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United States Nuclear Regulatory Commission
NRC Operations Center

Facility: Nuclear Metals, Inc.
2229 Main Street
Concord, MA 01742-3813

Docket No.: 040-00672
License No.: SMB-179
Radiation Safety Officer: Frank J. Vumbaco

Subject: Report of Sonodyne Incident of 2/21/96 at Nuclear Metals, Inc. (NMI)

This mailing is intended to provide information in fulfillment of the follow-up reporting requirements of 10CFR40.60(c), as they pertain to an unusual incident reported initially to NRC Region I on Friday, 23 Feb. 96, and to the NRC Operations Center line on Monday, 26 Feb. 96. An unplanned/unexpected vent fire, contained within a 'torit' filter plenum housing and downstream prefilter assembly servicing a pulsed-combustion wastewater evaporation system referred to as the 'Sonodyne' occurred on the morning of 21 February 96. NMI does not believe that the circumstances and conditions of this event constitute a reportable incident, according to the criteria specified in 10CFR40.60(b)(4), on the basis that one of the required conditions (ii), that "the damage affects the integrity of the licensed material or its container", was not met.

Despite this evaluation, NMI elected to provide a courtesy call to Region I, informing the assigned inspector of the event. In a subsequent telephone conversation (on the 26th), the NRC inspector advised us that, in the judgment of several Region I staff members, the incident did fulfill the specified requirements, and that notification was required, and that such notification could only be properly made through the NRC Operations Center. NMI therefore notified the Operations Center on the afternoon of the 26th, referencing the PN report (PN1-96-11) as advised by the Region I inspector. A follow-up call was made to the Operations Center on the afternoon of Friday, March 1st, following completion of a reactive inspection by Region I.

The required informational content specified in 10CFR40.60(c)(2) is addressed below, and in the referenced enclosures or attachments:

Description of the event, including the probable cause and the manufacturer and model number (if applicable) of any equipment that failed or malfunctioned:

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REG1 LIC40
SNM-0179 CF

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A-19 1/1

The enclosed/attached NMI internal office memorandum from George Shinopulos, (Manager, Facilities), to distribution, dated 29 February 1996, entitled: "REPORT OF FINDING: SONODYNE VENT FIRE, February 21, 1996" describes the incident.

The enclosed/attached NMI letter to NRC Operations Center dated 15 March 1996 (untitled), including an NMI interoffice memorandum from George Shinopulos to Frank Vumbaco entitled "REPORT OF DEFECT; Sonodyne Thermocouple", dated 14 March 1996 describes the failed/defective equipment (thermocouple).

exact location of event: within the Sonodyne exhaust ventilation system, housed in the Sonodyne room in the southeast corner of NMI's Building "E", at 2229 Main Street, in Concord, Massachusetts.

isotopes, quantities, and chemical and physical form of licensed material involved: Although NMI is licensed to possess/use natural and depleted uranium, and thorium, only depleted uranium (DU) is currently present at the site. Potential exposure considerations are therefore limited to uranium-238, uranium-235 (less than 0.2% by weight), uranium-234, and the short-lived progeny thorium-234, and protactinium-234 and -234m (beta-gamma emitters). Although exact and certain retrospective quantification of the amount of licensed material involved is impossible, NMI has provided a theoretical calculation, based on known concentrations of the feed material to the Sonodyne process, estimating a potential total of 50 grams of DU, mixed with other (unlicensed) materials similarly carried through the aqueous waste processing system. On the torit filters, the mixed materials, including the licensed DU, has been observed from past filter changeouts in fine powdery form, which tends to 'cake' with humidity or moisture.

date and time of the event: Wednesday morning, 21-Feb-96, signs of fire were detected at approx. 6:50 AM; various response measures were taken until the fire was extinguished by 11:45 AM. (For a more detailed chronology, see the listing of events in section 2 (VENT FIRE) of the interoffice memorandum "REPORT OF FINDING: SONODYNE VENT FIRE, February 21, 1996".

corrective actions taken or planned, and the results of any evaluations or assessments: See section 4 (CORRECTIVE ACTION) of the enclosed/attached NMI internal office memorandum from George Shinopulos,(Manager, Facilities), to distribution, dated 29 February 1996, entitled: "REPORT OF FINDING: SONODYNE VENT FIRE, February 21, 1996". Administrative procedures were also modified, implementing the engineering modifications described (torit deluge system, and additional thermocouple over temperature cut-off).

the extent of exposure of individuals to radiation or to radioactive materials without identification of individuals by name: A total of eight (8) people were

identified as potentially exposed individuals; five of these were Emergency Response Team (ERT) members involved in control and extinguishing of the vent fire, the remaining three acted in support positions, and were never very close to (or actively fighting) the fire itself. All personnel responding to the fire wore SCBA respiratory protective equipment, but were not monitored with any kind of breathing zone air sampler. Because the building was evacuated during response activities, and the HEPA exhaust filtration system(s) were not compromised, there was no potential for outside/offsite exposures.

Although results are not yet available from our contracted analytical services laboratory, urine bioassay samples have been collected from all personnel identified as potentially exposed to any airborne activity, or involved in immediate response to the incident. Priority (nonroutine) processing of these samples was not requested due to the relatively minor nature of the fire, and low concentrations of airborne activity observed in the building and effluent air samples collected during the time of the incident.

Although all potentially affected personnel were equipped with routine external dosimetry devices (film badges), the nature of the incident and the quantity and type of licensed material involved (or potentially involved) renders such devices inapplicable for the purpose of monitoring or assessing the radiological significance of their involvement in the incident. This is an expected consequence of the nature of DU; as an alpha emitter, the majority of any T.E.D.E. (Total Effective Dose Equivalent) incurred would arise from internal commitments, which must be monitored by other means (bioassay, air monitoring).

Air samples of four general types were collected and counted:

- in-plant portable "hi-vol" samples (high flow rate, short duration 'grab' samples); taken during the incident, and preparatory to return to service of building E.
- in-plant stationary (fixed, continuous, low flow rate); routine workplace air monitoring samples in building E.
- effluent (continuous, low volume); Sonodyne ("E-79") and three more exhaust ventilation stacks servicing other areas in building E.
- ambient / environmental (continuous, high volume); a total of eight samplers, two of which can be used as 'backgrounds' for evaluation of local/closer stations.

Results of these analyses show no significant or unusual potential for exposure to any individuals (on or off-site) other those eight persons already identified. With the exception of the results from the environmental air sampling stations, which were not available at the time, these results were made available to NRC Region I during inspection activities.

The routine stationary / fixed continuous air samplers in Bldg. E, collected continuously over the sampled interval of 2/20/96 to 2/22/96, yielded the following results:

sampler location	alpha activity concentration (uCi e-11/ml)
Charge Prep.	0.140
Ring Mill #1	0.204
Ring Mill #2	0.592
1250 Ton Press	0.345
Cement #1 (right)	0.035
Cement #2	0.338
Welding Area	0.211

A total of ten (10) exhaust ventilation systems potentially service E Building, as listed below:

E-80: Sonodyne room air vent (unmonitored)
E-79: Sonodyne system / process vent (monitored/sampled, HEPA filtered)
E-78: paint booth (not used)
E-77: oil solidification, resource recovery, electrowinning (monitored/sampled)
E-76: chip processing, cement mixing (monitored/sampled)
E-75: general building exhaust ventilation (unmonitored)
E-74: general building exhaust ventilation (unmonitored, HEPA filtered)
E-73: general building exhaust ventilation (unmonitored, HEPA filtered)
E-72: general building exhaust ventilation (unmonitored, HEPA filtered)
E-71: lockers / change area

E-79 (Sonodyne) stack exhaust sample showed an effective average alpha activity concentration of 9.87E-14 uCi/ml, for the sampled period of 2/16/96 - 2/22/96, which is consistent with effluent concentrations that had been experienced in the weeks prior to the incident.

E-80, the stack that provides ventilation for the room which houses the Sonodyne unit, is an unmonitored stack, but that stack was also shut off once fire was detected and E-79 was shut down.

The other two monitored stacks E-76 and E-77 yielded effective average alpha activity concentrations of 6.3E-14 uCi/ml and 8.9E-14 uCi/ml, respectively, for the reporting period of 2/10/96 through 2/23/96 (including the span of the Sonodyne incident).

At the time room air ventilation services were turned back on, stacks E-72, E-73, and E-74 were used exclusively to accomplish changeout of building E room air, although unmonitored, these systems are equipped with HEPA filtration systems. The low airborne activity concentrations observed from the 'hi-vol' grab samples and the routine

'stationary' workplace air samples support the conclusion that potential emissions from these sources are relatively minor, or not significant with respect to routine facility operating emissions.

Preliminary analyses (in-house counting using an automated gas-flow proportional counter) of samples from the eight environmental air stations yielded effective average ambient air alpha activity concentrations ranging from 4.9E-15 uCi/ml to 3.1E-15 uCi/ml. Using the two most distant stations as 'background' samples, the highest apparent 'net' alpha activity concentration was calculated as 7.3E-16 uCi/ml; this value is well within the analytical uncertainty of the measurement process, and the normal distribution of values observed in past datasets. While these samples will be reanalyzed, consistent with our routine environmental air monitoring program, and the final results recorded will be based on the reanalysis (which uses a more sensitive and robust analytical methodology), it is apparent from these data that any potential exposure to the environment, public, or outside personnel arising from this incident is not significant with respect to routine facility operating emissions, and all applicable effluent regulatory statutes and standards.

Routine weekly survey(s) for transferable contamination showed no significant change in the level of contamination of the Sonodyne work area, which is in, and considered to be, a radiologically restricted area.

If additional or more detailed information is required, or to address any questions or comments, please direct them to the undersigned. I can also be reached at my office extension (508)369-5410 ext. 348.

Sincerely,

Eric B. Andersen
Senior Health Physicist,
NMI Health & Safety

Note: A reactive inspection by NRC Region I on February 27th and 28th, was conducted (by Ms. Marie Miller, accompanied by a representative of Mass. Department of Public Health, Radiation Control Program), and a follow-up PN was issued, no. PN1-96-11A.

enclosures:

NMI internal office memorandum from George Shinopulos,(Manager, Facilities), to distribution, dated 29 February 1996, entitled: "REPORT OF FINDING: SONODYNE VENT FIRE, February 21, 1996".

NMI internal memorandum from David Schlier (Engineer, Facilities) to Eric Andersen (Health & Safety) entitled: "Potential Uranium involved in Vent Fire, 2/21/96".

NMI letter to NRC Operations Center dated 15 March 1996 (untitled), including an NMI interoffice memorandum from George Shinopulos to Frank Vumbaco entitled "REPORT OF DEFECT; Sonodyne Thermocouple", dated 14 March 1996. (This letter was previously transmitted in fulfillment of 10CFR21.21 defect notification requirements.)

cc: F. J. Vumbaco, V.P., Health & Safety
A. Carpenito, Manager, Health & Safety

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