

BECKMAN

BECKMAN INSTRUMENTS, INC.
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June 22, 1984

To: All Ultracentrifuge Users
Laboratory Safety Officers

URGENT CORRECTIVE ACTION NOTICE Reclassification to Minimize Ultracentrifuge Chemical Explosion Hazard

THIS LETTER IS SPECIFICALLY DIRECTED TO ALL OWNERS OF ULTRACENTRIFUGES OF THE MODEL L SERIES, MODEL L2 SERIES, MODEL L3 SERIES, MODEL L4 SERIES AND THE OWNERS OF TYPE 35 AND TYPE 42.1 ROTORS BELOW SERIAL NUMBER 1299.

In keeping with our policy of informing our customers of any potential safety hazard which might be experienced in operating Beckman equipment, we are providing this URGENT corrective action notice with respect to some of our older ultracentrifuges and rotors.

Although all Beckman ultracentrifuges and rotors undergo the closest design scrutiny and testing, there have now been four unusual and exceptionally forceful rotor explosions in Beckman's ultracentrifuge manufacturing history. The second of these incidents occurred in 1982 and was described in detail, together with a worldwide instrument retrofit (of L2-65B, L2-75B, and L4's), in a letter mailed in April, 1982. The latest two incidents which just recently occurred are described in detail in this notice, along with immediate and positive steps which the company is taking to minimize the possibility of a recurrence of this type of incident. WE URGE YOU TO READ THIS NOTICE CAREFULLY, AND TO JOIN WITH US IN THIS CORRECTIVE PROGRAM TO ASSURE CONTINUED LABORATORY SAFETY.

The following summarizes the two most recent incidents:

Incident No. 1. This incident occurred in an unoccupied laboratory with a 15-year-old Model L2-65B and a 6-year-old Type 60 Ti rotor. Beckman's subsequent investigation showed there were three separate electronic malfunctions, two being in the overspeed circuit causing it to be inoperative but allowing the ultracentrifuge to continue to run. Also there was a malfunction in the speed-control circuit which caused- the rotor to run at two times the set speed. In this case, the set speed was 45,000 rpm and the instrument attempted to accelerate the rotor to 90,000 rpm.

The instrument moved 4 feet from its original position. Although no parts actually escaped from the ultracentrifuge, the shock blast was sufficient to crack a cinder-brick wall in two places.

Incident No. 2. This incident occurred during the day with personnel in the laboratory. A 13-year-old Model L3-50 and a 13-year-old Type 42.1 rotor (originally derated from 50,000 rpm) were involved. The rotor was being operated at just below rated speed (41,500 rpm) when the malfunction occurred. There was no indication of overspeeding. The lid blew off the Ultracentrifuge, hit the ceiling, and landed several feet away from one of the laboratory personnel. The instrument rotated 75 degrees from its original position. The radiation handle also came out of the instrument and broke some glassware.

To the best of our current understanding, the fracture of these rotors under high-energy conditions caused the rotors to disintegrate into finely divided metallic particles. Thus a large surface area of unoxidized metal was exposed to water (from the samples), and to the Freon* released when the centrifuge's cooling coils were ruptured by flying rotor fragments. Sparks resulting from the rotor disintegration then triggered a chemical reaction and explosion which resulted in the damage described above.

Several years ago, Beckman was able to create a chemical explosion with a rotor fracturing under normal run conditions. As a result of our investigation at that time, an additional safety margin was added. Beckman Type 50.1 and Type 42 rotors were derated to the Type 42.1 (42,000 rpm) and Type 35 (35,000 rpm) to limit their energy level to what was thought to be insufficient to create a chemical explosion under normal operating speeds. At that time, Beckman also changed its rotor manufacturing processes and made design changes to avoid conditions under which a chemical explosion at rated rotor operating speeds might occur in any Beckman Ultracentrifuge. In its newer ultracentrifuges, the L5 and L8 models, Beckman has incorporated advanced safety features which are designed to avoid a chemical explosion even at speeds greatly in excess of rated rotor operating speeds.

As a result of the chemical explosion two years ago, all the Beckman ultracentrifuges with the L2-65B-type electronics were retrofitted. The latest malfunction on the L2-65B involved one of these retrofitted instruments but was caused by different multiple electronic malfunctions. Both of the explosions involving L2-65B's have resulted from corrosion and deterioration of the electronics. Since it is practically impossible to eliminate all potential electronic malfunctions which might result in an overspeed condition, elimination of possibly suspect ultracentrifuge /rotor combinations is considered to be the best course of action to avoid conditions which might result in further explosions of this type. It is for this reason that we are taking the following steps:

(A) Action on Model L's Classified "A"

All Model L's classified "A" can now safely be used with the following rotors:

Type 65¹, Type 50, Type 40, Type 40.2, Type 40.3, SW 50.1, SW 25.1, and AI-15.

The following rotors can no longer be used in the above instrument and should be transferred to L5's, L5B's, L8's, or L8M's:

Type 30, Type 30.2, and Type 21.

*A registered trademark of E.I. du Pont *de* Nemours & Company.

¹To the maximum speed of the ultracentrifuge as applicable.

(B) Action on Model L's Classified "B"

All Model L's classified "B" can now safely be used with the following rotors:

Type 65¹, Type 60 Ti¹, Type 50 Ti, Type 50.3 Ti, Type 50, Type 40, Type 40.2, Type 40.3, SW 65 Ti¹, SW 55 Ti¹, SW 50.1, SW 30, SW 30.1, SW 25.1, and zonals.

The following rotors can no longer be used in the above instrument and should be transferred to L5's, L5B's, L8's, or L8M's:

Type 42.1², Type 30, Type 30.2, and Type 21.

(C) Action on Model L2-50's Classified "C"

All Model L2-50's classified "C" can now safely be used with the following rotors:

Type 65¹, Type 50 Ti, Type 50.3 Ti, Type 50, Type 40, Type 40.2, Type 40.3, Type 25, SW 65 Ti¹, SW 55 Ti¹, SW 50.1, SW 41 Ti, SW 30, SW 30.1, SW 28.1, SW 28, SW 27, SW 27.1, SW 25.2, SW 25.1, and zonals.

The following rotors can no longer be used in the above instrument and should be transferred to L5's, L5B's, L8's, or L8M's:

Type 30, Type 30.2, Type 21, and Type 19.

(D) Action on Model L2-50's Classified "D"

All Model L2-50's classified "D" can now safely be used with the following rotors:

Type 65¹, Type 50 Ti, Type 50.3 Ti, Type 50, Type 40, Type 40.2, Type 40.3, Type 25, SW 65 Ti¹, SW 55 Ti¹, SW 50.1, SW 41 Ti, SW 30, SW 30.1, SW 28.1, SW 28, SW 27, SW 27.1, SW 25.2, SW 25.1, and zonals.

The following rotors can no longer be used in the above instrument and should be transferred to L5's, L5B's, L8's, or L8M's:

Type 30, Type 30.2, Type 21, and Type 19.

(E) Action on Model L2-65's Classified "D"

All Model L2-65's classified "D" can now safely be used with the following rotors:

Type 65, Type 50 Ti, Type 50.3 Ti, Type 50, Type 40, Type 40.2, Type 40.3, Type 25, SW 65 Ti, SW 55 Ti, SW 50.1, SW 41 Ti, SW 30, SW 30.1, SW 28.1, SW 28, SW 27, SW 27.1, SW 25.2, SW 25.1, and zonals.

The following rotors can no longer be used in the above instrument and should be transferred to L5's, L5B's, L8's, or L8M's:

Type 30, Type 30.2, Type 21, and Type 19.

¹To the maximum speed of the ultracentrifuge as applicable.

²Serial numbers 1300 and above.

(F) Action on Model L2-50's Classified "F"

All Model L2-50's classified "F" can now safely be used with the following rotors:

Type 80 Ti¹, Type 75 Ti¹, Type 70.1 Ti¹, Type 65¹, Type 60 Ti¹, Type 50 Ti, Type 50.3 Ti, Type 50.2 Ti, Type 50, Type 45 Ti, Type 40, Type 40.2, Type 40.3, Type 25, SW 65 Ti¹, SW 55 Ti¹, SW 50.1, SW 41 Ti, SW 30, SW 30.1, SW 28.1, SW 28, SW 27, SW 27.1, SW 25.2, SW 25.1, and zonals.

The following rotors can no longer be used in the above instrument and should be transferred to L5's, L5B's, L8's, or L8M's:

Type 42.1², Type 35², Type 30, Type 30.2, Type 21, and Type 19.

(G) Action on Model L2-65's Classified "F"

All Model L2-65's classified "F" can now safely be used with the following rotors:

Type 80 Ti¹, Type 65, Type 50 Ti, Type 50.3 Ti, Type 50.2 Ti, Type 50, Type 45 Ti, Type 40, Type 40.2, Type 40.3, Type 25, SW 65 Ti, SW 55 Ti, SW 50.1, SW 41 Ti, SW 30, SW 30.1, SW 28.1, SW 28, SW 27, SW 27.1, SW 25.2, SW 25.1, and zonals.

The following rotors can no longer be used in the above instrument and should be transferred to L5's, L5B's, L8's, or L8M's:

Type 75 Ti, Type 70.1 Ti, Type 60 Ti, Type 42.1², Type 35², Type 30, Type 30.2, Type 21, and Type 19.

(H) Action on Model L2-65B's and Model L2-75B's Classified "G"

All Model L2-65B's and Model L2-75B's classified "G" can now safely be used with the following rotors:

Type 80 Ti¹, Type 65, Type 55.2 Ti, Type 50.2 Ti, Type 50 Ti, Type 50.3 Ti, Type 50, Type 45 Ti, Type 42.2 Ti, Type 40, Type 40.2, Type 40.3, Type 25, SW 65 Ti, SW 60 Ti, SW 55 Ti, SW 50.1, SW 41 Ti, SW 40 Ti, SW 30, SW 30.1, SW 28, SW 28.1, SW 27, SW 27.1, SW 25.1, SW 25.2, and zonals.

The following rotors can no longer be used in the above instrument and should be transferred to L5's, L5B's, L8's, or L8M's:

Type 75 Ti, Type 70.1 Ti, Type 70 Ti, Type 60 Ti, Type 42.1², Type 35², Type 30, Type 30.2, Type 21, and Type 19.

(I) Action on Model L3-40's and Model L3-50's Classified "F"

All Model L3-40's and Model L3-50's classified "F" can now safely be used with the following rotors:

Type 80 Ti¹, Type 75 Ti¹, Type 70.1 Ti¹, Type 65¹, Type 60 Ti¹, Type 50.2 Ti, Type 50 Ti, Type 50.3 Ti, Type 50, Type 45 Ti, Type 40, Type 40.2, Type 40.3, Type 25, SW 65 Ti¹, SW 55 Ti¹, SW 50.1, SW 41 Ti, SW 30, SW 30.1, SW 28, SW 28.1, SW 27, SW 27.1, SW 25.1, SW 25.2, and zonals.

¹To the maximum speed of the ultracentrifuge as applicable.

²Serial numbers 1300 and above

The following rotors can no longer be used in the above instrument and should be transferred to L5's, L5B's, L8's, or L8M's:

Type 42.1², Type 35², Type 30, Type 30.2, Type 21, and Type 19.

(J) Action on Model L3-40's and Model L3-50's Classified "G"

All Model L3-40's and Model L3-50's classified "G" can now safely be used with the following rotors:

Type 80 Ti¹, Type 75 Ti¹, Type 70.1 Ti¹, Type 65¹, Type 60 Ti¹, Type 50.2 Ti, Type 50 Ti, Type 50.3 Ti, Type 50, Type 45 Ti, Type 42.2 Ti, Type 40, Type 40.2, Type 40.3, Type 25, SW 65 Ti¹, SW 60 Ti¹, SW 55 Ti¹, SW 50.1, SW 41 Ti, SW 40 Ti, SW 30, SW 30.1, SW 28, SW28.1, SW 27, SW 27.1, SW 25. 1, SW 25.2, and zonals.

The following rotors can no longer be used in the above instrument and should be transferred to L5's, L5B's, L8's, or L8M's:

Type 42.1², Type 35², Type 30, Type 30.2, Type 21, and Type 19.

(K) Action on Model L4's Classified "Q"

All Model L4's classified "Q" can now safely be used with the following rotors:

Type 65, Type 50 Ti, Type 50.3 Ti, Type 50, Type 45 Ti, Type 40, Type 40.2, Type 40.3, SW 65 Ti, SW 55 Ti, SW 50.1, SW 30, SW 30.1, SW 25.1, and zonals.

The following rotors can no longer be used in the above instrument and should be transferred to L5's, L5B's, L8's, or L8M's:

Type 75 Ti, Type 60 Ti, Type 42.1², Type 35², Type 30, Type 30.2, and Type 21.

(L) Action on Type 35 and Type 42.1 Rotors

In the L2-65B, L2-75B, L4 retrofit letter of April, 1982, the following warning was also given:

We have also found that there is a higher risk associated with Type 35 rotors having serial numbers below 1299 and Type 42.1 rotors having serial numbers below 1299. These rotors were originally stamped "Type 42" or "Type 50.1" and were derated 10 years ago. **THESE ROTORS ARE NOW AT LEAST 10 YEARS OLD AND MUST BE RETIRED IMMEDIATELY REGARDLESS OF THE INSTRUMENTS IN WHICH THEY ARE USED.** Our normal trade-in policy will apply to these rotors.

The incident described above in an L3-50 involved one of these rotors. Once again, we would like to emphasize the importance of checking your rotor inventory and immediately retiring these early Type 42.1 and Type 35 rotors below serial numbers 1299.

¹ To the maximum speed of the ultracentrifuge as applicable.

² Serial numbers 1300 and above.

Please complete the enclosed card and return it immediately to Palo Alto. On receipt of the reclassification card, a new instrument classification sticker will be sent to you. If you have a Model L5 or a Model L8, no new classification sticker is needed.

This letter is being mailed to every ultracentrifuge owner that Beckman has on record. In an attempt to reach every ultracentrifuge user, we are requesting your cooperation in the following way: please ensure that all of your colleagues who use Beckman ultracentrifuges in your facility and nearby facilities receive this notification. If you locate any user we did not have on our distribution, please call or have that other person call the Marketing Department of Beckman in Palo Alto and ask for either of the persons listed in the last paragraph of this letter.

We trust that you will understand the necessity for this action. We would like to stress that your cooperation in the actions outlined above is essential if further incidents of this type are to be avoided.

Beckman ultracentrifuges have a long history of safety, and Beckman wants its instruments to be the safest ultracentrifuges in the world. The corrective steps set forth in this notice with respect to its Model L, L2, L3, and L4 ultracentrifuges and rotors are part of Beckman's efforts to assure continued safe use of our ultracentrifuges. However, it is essential that you do your part by following the above instructions.

Please complete the information required on the enclosed card and mail it immediately to Beckman's Spinco Division Marketing Department.

BECKMAN INSTRUMENTS, INC.

