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