Advanced Detection Technologies, Inc.

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U S N R C
Sealed Source Safety Section
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NOVEMBER 21, 1991

6H3

ATTN: Mr. Steve Baggett

Dear Steve:

Per our telecon on November 18,1991, please include the following data in our submission file:

1. It is our policy to maintain a record of the serial numbers of the detectors we manufacture. We commit to supplying a letter to the U.S.N.R.C. every five (5) years informing you of our production of all variation of our smoke detectors.

2. Regarding the construction of the device, we are going to continue to manufacture our detectors using AD32B3 aluminum poprivits to fasten the chamber endplates to the chamber walls, and the chamber assemblies to the circuit card assembly. At no time will we use machine screws or sheet metal screws to fasten the chambers to the circuit card.

3. We expect our detectors to have a service life of five (5) to ten (10) years on average

4. The hexagon label we use is manufactured by Thunderbird Label of Fairfield, New Jersey. The label stock is a 50# paper stock with an acrylic adhesive that builds adhesion over time. The manufacturer feels that this label will survive the service life of the detector under the prevailing installation conditions and that the adhesive which holds the label on is so aggressive that attempts to remove the label will destroy it.

5. We performed the following drop test to verify the integrity of the device. Our normal installation of the device is in a computer room. Most office areas have an 8 or 10 foot ceiling, and the floor is usually carpet or raised tile floor. To verify that our detector will survive a 10 foot fall to the floor we tested the design by dropping the units from a height of 3 feet 11 inches (abut 140% of maximum normal height) to a concrete floor, a worst

case impact target. As we have devices manufactured by Firetek at our facility for disposal of the sealed sources, I tested six (6) detectors manufactured between February of 1988 and June of 1988. There is no physical difference in between our detector and the Firetek device except that we intend to reorganize the component positions on the circuit board at some date to facilitate production. We will not be doing this initially. Reviewing the design, I felt the worst case impact would be one that is parallel with the central axis of the detector, impacting at either the pins or the shell endplate. Dropping three (3) detectors so they landed on the pins yielded negligible deformation of either chamber as the force was transmitted up through the pins to the poprivit standoffs and finally to the circuit card, bypassing the reference chamber. The base molding shattered on impact.

Impacts colinear with the central axis of the detector, but striking the shell endplate, yielded more deformation to the interior of the device. On all three (3) impacts the joints between the shell endplate and the shell failed as I expected. Some minor deformation of the sample chamber occurred, but it was substantially less than would be required for the electrode to impact the source. I say this because if you review the cutaway drawing of the detector, you'll note that the points of attachment between both chamberwall to chamber endplate and chamber assembly to circuit card are on small sheetmetal legs (.100 inches wide by .015 inches thick) on the chamber walls. While these small legs were deformed, the cylinder described by the chamber wall was not. Even if the legs collapsed completely, the chamber wall is tall enough to prevent the electrode from impacting the source and threatening the source containment. The chamber wall would have to compress almost .500 inches to allow the source and electrode to come into contact; this would require alot more energy than a fourteen foot fall will provide.

Swipe testing the twelve sources inside the detectors yielded no removable radiation. Close inspection of the sources and the impact geometry of the detectors confirmed that nothing had touched the sources during the tests.

When I talked with John Ohelin, our consultant, he confirmed that drop testing had been done on the 303-2130 (please see documentation for original license) by Underwriter's Laboratories. Due to physical similarities between the 303-2130 and the 303-2160 the drop test data was accepted fro the 303-2160 after engineering inspection.

6. The radiation dose received by our customers and end users is extremely low. Building on the data presented in our submission package, where we showed that our dose rate was acceptable for a factory technician manipulating the sources during assembly. The dose rate for end users will substantially reduced when you take into account the following points:

First: Most of our business is based on replacing detectors which have failed in existing Firetek systems. As a supplier of spare parts the quantities are small.

Second: While our assembly staff would be in close proximity to the material when assembling the detector, most people will be several feet from the detector at the point of closest approach as the stroll past a unit installed on the ceiling. As the dose rate is inversely proportional to the square of the distance, the separation is germane.

Third: While service technicians will handle the devices (i.e. close proximity) they will only do so for a small proportion of their work day, so their dose rate will be proportionately less.

Fourth: Lastly, none of the above takes into account the most significant issue. The body of the detector acts a shield for the customer/end user.

In sum, we feel that our detectors will generate negligible risk for the end user due to the shielding by the components, the small quantities that we will be producing and the lack of proximity provided by the packaging.

7. The last item you wished to review is our quality assurance program. Our general management quality policies revolve around the ethic that our best salesman is a high quality product. Toward this end, we have made the engineering department directly responsible for the operation of our production facility. While we are small right now, so I am the production department, as we grow the QA program will continue to be under my direct control. Another basic policy states that we will undertake no unsafe practices, regardless of whether the impact is in our facility or elsewhere, as a result we stop processing when-ever we fail any of our radiation checks and notify the R.S.O. (me) immediately.

We are still refining the process we purchased from Firetek as we are not yet satisfied with the quality of the device it yields. We are committed to provide the following material and quality checks as a minimum:

1. We sort <u>all</u> incoming sources by their activity into one of four groups. If the activity is too high or low we

reject the source. This incoming inspection is performed using six (6) second counts on our Eberline S.A.C.-4. The calibration of the instrument is verified against an 1160 Dpm source per our license application.

2. We swipe test every tenth source as we swage the sorted sources onto labeled endplates. We swipe the press at the same time and count the scintillations from the filter paper for one minute to detect removable radiation. Our maximum allowable count is 100 counts above background. All results are logged on a report.
3. The swipe test is repeated on the outside of the chambers after they are accombled onto the circuit card. Each detector in the batch is swiped and a single count is made of the filter paper. The results are not logged and the maximum pass value is 100 count over background.
4. After final checkout the detectors in a batch are swiped across the endplate and along the sides for removable radiation. The detectors are not shipped if we detect more than 80 counts per minute over background.

All of our swipe testing is done with the S.A.C.-4 and again the instrument is calibrated to 470 counts above background prior to performing the swipe test. This should easily detect 0.005uci of removable radiation, if we detect removable radiation we will not ship <u>any</u> detectors until we rectify the situation.

If you feel that we should improve on this, tell me which criteria you feel we don't meet and I'll improve on quality program accordingly.

Also, you asked about our device dimensions; it is 3.5 inches in diameter and 4.5 inches long.

If there are any further questions, please feel free to call me so I can be of service.

Regards,

ADVANCED DETECTION TECHNOLOGIES, INC.

Jeffrey G. Chollin
Radiation Safety Officer

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