

February 1, 2022

**Via Electronic Submission and Federal Express**

Deputy Director  
Office of International Programs  
US Nuclear Regulatory Commission  
11555 Rockville Pike  
Rockville, Maryland 20852

Re: Voluntary Self-Disclosure of Apparent Violation (10 CFR Part 110);  
Indirect Export of Byproduct Material to Pakistan without a Specific License

To Whom It May Concern:

Nordson Corporation (“Nordson”) was founded in 1954 and is headquartered in Westlake, Ohio. Nordson manufactures and sells precision technology solutions, including precision fluid dispensing equipment and test and inspection equipment.

On November 1, 2021, Nordson completed the acquisition of NDC Technologies, Inc. (“NDC”), a provider of process measurement and control systems headquartered in Dayton, Ohio. NDC’s product lines include x-ray technology used for precise, non-contact measurement in manufacturing processes, including for the film, packaging and extrusion, energy storage, and cable and tubing industries.

The subject of this report is an NDC gamma backscatter gauge (the “Product”) that is used to precisely measure the thickness of films, coatings and similar substrates to support precise manufacturing and quality controls. This Product contains 0.00555 TBq of Americium-241 within a sealed source. A marketing circular for the Product is enclosed.

The potential violation took place in April 2021, six months before Nordson acquired ownership of NDC. Nordson engaged a prominent global law firm with experience in the nuclear regulatory industry to support Nordson in performing due diligence prior to the transaction. Following the acquisition, Nordson continued working with outside counsel to undertake additional due diligence, which ultimately identified the apparent violation.

As described below, the apparent violation by NDC was inadvertent. NDC has already conducted a root cause analysis and implemented corrective action to prevent future recurrence of this issue. Based on the nature of the product and the end customer, it does not appear that NDC’s failure to obtain a specific license impeded or influenced any regulatory action or otherwise resulted in a safety or security consequence.

NDC is submitting this voluntary self-disclosure of an apparent violation of 10 CFR § 110.5 because the general license that NDC believed in good faith to have authorized the transaction at the time of export was suspended and NDC did not obtain a specific license. NDC respectfully

*We request that the enclosed information be afforded confidential treatment pursuant to 31 CFR § 1.5 to protect from disclosure under the Freedom of Information Act, 5 U.S.C. § 552, et seq (FOIA).*

submits that, pursuant to the published NRC Enforcement Policy, no civil penalty is warranted for the violation.

## **1. Applicable Laws and Regulations**

Exports of Americium-241 are subject to the jurisdiction of the NRC, as described in 10 CFR § 110.23 and Appendix L and Appendix P to 10 CFR 110. Americium-241 is generally authorized for export to most countries pursuant to a General License (“GL”) set forth in 10 CFR § 110.23, subject to certain quantity requirements and destination restrictions found in 10 CFR §§ 110.23, 110.28, and 110.29. There are six Embargoed Destinations identified in 10 CFR § 110.28 – Cuba, Iran, Iraq, North Korea, Sudan and Syria – that are ineligible for any exports under the GL. There are ten countries identified in 10 CFR § 110.29 – including Pakistan – that are ineligible for exports under the GL in quantities exceeding the limits set forth in 10 CFR § 110.23(a)(5). The quantity of Americium-241 in the NDC product was below the limit set forth in 10 CFR § 110.23(a)(5) and therefore the Restricted Destination list in 10 CFR § 110.29 did not apply to this transaction.

On April 21, 2020, the NRC suspended the 10 CFR § 110.23 GL for all shipments of Americium-241 to Pakistan via an announcement published in the Federal Register at 85 Fed. Reg. 22181. Importantly, as of the date of this submission, the list of Embargoed Destinations in 10 CFR § 110.28 was not changed and therefore Pakistan is still not currently included in the 10 CFR 110 regulatory list of Embargoed Destinations, even though the GL was suspended by Federal Register announcement. As discussed below, this regulatory disconnect was related to the root cause of the apparent violation in NDC’s case.

## **2. Potential Violation**

On April 16, 2021, NDC shipped one Product containing 0.00555 TBq of Americium-241 to a customer in Switzerland (the “OEM Customer”). The OEM Customer integrated the NDC Product into a larger manufacturing line that was delivered by the OEM Customer to an end customer in Karachi, Pakistan (the “End Customer”).

The End Customer in Pakistan manufactures plastic films and plastic packaging for food and beverage, home care products, cosmetics and agricultural industries. This product application is consistent with NDC’s target market for the Product and no red flags or suspicious activity were identified during the course of the transaction. The NDC Product is designed to precisely measure the thickness of a particular substrate – in this case, the thickness of plastic film and plastic packaging – to ensure proper manufacturing controls, quality controls and calibration.<sup>1</sup> The End Customer has a prominent online presence consistent with commercial/civilian activities. The End Customer was screened against applicable export control lists at the time of the transaction, which revealed no matches or concerns.

The name and address for the End Customer was included in the purchase order submitted to NDC by the OEM Customer, and therefore NDC acknowledges being on notice that the OEM Customer

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<sup>1</sup> Additional information on the target market and common application is available here: <https://www.ndc.com/film-extrusion-converting/products/beta-and-gamma-gauges/gamma-backscatter-gauges/>

intended to ultimately re-export the Product to the End Customer in Pakistan. However, NDC was unaware at the time of shipment that general license authority had been suspended for shipments to Pakistan pursuant to 85 Fed. Reg. 22181.

At the time of order acceptance and again prior to shipment, consistent with its internal regulatory screening process controls, NDC reviewed both the OEM Customer and End Customer names and addresses against applicable export control lists and against the list of Embargoed Destinations under 10 CFR § 110.28. Having identified no matches or prohibitions, NDC accepted and fulfilled the order.

The quantity and use of the Americium-241 was within the scope of the general license contained in 10 CFR § 110.23, but below the quantity that would implicate 10 CFR § 110.23(a)(5) or the list of Restricted Destinations in 10 CFR § 110.29. NDC's regulatory screening process correctly identified that Pakistan was not an Embargoed Destination pursuant to 10 CFR § 110.28 but failed to identify the suspension contained in 85 Fed. Reg. 22181.

### **3. Root Cause Analysis**

NDC designated specific persons to screen all sales of NDC products that contain byproduct material for compliance with 10 CFR Part 110 in accordance with written internal regulatory screening process controls. NDC's policy specifically instructed responsible personnel to review the underlying NRC regulations in 10 CFR Part 110, including 10 CFR § 110.28, believing that the underlying regulations would be the most reliable source of current information as to restrictions and limitations in the nuclear export process. However, the suspension of the 10 CFR § 110.23 GL for exports destined to Pakistan is not reflected in the 10 CFR 110 NRC regulations. The suspension was announced via a Federal Register notice, which was not within the scope of NDC's compliance review procedure.

### **4. Corrective Actions**

During the course of post-acquisition due diligence, in coordination with Nordson internal legal and trade compliance personnel and guidance from outside counsel, NDC became aware of the GL suspension to Pakistan. NDC conducted a historical lookback to the GL suspension effective date and identified a single shipment, which is the subject of this disclosure. There were no other apparent violations identified.

NDC has taken the following remedial steps to prevent a potential violation from taking place in the future:

- Self-identified and is promptly self-disclosing the potential violation as part of its post-acquisition compliance review.

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- Updating its internal regulatory screening process controls to add a requirement to check the NRC import-export website<sup>2</sup> for export restrictions, in addition to continued review of 10 CFR §§ 110.28 and 110.29.
- Responsible personnel have been specifically notified of this incident and the updated procedures.
- NDC and Nordson responsible personnel subscribed to an NRC email update list for Federal Register Notices Affecting Title 10 of the Code of Federal Regulations.<sup>3</sup>

## **5. No Penalty is Warranted**

Pursuant to the factors and principles set forth in the NRC Enforcement Policy, and consistent with the NRC's stated purpose to encourage prompt identification and prompt comprehensive correction of violations of NRC requirements, Nordson respectfully submits that no civil penalty is warranted for the violation.

- First, the apparent violation was non-willful;
- Second, NDC promptly initiated corrective action to prevent a recurrence;
- Third, neither Nordson nor NDC has had any violation during the preceding two years;
- Fourth, the apparent violation was self-identified by NDC and is being voluntarily self-reported with the participation and support of Nordson's and NDC's management;
- Fifth, the apparent violation occurred in April 2021, approximately 6 months prior to Nordson's acquisition of NDC. Nordson did not own or control NDC at the time of the apparent violation;
- Sixth, the apparent violation was identified during the course of proactive, post-acquisition due diligence conducted by Nordson. While not specifically addressed in the NRC Enforcement Policy, the identification and self-reporting of a compliance violation promptly after the closing of an acquisition is generally recognized by DOJ and other federal agency guidance as a mitigating factor indicative of an overall effective compliance program;
- Seventh, the apparent violation does not appear to present any actual or potential safety or security consequences or to have affected the ability of the NRC to perform its regulatory oversight function. In light of the nature of the NDC product and end-use application, it appears this transaction would have been a strong candidate for a specific license had an application been submitted.

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<sup>2</sup> <https://www.nrc.gov/about-nrc/ip/export-import.html>

<sup>3</sup> <https://service.govdelivery.com/accounts/USNRC/subscriber/topics>

Notwithstanding these mitigating factors, Nordson and NDC recognize the potential seriousness of any violation of NRC rules and regulations and remain committed to full compliance.

If you have any questions regarding this self-disclosure, please contact either of the undersigned or our colleague, Zach Robock, Corporate Attorney ([zachary.robock@nordson.com](mailto:zachary.robock@nordson.com)).

Sincerely,

*Jennifer L. McDonough*

Jennifer L. McDonough  
Executive Vice President,  
Secretary and General Counsel  
Nordson Corporation

*Martin Nyman*

Martin Nyman  
President  
NDC Technologies, Inc.

Enclosure: NDC Gamma Backscatter Sensor Product Information Sheet

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# GAMMA BACKSCATTER SENSORS

## Model 100

Fixed Point or Scanning Measurement of Thickness or Basis Weight

### Applications:

- ▶ Blown film
- ▶ Cast film and sheet
- ▶ Rubber and vinyl
- ▶ Coatings and laminates
- ▶ Textiles and nonwovens
- ▶ Composites

### Features:

- ▶ Compact measurement form factor
- ▶ Single-sided measurement
- ▶ Continuous measurement without the need for standardization
- ▶ Stable, accurate product measurement against either air or a steel roll
- ▶ 100% digital measurement technology



### Introduction

The NDC Backscatter Gamma sensor (GBS) is an integrated source and detector instrument that provides a thickness or weight measurement from one side of the sheet. Its compact size allows product measurements to be taken from areas of the process that are often inaccessible to conventional sensors. It can also be configured to either measure in fixed point or to scan the web.

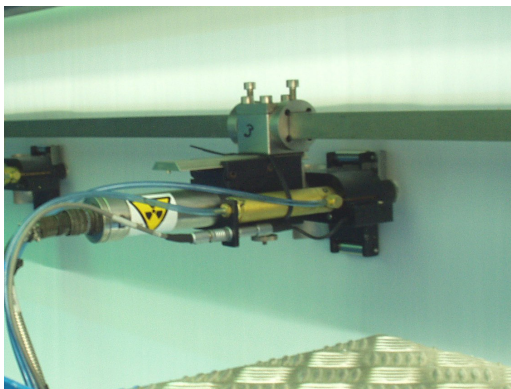
Compared to other gauging techniques, the GBS sensor offers a robust, cost-effective measurement solution that is reliable, accurate and easy to maintain.

### Theory of Operation

This unique sensor employs the Compton Photon Backscatter measurement principle known as gamma backscatter, or GBS. When gamma rays of photons are directed at a

material, many of the photons are scattered back, losing some of their energy in the process.

These backscattered photons strike a 100% efficient scintillator detector that produces flashes of visible light. These light flashes enter the photomultiplier tube where they are converted into electrons and amplified. The output from the photomultiplier tube is a train of pulses whose height is proportional to the energy of the detected gamma photons, and whose pulse rate (pulses per second) are proportional to the mass (or weight per unit area) of the material being measured.



# Technical Specifications

					
<b>EPP</b> 102, 103	<b>AFRA w. Deflector</b> 101, 102, 103	<b>Auto Shutter</b> 101, 102, 103	<b>PECA</b> 101, 102, 103	<b>PECA w. Deflector</b> 101, 102, 103	<b>Shoe</b> 101, 102, 103

## Gamma Backscatter Sensor Product Overview

**EPP:** Extended Plateau Probe for non-contacting applications.

**AFRA:** Anti-Friction Roller Assembly: Roller Head Assembly to minimize chance of scratching or marking the web.

**Auto Shutter:** Includes an integral automated shutter assembly as required by certain local authorities.

**PECA:** Position End Cap Assembly for positive measurement contact. Frequently used for blown film applications.

**Shoe:** Used when a large surface area is required for an application, for example nonwovens.

## Linear Calibration

The GBS sensor is inherently easy to setup and calibrate, making it a valuable sensor especially when it is installed in difficult process locations. The linear response of the sensor makes it very easy to calibrate. Often, a single response curve is all that is required, with a straightforward offset or slope adjustment in order to fine tune the measurement to the product.

## Long-Term Accuracy

Unlike other types of gauges, the GBS sensor is not affected by air gap temperature changes. Also, the sensor provides continuous measurement, either in fixed-point or scanning modes without the need to standardize. In addition, the GBS sensor family are relatively insensitive to factors that affect other gauges such as source decay, dust, material composition and scanner alignment. This results in exceptionally stable measurement with long-term accuracy that requires very little maintenance.

## Specifications

### Measurement Ranges

Model	Weight Range	Thickness Range
103	25* - 2000g/m <sup>2</sup>	25* - 2000μ (1-80mils)
102	1500* - 8510g/m <sup>2</sup>	1500* - 8510μ (60-335mils)
102 Steel	1500* - 6350g/m <sup>2</sup>	1500* - 6350μ (60-250mils)
101	6350* - 26000g/m <sup>2</sup>	6350* - 26000μ (250-1025mils)

\*GBS sensors are commonly used very successfully on products that are significantly below the minimum values listed in the table above. Please contact NDC with your requirements for evaluation.

### Static Accuracy:

- Model 103: ± 1.0g/m<sup>2</sup> + 0.2% of reading
- Model 102: ± 2.5g/m<sup>2</sup> + 0.2% of reading
- Model 101: ± 5.25g/m<sup>2</sup> + 0.5% of reading

**Measurement Response Time:** 50ms

**Maximum Temperature:** 122°F (50°C) without water cooling

### Source Characteristics:

- Am-241: activity between 25-150mCi (0.93-5.55GBq)
- Energy: 60keV
- Half life: 455 years
- Recommended Working Life (RWL): 15yrs

**Measurement Area:** Approximately 0.50ins (12.5mm) for all gauges except EPP which is 1.1ins (28mm)

### Options:

- Air purge for hazardous environments
- Automatic, remote activated shutter
- Water cooling for high temperature environment
- Off-roll measurement
- Extended plateau non-contact version

NDC Technologies is represented in over 60 countries worldwide. [www.ndc.com](http://www.ndc.com)

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