UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION III
2443 WARRENVILLE ROAD, SUITE 210
LISLE, ILLINOIS 60532-4352

March 7, 2019

EN 53844 / NMED 190042 (Closed)
EN 53582 / NMED 180421 (Closed)

Mr. Dean Wegleitner
Area Manager - Safety
Tilden Mining Company, L.C.
P.O. Box 2000
Ishpeming, MI 49849

SUBJECT: NRC REACTIVE INSPECTION REPORT NO. 99990003/2019001(DNMS)
TILDEN MINING COMPANY, L.C.

Dear Mr. Wegleitner:

On January 30 and 31, 2019, an inspector from the U.S. Nuclear Regulatory Commission (NRC) conducted a reactive inspection at the Tilden Mine in Marquette County, Michigan. The purpose of the inspection was to review the circumstances, root and contributing causes, and corrective actions for an incident involving the removal of a generally licensed fixed nuclear gauge from service by contract maintenance staff, reported to the NRC on January 24, 2019. Mr. Ryan Craffey of my staff conducted a final exit meeting by telephone with Mr. Lawrence Gray of your staff on February 14, 2019, to discuss the inspection findings. This letter presents the results of the inspection.

During this inspection, the NRC staff examined activities conducted under the terms of the general license granted in Title 10 of the *Code of Federal Regulations* (CFR) Part 31.5 as they related to public health and safety. Within these areas, the inspection consisted of selected examination of procedures and representative records, observations of activities, and interviews with personnel.

Based on the results of this inspection, the NRC has determined that one violation of NRC requirements occurred. The violation concerned the failure to remove a generally licensed fixed gauging device in accordance with the instructions provided by the manufacturer, as required by 10 CFR 31.5(c)(3)(i).

The violation was evaluated in accordance with the NRC Enforcement Policy, which can be found on the NRC's website at http://www.nrc.gov/about-nrc/regulatory/enforcement/enforce-pol.html. The agency determined that the violation met the criteria from Section 2.3.2.b of the Policy to be considered a Noncited Violation (NCV), because: (1) your staff identified the violation and its apparent root cause; (2) your staff corrected the violation in a reasonable period of time; and (3) the violation was not considered to be repetitive or willful. Therefore, as a credit to your radiation safety program in identifying and correcting issues in a timely fashion, the NRC will not issue a Notice of Violation on this matter.

The inspector agreed with your staff's assessment that the root cause of the violation was the lack of awareness that the equipment removed from service was a fixed nuclear gauge. As corrective actions, by the time of the onsite inspection, your staff had already performed a root cause determination and exposure assessment of the incident, installed additional signage on the device in question, checked all other density scales in the balling mill for proper signage, and sent a safety notice to all mine staff summarizing the incident with pictures and relevant procedures for source holder removal and reinstallation. Following the inspection, your staff also developed plans to revise work order templates and to install additional equipment so that all density scales in the balling mill would be locked out during major outages to provide additional visual indication that source holders are not to be removed from service unless specifically authorized.

The NRC has concluded that information regarding the reason for the violation, the corrective actions taken and planned to correct the violation and prevent recurrence, and the date when full compliance was or will be achieved is already adequately addressed on the docket in this letter. Therefore, you are not required to respond to this letter unless the description herein does not accurately reflect your corrective actions or your position. In that case, or if you contest the violation of significance of this NCV, you should provide a response within 30 days of the date of this letter, with the basis for your denial, to the U.S. Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington, DC 20555-0001 with copies to: (1) the Regional Administrator, Region III; and (2) the Director, Office of Enforcement.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice," a copy of this letter, its enclosure, and any response you provide will be made available electronically for public inspection in the NRC's Public Document Room or from the NRC's Agencywide Documents Access and Management System (ADAMS), accessible from the NRC's website at http://www.nrc.gov/reading-rm/adams.html. To the extent possible, any response should not include any personal privacy, proprietary, or security-related information so that it can be made publicly available without redaction.

Please feel free to contact Mr. Craffey if you have any questions regarding this inspection. Mr. Craffey can be reached at 630-829-9655.

Sincerely,

/RA/

Aaron T. McCraw, Chief
Materials Inspection Branch
Division of Nuclear Materials Safety

Docket No. 999-90003
General License per 10 CFR 31.5

Enclosure:
IR 99990003/2019001(DNMS)

cc w/encl: Lawrence Gray,
Radiation Safety Officer
State of Michigan

Letter to Mr. Dean Wegleitner from Aaron McCraw, dated March 7, 2019.

SUBJECT: NRC REACTIVE INSPECTION REPORT NO. 99990003/2019001(DNMS)
TILDEN MINING COMPANY, L.C.

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U.S. Nuclear Regulatory Commission
Region III

Docket No.	999-90003
License No.	General License per 10 CFR 31.5
Report No.	99990003/2019001(DNMS)
EN No. / NMED No.	53844 / 190042 (Closed) 53582 / 180421 (Closed)
Licensee:	Tilden Mining Company, L.C.
Facility:	Tilden Mine Marquette County, Michigan
Inspection Dates:	January 30 and 31, 2019
Exit Meeting Date:	February 14, 2019
Inspector:	Ryan Craffey, Health Physicist
Approved By:	Aaron T. McCraw, Chief Materials Inspection Branch Division of Nuclear Materials Safety

Enclosure

EXECUTIVE SUMMARY

Tilden Mining Company, L.C.
NRC Inspection Report 99990003/2019001(DNMS)

This was an announced reactive inspection, conducted on January 30 and 31, 2019, to review the circumstances surrounding an incident at the Tilden Mine in Marquette County, Michigan, involving the removal of a generally licensed fixed nuclear gauge from service by contract maintenance staff. The incident was reported by Tilden Mining Company, L.C. to the U.S. Nuclear Regulatory Commission (NRC) on January 24, 2019.

As a result of the inspection, the NRC noted one violation of Title 10 of the *Code of Federal Regulations* 31.5(c)(3)(i) for the failure to remove a generally licensed fixed gauging device in accordance with the instructions provided by the manufacturer. The agency determined that the violation met the criteria from Section 2.3.2.b of the NRC's Enforcement Policy to be considered a Noncited Violation.

The circumstances surrounding this incident, as well as a discussion of root causes, contributing factors, and the licensee's corrective actions, are discussed in more detail in the following report.

Report Details

1 Program Overview and Inspection History

Tilden Mining Company, L.C. (the licensee) was authorized under NRC Materials License No. 21-26748-01 to use fixed gauging devices and materials analyzers containing radioactive material at the Tilden Mine in Marquette County, Michigan. The licensee possessed additional fixed gauging devices under the terms of a general license granted by Title 10 of the *Code of Federal Regulations* (CFR) Part 31.5.

The NRC last conducted an inspection of the licensee on August 22, 2018. One Severity Level IV violation of 10 CFR 30.50(b)(2) was identified during this routine inspection for failure to notify the NRC of a reportable event within 24 hours of discovery.

2 Sequence of Events and Licensee Response

2.1 Inspection Scope

The inspector toured the mine's pellet plant, where the incident occurred; interviewed licensee and contract maintenance staff; and reviewed a selection of records to obtain a detailed understanding of the circumstances surrounding the incident and to evaluate the licensee's response.

2.2 Observations and Findings

A. Sequence of Events Leading up to the Incident

On or around January 13, 2019, the licensee began a scheduled three-week maintenance outage at the mine. As part of this outage, the licensee hired a mechanical contractor, Industrial Maintenance Services, Inc. (IMS), based in Escanaba, Michigan, to perform work on conveyor belts in the mine's pellet plant. One IMS employee and his supervisor were primarily responsible for this work. The former had approximately four years of outage experience at the mine, along with prior nuclear power plant experience; the latter had around twelve years of outage experience at the mine. Both were generally aware of the presence of fixed nuclear gauges on the premises, and understood that these devices should only be handled by trained mine staff. Neither had received any specific training in fixed gauge use or maintenance from their employer or from the mine, as none was necessary given their expected duties.

On the evening of January 18, 2019, IMS staff began their assigned work on conveyor 23 of balling line 10 (i.e. conveyor 23-10), which included refurbishing the head pulley and replacing the belt. Following the work order for pulley maintenance, they removed the head pulley and slid it onto the belt of conveyor 24-10, which was perpendicular to and directly below conveyor 23-10. With the pulley removed, the staff attempted to then replace the belt, but soon realized that the head pulley would interfere with this task. The work order for belt replacement did not provide any specific guidance on the matter, so the staff decided to slide the head pulley further up the belt of conveyor 24-10 to make room for the new belt.

Before doing so, the contractor's staff noticed that the pulley might make contact with a piece of equipment mounted further up conveyor 24-10. As a precautionary measure, the staff unbolted the square frame on which this equipment was installed, and placed it upside-down on an adjacent platform, directly underneath conveyor 21-10 which

ran parallel to 24-10. The staff did not realize at the time that this equipment was a Ronan Engineering Company RLL-1 source holder containing approximately 0.45 millicuries of cesium-137. The staff were familiar with signage that would have indicated the presence of radioactive material, but did not recall seeing any from their vantage point while working on conveyor 23-10.

The licensee later identified that the removal from service of the RLL-1 source holder was contrary to the manufacturer's instructions and represented a violation of NRC requirements, as described in Section 3.2.A of this report.

B. Licensee's Response to the Incident

Around 1:00 am on January 21, an electrical repairman for the mine received a work order to perform calibrations on the balling lines' conveyor density scales, which consisted of Ronan RLL-1 source holders mounted above each monitored conveyor with accompanying detectors mounted directly below, underneath the belt. The repairman noted unusual readings on the scale for conveyor 24-10, and entered the plant to investigate.

The repairman approached conveyor 24-10 from the end opposite of conveyor 23-10. He could see a "Caution Radioactive Materials" sign posted on a platform directly above where the density scale for conveyor 24-10 had been installed; however, he did not see the source holder or its frame, as it was obscured from his vantage point by the conveyor itself. Assuming that the source holder had been removed by mine staff and placed in secure storage, the repairman left the area without completing the work order.

In the early hours of January 22, the repairman attempted again to complete the work order for density scale calibration, but after returning to the plant and finding that the source holder was still not present, he left without completing the work order for a second time.

In the afternoon of January 23, the repairman contacted the mine's electrical supervisor and inquired about the status of work on the density scales, as it was impeding his completion of the calibration work order. The supervisor was not aware of any other work on the scales, so both returned to the plant to investigate. Finding no source holders in secure storage, the two walked down conveyor 24-10, and discovered the RLL-1 source holder lying under conveyor 21-10 at approximately 3:00 pm.

The repairman immediately removed the shipping cover (a lead bar affixed to a mounting plate) from the back of the source holder and installed it on the holder's beam port, which was pointing towards the ceiling at the time of discovery. The supervisor contacted another electrical repairman to request a survey meter and locking chain. The second repairman responded to the area, conducted surveys to confirm that the beam was successfully shielded, and assisted the other two mine staff in moving the source holder and securing it with the locking chain to a beam supporting conveyor 21-10. The supervisor then noticed the IMS staff still working on conveyor 23-10, discussed the situation with them, and reiterated the licensee's expectations regarding the handling of fixed nuclear gauges.

The electrical supervisor then contacted the mine's Radiation Safety Officer (RSO) to report the incident and discuss next steps. The RSO developed and approved one work order for removal of the gauge to permit its continued storage under conveyor 21-10, as well as a second work order for its reinstallation upon completion of the conveyor work. On January 28, two electrical repairmen reinstalled the source holder in accordance with the work order, which included surveys in the vicinity to confirm the proper alignment of the device, and the installation of a "Caution Radioactive Materials" sign directly onto the source holder's mounting frame.

Shortly after the incident, the RSO interviewed the contractor and mine staff involved to determine the root cause and to estimate radiation exposure to affected individuals. The RSO also prepared a safety notice, summarizing the incident with pictures and relevant procedures for source holder removal and reinstallation, and forwarded it to all mine staff for review. The RSO developed and approved a work order to check all other density scales for proper signage, with particular attention to signs on source holder mounting frames. This work order had been completed by the time of the onsite inspection.

Following the inspection, the licensee developed additional plans to revise work order templates and install additional equipment (a lockout box with chains and locks) in the pellet plant so that all density scales in the balling mill would be locked out during major outages to provide additional visual indication that source holders are not to be removed from service unless specifically authorized.

2.3 Conclusions

The inspector identified no concerns with the licensee's response to this incident.

3 Licensee Assessment and Reporting

3.1 Inspection Scope

The inspector discussed the licensee's assessment with the RSO and reviewed notifications provided by the licensee to evaluate the licensee's findings and compliance with reporting requirements.

3.2 Observations and Findings

A. Licensee's Assessment

The licensee determined that the root cause of the incident was the lack of awareness that the equipment removed from service was a fixed nuclear gauge, due to the absence of any posting visible to IMS staff working on conveyor 23-10. The RSO confirmed that the area was posted at the time with multiple "Caution Radioactive Material" signs, however none of them appeared to be visible from the direction of conveyor 23-10.

The licensee determined from radiation measurements, an evaluation of work performed in the vicinity of conveyor 23-10, and worst-case exposure calculations that there were no exposures in excess of regulatory limits during or subsequent to the removal of the source holder from service.

However, the licensee did determine that its procedures for source holder removal had not been properly followed. Specifically, the licensee permitted only trained mine staff to perform such work, and required that the shutter (or in this case, shipping cover) of any source holder be installed prior to removal, to minimize the potential for exposure.

Title 10 CFR 31.5(c)(3)(i) states in part that any person who acquires, receives, possesses, uses or transfers byproduct material in a device pursuant to the general license in paragraph (a) of this section shall assure that the tests required by paragraph (c)(2) of this section and other testing, installation, servicing, and removal from installation involving the radioactive materials, its shielding or containment, are performed in accordance with the instructions provided by the labels.

The label for a Ronan Engineering Company RLL-1 source holder, possessed by Tilden Mining Company pursuant to the general license in 10 CFR 31.5(a), states in part that "the operation manual for this device contains the specific instructions for installation, relocation, disposal and loss or theft reporting instructions."

The Basic Radiation Safety Manual provided by Ronan for generally licensed RLL-1 source holders states on Page 2 that "the combination of high structural integrity and low source quantity permits the general licensee to install and commission the device without special training or certification." However, the manual does require on Page 15 that "if [the] source holder is removed for any reason, make sure the shipping cover is reattached to the source holder face plate so that it covers the radiation port."

Contrary to the above, on or around January 18, 2019, Tilden Mining Company failed to ensure that the removal of a generally licensed RLL-1 source holder was performed in accordance with the instructions provided by the manufacturer. Specifically, a contractor working for the licensee removed an RLL-1 source holder from conveyor 24-10 without first ensuring that the shipping cover was reattached to the source holder face plate, as required by the device's operating manual.

This represents a Severity Level IV violation of 10 CFR 31.5(c)(3)(i), in accordance with NRC Enforcement Policy example 6.3.D.3. However, because (1) the licensee identified the violation and its apparent root cause, as described previously in this Section; (2) corrected the violation in a reasonable period of time and took additional corrective actions to address the potential for recurrence, as described in Section 2.2 of this report; and (3) the violation was determined not to be repetitive or willful, the violation met the criteria in Section 2.3.2.B of the Enforcement Policy to be considered a Noncited Violation (NCV).

B. Notifications and Reporting

The licensee discovered that the gauge had been removed from service at approximately 3:00 pm on January 23, 2019. The licensee's RSO contacted the NRC's Headquarters Operations Center at 11:14 am on January 24, 2019 to report the incident. The notification resulted in Event Number (EN) 53844, reported under 10 CFR 30.50(b)(2) as an event in which equipment is disabled or fails to function as designed when the equipment is required by regulation or license condition to prevent exposures to radiation and radioactive materials exceeding regulatory limits, and was recorded in the Nuclear Materials Events Database (NMED) under item number 190042.

On February 18, 2019, the licensee contacted the NRC to retract the event, after determining in discussion with NRC staff that it did not actually meet the criteria to be considered reportable under 10 CFR 30.50(b)(2) or any other NRC reporting requirement. The licensee therefore did not submit a written report on the matter.

3.3 Conclusions

The inspector determined that a violation of 10 CFR 31.5(c)(3)(i) occurred for failure to remove a generally licensed fixed gauging device in accordance with the instructions provided by the manufacturer. This violation met the criteria in the NRC's Enforcement Policy to be considered an NCV.

4 NRC Assessment of the Incident

4.1 Inspection Scope

The inspector toured the toured the licensee's balling mill, where the incident occurred, interviewed licensee and contract maintenance staff, reviewed a selection of records, and conducted independent radiation surveys and dose assessments to evaluate the circumstances and consequences of the event and licensee's response.

4.2 Observations and Findings

A. Root Cause and Contributing Factors

The inspector agreed with the licensee's determination that the contract maintenance staff's failure to reinstall the shipping cover prior to removal of the RLL-1 source holder did not meet the criteria to be considered reportable under 10 CFR 30.50(b)(2) or any other NRC reporting requirement.

The inspector also agreed with the licensee's determination of apparent root cause, and noted an additional contributing factor, in that the work orders used by IMS staff made no mention of the presence of fixed nuclear gauges on any of the balling mill conveyors.

B. Independent Assessment of Radiation Exposure

Using a Canberra UltraRadiac energy compensated Geiger-Muller survey meter, the inspector conducted independent and confirmatory surveys of the RLL-1 gauge which had since been reinstalled on conveyor 24-10. The inspector noted maximum readings at the beam port of around 3 mrem/hr, and readings around the source holder's frame of 0.2 mR/hr. These values were consistent with the licensee's measurements and with the radiation profiles provided by the manufacturer in the applicable Sealed Source and Device Registry (SSDR) Safety Evaluation (KY-576-D-113-B) when considering the lower actual activity of the source (0.45 mCi vs. 0.9 mCi used by the manufacturer in its measurements).

Based on these readings, and based on estimated exposure times obtained from interviews with IMS staff, the inspector estimated that the staff likely received no more than 0.1 millirem of exposure during their removal of the source holder. Based on additional interviews of mine staff, the inspector identified no additional occupancy of areas around or above the source holder following its removal from conveyor 24-10. Therefore, the inspector concluded that additional inadvertent exposures to radiation from this incident were unlikely.

C. Assessment of Radiation Safety Practices

The inspector noted that the licensee promptly and adequately mitigated the radiation safety hazard created by the unshielded source holder upon discovery, and performed a timely and adequate root cause determination and radiation exposure assessment.

The inspector also noted that the licensee maintains all generally licensed Ronan RLL-1 devices in the same manner as for specifically licensed devices. As such, the licensee performs routine maintenance, such as inventories, shutter checks, and posting evaluations every six months, regardless of whether explicitly required by regulations. In addition, the licensee performs non-routine maintenance, such installation and removal from service, in accordance with established procedures which, having been developed for its specifically licensed devices, were more restrictive than the manufacturer's instructions discussed previously in Section 3.2.A of this report.

4.3 Conclusions

The inspector identified no additional concerns from the independent assessment of this incident.

5 Review of Previously Reported Incidents

5.1 Inspection Scope

The inspector toured other areas of the pellet plant, interviewed licensee staff, and reviewed additional records to follow up on a previous incident reported by the licensee which also involved a Ronan RLL-1 source holder.

5.2 Observations and Findings

A. Background

On August 12, 2017, during a semiannual shutter check, a mine technician identified the buildup of iron fines on the face of an RLL-1 source holder installed on the T1 chunk tunnel. The technician determined that the buildup would have prevented the installation of the shipping cover, and therefore determined it to be inoperable. In response, the licensee initiated a work order to address the issue. The device was cleaned during a subsequent outage on September 13, 2017.

Following the routine NRC inspection on August 22, 2018, the licensee conservatively reported this incident to the NRC's Headquarters Operations Center, where it was logged as EN 53582 as reportable under 10 CFR 30.50(b)(2), and was recorded in NMED under item number 180421. On September 28, 2018, the licensee provided a written report of the incident.

However, prior to the issuance of the report for the August 2018 inspection (IR 03034221/2018001(DNMS)) the NRC concluded that shutter checks were not required for this device per the SSDR Safety Evaluation, and therefore this incident was not required to be reported. The event was closed on February 5, 2019 upon issuance of the aforementioned report.

B. Observations

The inspector visited the T1 chunk tunnel, where the source holder was located. The inspector conducted independent surveys in the vicinity of the device and found no readings in accessible areas distinguishable from background. The inspector noted the presence of significant amounts of iron fines and pellets as the consequence of normal operations, and discussed with the licensee its continued oversight of the condition of this gauge. The RSO stated that should buildup be identified in the future, he has directed staff to simply clean the gauge of any fines or pellets on the spot. The inspector reviewed documentation for routine maintenance performed on this and other gauges in the area since the incident occurred, with no further operational issues noted.

5.3 Conclusions

The inspector identified no concerns with the licensee's response to the incident. This event remains closed.

6 Exit Meeting Summary

The inspector presented preliminary inspection findings to the licensee on January 31, 2019, at the conclusion of the onsite inspection. The licensee did not identify any documents or processes reviewed by the inspectors as proprietary, and acknowledged the findings presented. The inspector conducted a final exit meeting with the licensee by telephone on February 14, 2019.

LIST OF PERSONNEL CONTACTED

Adam Bradshaw, IMS Supervisor
#^ Lawrence Gray, Radiation Safety Officer
Don Johnson, Electrical Repairman
Jeff Kyllonen, Electrical Repairman
Gary Meyers, Electrical Repairman
Dylan Sharkey, IMS Employee
Jordan Skytta, Electrical Supervisor
Dean Wegleitner, Area Manager – Safety

Attended preliminary exit meeting on January 31, 2019
^ Attended final exit meeting by telephone on February 14, 2019

INSPECTION PROCEDURES USED

87103: Materials Licensee Involved in an Incident or Bankruptcy Filing
87124: Fixed and Portable Gauge Programs

- END -