UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

January 28, 1997

NOTE TO: Generic Assessment Panel
Fred C. Combs
Larry W. Camper
Josephine M. Piccone
Kevin M. Ramsey

FROM: Steven L. Baggett, Section Leader
Commercial Section
Medical, Academic, and Commercial
Use Safety Branch
Division of Industrial and
Medical Nuclear Safety, NMSS

SUBJECT: REQUEST TO EVALUATE AND MAKE RECOMMENDATIONS ON VIBRATION DAMAGE TO FIXED LEVEL/MEASURING GAUGES

I am responding to your request of October 11, 1996, regarding a review of the adequacy of the sealed source and device vibration parameter evaluations. Three reports of fixed gauges failing due to vibration damage were submitted recently. These reports involved two different manufacturer's gauges and two occurrences with one particular model of gauge.

One occurrence in early October 1996, involved a five year old Berthold systems gauge installed on a hopper subject to vibration from a motor used to dislodge ash from the hopper. The shutter had "stuck open" as the shutter rod sheared or broke off the cylindrical shutter. The licensee's RSO stated that the mechanism "fell apart" due to the vibration from the pneumatic shaker motor.

The other occurrences involved two of the same model Kay-Ray gauges at one licensee three years apart. The first was in early December 1993 involving a secondary shredder level detector where the shutter spring would lose tension and fail shut. An inspection by the manufacture's technician found that, besides damage to the spring the handle shaft bracket had broken at the weld. The second in late July 1996, involved the same model gauge located on the secondary baghouses. Again, the shutter spring and spindle bearings failed, and, along with the equipment vibrations, caused the shutter closed giving a false level indication.

To determine whether the registration, licensing, or inspections processes adequately address use conditions, staff reviewed a number of documents, including the device safety evaluations for the gauges, the NUREG-1550. "Standard Review Plan for Applications for Sealed Source and Device Evaluation and Registrations" and FC 84-04 "Standard Review Plan (SRP) for Application for Use of Sealed Sources in Nonportable Gauging Devices."

The safety evaluation performed to register the five year old Berthold gauge used the history of "10 years of safe operation in industrial environments in Europe without problems" in lieu of actual prototype testing of the units. This approach is one of the accepted methodologies outlined in the SRP. Thus, no specific limit were placed on vibration other than to state that limitations for the scintillation detector system used with the gauge would keep the stresses well within the capabilities of the units.

The safety evaluation performed to register the other Kay Ray model gauge included prototype testing evaluations and specific vibration limits. Additionally, since 1991, the company uses a Vibration Concern Survey form which questioned if a source housing was subject to vibration and noted the vibration limits in peak to peak displacement or G's for three ranges from 15Hz to 2000Hz when servicing or installing a gauge.

A review of NUREG-1550 showed that vibration was specifically addressed two times, once in 5.5 Conditions of use, and once in the Appendix C Review Checklist. Both times it is included in instructions to evaluate the extreme/maximum condition of corrosion, vibration, impact, puncture, compression loads, explosion, flooding, poor air quality, excessive high or low temperatures, change in temperature and cycling of the on/off mechanisms.

With regards to the licensing of these gauges, Policy and Guidance Directive (P&GD) FC 84-04, "Standard Review Plan for Application for Use of Sealed Sources in Nonportable Gauging Devices" was reviewed for information on vibration or environmental conditions of use limits. FC 84-04 does address vibration and environmental conditions under Facilities and Equipment - Item 9. It states that the application should include "2. The environmental condition to which gauges will be exposed, e.g., elevated temperature, corrosive atmosphere, vibration. While the reviewers note at the end of item 9 state the if all items are not addressed .....to ensure that the gauges will not be affected by potentially adverse conditions....the applicant should be asked to provide the necessary information. However, the generic method NRC uses to issue gauge licenses, makes it impossible to determine if environmental conditions are considered during the licensing process for each gauge type used by the licensee. Typically, gauge users rely totally on vendors for proper installations and maintenance of gauges at its facility and limited guidance exists for licensing or inspecting vendors.

In conclusion, vibration and other environmental and potentially limiting conditions appear to be addressed in the safety evaluation process, but they might not be fully considered during licensing or inspection process.

I would recommend development of guidance to ensure that conditions of use are identified on the registration certificate and are considered during the licensing and inspection processes. Please note that based on a quick review of the event registrations database and information from the manufacturers, we believe that gauge malfunctions caused by use under limiting environmental conditions are infrequent, and therefore do not appear to require retrofit to existing reg certs or licenses.

DISTRIBUTION CLOSES IMNS-5585
SSS/RF
NE02-SSD6

OFC	IMAB											
NAME	SBaggett:ce											
DATE	1/ /97											

C = COPY E = COVER/ENCLOSURE N = NO COPY OFFICIAL RECORD COPY

310021

1/0