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January 3, 2000

State of California  
Radiological Health Branch  
Department of Health Services  
714/744 P Street  
P.O. Box 942732  
Sacramento, CA 94234-7320  
Don Bunn, Chief Compliance and Enforcement

Subject: **Report on Failure of Shutter indicator Lights for NDC Model 302 (CA471D105B) for California Radioactive Materials Licenses 1451-19 and 1933-19GL.**

Dear Mr. Bunn:

In accordance with California, Department of Health Service, Title 17, NDC Systems would like to report, that a shutter indicator light failed to relay the correct position of the shutter. The customer's facility is location in the State of Pennsylvania.

#### **Summery of Events:**

On December 3<sup>rd</sup> 1999, I was informed by an NDC field service engineer of a potential problem with the shutter indicator lights on an NDC model 302, beta gauge. The service engineer was dispatched to the customer's location to repair the problem. NDC beta systems have two indicators of shutter position. There is a green metal flag mounted to the moving radiation shutter blade and a red metal flag mounted to the fixed (non-moving) part of the radiation source housing. There is a 5/8" diameter window in the end of the source housing (upper head) facing the motor side of the O-frame. This window allows viewing of the green and red metal flags. By viewing this shutter position window, the safe functioning of the shutter can be absolutely verified independent of any electrical sensors or lights. The second indicator system, consist of two indicator lights. The lights are green and red in color. Green indicates that the shutter is closed and red indicates that the shutter is open. In this particular case the customer's lights indicated green even when the shutter was open. It appears that the shutter proximity switch failed with the switch on. This caused the close relay to activate. The shutter would still open and close, but the light always showed green. The NDC field service engineer was able to replace the proximity switch and the system is fully functioning.

This particular customer was able to identify the problem as a result of a third indicator of the NDC system. The control panel of the system where the system controls and

displays are located is equipped with a visual warning indicator for the shutter. If the shutter is not in the correct position the system detects this and a visual warning is displayed on the control panel. The customer did receive the warning and was able to notify NDC of the problem.

We believe that the root cause of this problem is the failure of an electrical switch. NDC had changed suppliers of this switch several years ago and has since returned to the original manufacturer of the original switches. The NDC engineering department is also in the process of redesigning the electrical system to prevent reoccurrence of this event on future systems. NDC believes that due to dual indicating system and the rare failure occurrence of the proximity switches the system is safe.

NDC further believes that the potential of any person receiving an exposure from the system is very unlikely if customers follow the NDC recommendations and safety guidelines. NDC has completed the required radiation profiles and submitted the profile within a device registry for each model. The measured exposure rate of the model 302 is 0.1 mR/hr at a distance of 100 cm. This exposure rate is measured at 300 mg/cm<sup>2</sup>. If one assumes a dept of 1000 mg/cm<sup>2</sup> then the calculated exposure is significantly less and represents a deep dose equivalent as required in 10 CFR 20. The mechanical shutter indicator system was purposely designed so that reliable shutter positioning could be obtained if work was to be performed on the system and a worker was expected to work closer than 100 cm from the source. NDC will remind customers who posses these devices to perform the shutter function tests as required by regulations. In addition, we will have the customer inform in-house personnel that anyone likely to work within a distance of 100 cm from the source should ensure that the shutter is closed by viewing the mechanical shutter indicator. Once the green flag is observed work can be completed.

If you have any questions or comments please do not hesitate to contact me at (626) 939-3859.

Sincerely,

A handwritten signature in black ink, appearing to read "Chris Fitz", with a stylized flourish at the end.

Chris Fitz  
NDC Systems  
Radiation Safety Officer

Copy: USNRC Region I  
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King of Prussia, PA 19406