UNITED STATES
NUCLEAR REGULATORY COMMISSION
OFFICE OF NUCLEAR REACTOR REGULATION
WASHINGTON, D.C. 20555

May 9, 1991

NRC INFORMATION NOTICE NO. 91-31: NONCONFORMING MAGNAFLUX MAGNETIC PARTICLE (14AM) PREPARED BATH

Addressees:

All holders of operating licenses or construction permits for nuclear power reactors.

Purpose:

This information notice is intended to alert addressees of a product recall notice issued by the Magnaflux division of Illinois Tool Works Inc. (Magnaflux), regarding their aerosol cans of fluorescent magnetic particle prepared bath (14AM Magnaglo) (Attachment 1). The recall notice has been transmitted by Magnaflux through its distribution channels; however, all commercial nuclear and industrial end-users may not receive this information. It is expected that recipients will review the information for applicability to their facilities and consider actions, as appropriate, to avoid similar problems. However, suggestions contained in this information notice do not constitute NRC requirements; therefore, no specific action or written response is required.

Description of Circumstances:

While under contract by Consumers Power Company, MQS Inspection, Inc. (MQS), tested some aerosol cans of Magnaflux 14AM Magnaglo in accordance with the American Society for Mechanical Engineers Boiler and Pressure Vessel Code (ASME Code), Article 25, Standard SE-709, 1986 edition. MQS found the particle concentration levels of batches 90F12P and 90H01K to be out of compliance with this ASME standard. Subsequently, nondestructive testing personnel of Consumers Power Company performed a particle concentration check on batch 90F12P and confirmed the conclusion of MQS.

MQS notified Magnaflux of the deviation on February 11, 1991. On the basis of this information, Magnaflux initiated an investigation on the particle concentration levels of Magnaflux 14AM Magnaglo and, as part of its corrective actions, issued the attached recall notice. Additional information on the Magnaflux recall may be obtained by calling Magnaflux Customer Service at (708) 867-8000.

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This information notice requires no specific action or written response. If you have any questions about the information in this notice, please contact one of the technical contacts listed below or the appropriate NRR project manager.

Charles E. Rossi, Director
Division of Operational Events Assessment
Office of Nuclear Reactor Regulation

Technical Contacts: Joseph J. Petrosino, NRR
(301) 492-0979

Nancy Campbell, NRR
(301) 492-0836

Attachments:
1. Magnaflux 14AM Aerosol Recall Notice
2. List of Recently Issued NRC Information Notices

MAGNAFLUX®

14AM AEROSOL RECALL NOTICE

Testing has revealed that particle concentration may be out of specification in some aerosol cans of 14AM in batches 90E01P, 90F12P, and 90H01K. Indications are that a very small percentage of cans were affected. However, in order to avoid any possibility of the affected cans being used in inspections, we are hereby recalling the three batches identified above.

Nature of the Deficiency
An intermittent problem occurred in the aerosol canning process. As a result, the particle concentration may be "light" (too few particles) in some cans, and "heavy" (too many particles) in others. This only affected a small number of cans in each batch. The vast majority of cans in these batches are of the proper concentration.

Bulk 14AM, 14A Powder, Carrier II Are Unaffected
These products are not affected. The problem relates only to the aerosol canning process and not to the materials themselves.

Corrective Action Has Been Taken
The source of the problem has been positively identified. Process changes have already been made to prevent any recurrence, and appropriate Quality Control checks are in place. The problem has been corrected in 14AM aerosol batches beginning with 91B03K. This material is in stock and available for immediate shipment.

Recall Procedures
1. Telephone MAGNAFLUX Customer Service to request a Returned Goods Authorization and shipping instructions -- (708) 867-8000.
   - Please identify the number of cans you wish to return, the batch number(s) and where purchased.
   - Inform MAGNAFLUX of any special circumstances, such as an urgent need for an interim supply, until the replacement shipment arrives. We will make every effort to accommodate everyone's needs.
2. Return material to MAGNAFLUX, De Witt Plant, freight collect.
3. Replacement material will be shipped to you directly, freight prepaid.

Other Aerosol Products
Only 14AM aerosol was affected.

Other Batches of 14AM
Because of a similarity in process, we are issuing a WARNING for batches 90A01K, 90E02P, 90E03P, 90K08K, 91A02P, and 91A03P. No evidence has been found that these batches are affected. Our investigation continues at this time, however, and in the event any evidence of further errors is found, you will be informed immediately. No other batches are affected.

Recognition of the Problem in the Field
It is likely that an experienced inspector may notice a defective can as being "light" in color or almost devoid of particles under black light. Similarly, other cans might exhibit an abnormally high amount of background. However, depending on field conditions and the type of parts being inspected, the error may not be obvious to the eye. The situation could be confirmed by discharging the contents into a container and using a centrifuge tube to test settling volume--just as for a normal particle bath.

MAGNAFLUX, A Division of Illinois Tool Works Inc.
7300 West Lawrence Avenue | Chicago, Illinois 60656 | Telephone: 708-867-8000 | Telex: 277858 MAGX UR | Fax: 708-867-6833

Final Report: 14AM Recall

I. Introduction

A small percentage of cans from recent batches of 14AM aerosol have been found to have a particle concentration outside MAGNAFLUX acceptance specifications. This report summarizes the investigation of the problem and outlines the corrective actions taken. The bulk material is manufactured at the MAGNAFLUX manufacturing facility in De Witt, Iowa and is canned by two contract fillers, IKI, of Edgerton, WI, and Plaze, Incorporated of St. Louis, MO.

MAGNAFLUX has recalled the following batches:

90E01P
90F12P
90H01K

II. Nature of the Problem

MAGNAFLUX was first notified of a possible problem on February 11, 1991, by Wilmer Blankenship of MQS Inspection, Inc., who contacted Mathew Plamoottil, Quality Control Manager, De Witt Manufacturing Plant.

Wilmer reported that testing of cans from two batches, 90F12P and 90H01K had produced the following results:

Table 1
MQS Data, Batches 90F12P & 90H01K

	MAGNAFLUX Control Limits	90F12P	90H01K
Particle Concentration (ml/100 ml bath)	.25-.40	.08 .09 1.50	1.03 1.02 3.00

III. Investigation

A. Testing of MAGNAFLUX Retain Samples

The retain samples of both of these batches were checked; all were within the control limits. Mr. Plamoottil requested that Mr. Blankenship return the suspect cans for confirmation.

B. Development of a Standard Test Method

A standard testing method was developed to eliminate variables from the testing procedure. For example, if not properly shaken throughout the expulsion, an artificially low reading would be attained. If, on the other hand, a can had been used for some time and had not been well shaken, and then tested, an artificially high reading would be attained.

Only new cans were tested (verified by inspection of the spray tip and weight). All material was evacuated from the can into a glass beaker, and the can was cut open to verify that no particles remained.

C. First Visit to IKI

Since MAGNAFLUX had a scheduled canning run of two totes of 14AM (5000 cans each), Mr. Plamoottil visited IKI on February 14. The run was completed with no breaks and assigned batch # 91B03K.

Samples were taken from ungassed cans from the line at the beginning, middle, and end of each tote (Table 2). Mr. Plamoottil provided written instruction to both canners to perform these tests on all suspended particle products until further notice (See attached document).

Soon after the batch was delivered to De Witt, a can was pulled from every pallet layer and tested for concentration (Table 3). Beginning with this batch, IKI stamped each can with a serialized number.

Table 2
Data Taken at IKI During Run of Batch #91K03K

		Particle Concentration (ml/100 ml bath)
Tote 1	Beginning	.30
	Middle	.27
	End	.30
Tote 2	Beginning	.30
	Middle	.30
	End	.30

Table 3
Batch #91B03K--Each Pallet Layer

Serial #	Particle Concentration (ml/100 ml bath)	Serial #	Particle Concentration (ml/100 ml bath)
493	.29	3022	.30
703	.28	3061	.30
933	.28	3384	.28
990	.29	3719	.25
1076	.28	4414	.31
1581	.30	4379	.31
1968	.30	4629	.30
2010	.30	4650	.30
2413	.29	4836	.30
2623	.30	5057	.29
2956	.30	5192	.30

D. MQS Visit to Chicago Lab

On Tuesday, February 26, Ron Faloon, Executive Vice President of MQS and Mr. Blankenship visited the Chicago office. We discussed what steps had been taken so far, and assured them of our commitment to uncover the cause of the problem and correct it. Cans from the two suspect batches were run, the results of which confirmed the results earlier obtained by Mr. Blankenship.

Assured that the most recent batch, 91B03K, was a good batch, Mr. Faloon indicated they would replace all returned material with this batch. We agreed that when the cause of the problem was determined and corrected, we would invite them to audit us at De Witt and at each canning facility.

E. Visit to Plaze

In order to determine the cause of the concentration inconsistency, one-tote runs were scheduled at each canning facility. Plaze was visited March 5 and 6, by myself, Mr. Plamoottil, and Cheri Zeleznik and Sei Song from the Chem Lab. The cause of the problem was traced to inadequate mixing of the filling material during line shut downs.

During filling, material is pumped from the bottom of the tote through a pipe and hose to a hopper. The filling is triggered by a level sensor in the hopper, and during normal operation occurs every 30-40 seconds. Between tote and filler nozzle, there is a total volume of 4 gallons, including the hopper (1-2 gallons).

Although material was being mixed constantly in the tote throughout the run, no mixer was present in the hopper. If the line were to shut down for an extended period of 30 minutes or more, particles would settle in the hopper and in the transfer plumbing, causing uneven particle distribution in the resulting cans. To confirm this, the line was shut down for 30 minutes with material in the lines and restarted without mixing. The resulting cans were out of specification.

F. Visit to IKI

IKI was visited March 14 by Mr. Fijalkowski and Ms. Zeleznik. Similar to Plaze, the plumbing between tote and filler nozzle is about 4 gallons. Although a mixer had always been used in the hopper, no special precautions had been taken during break periods to prevent particles from settling.

G. Conclusions

1. Scope of Problem

Any batch which might have been subject to a 30 minute break or more during its run might have as many as 80 cans per break affected. For two breaks in a 10,000 can run, this would amount to 1.5% of the total.

2. Other Products Affected

Only 14AM, 7CF, and 9CM have fast enough settling rates to have been affected. 7CF and 9CM, however, are canned from drums and are run continuously from start to finish without break.

3. Other Batches of 14AM

Records were requested from both canners on the number and duration of all breaks during from all previous batches of 14AM (See Appendix 1). Based on these data, batches 90E01P, 90E02P, 90E03P, 90F12P, 91A02P, 91A03P, 90A01K, 90H01K, and 90K08K might have been affected.

To date, based on testing of cans returned from the field, only cans from batches 90F12P, 90E01P, and 90H01K have been verified to have cans outside MAGNAFLUX control limits (See

Appendix 2).

Batches prior to those listed in Appendix 1 were either canned from drums and not subject to long break periods or were canned by MAGNAFLUX. Batches starting with 91B03K were not subject to the conditions which caused the problem.

IV. Corrective Action

A. Written Procedures

Both IKI and Plaze have been given the following in writing:

1. Settling Test Procedure

2. Setup Procedure
   - Fit tote with double prop mixer blade at bottom of tank.
   - Mix and recirculate through bottom valve back into tote for 30 minutes.
   - Sample tote for settling test.
   - On approval from QC, fill hopper and start mixer.

3. Filling Instructions:
   - Mixers shall be on throughout run.
   - For any break in line operation, empty transfer plumbing back into tote.
   - For breaks longer than one hour, recirculate for 30 minutes before restarting.

4. QC Procedure
   - Sample ungassed cans from the beginning, middle, and end of each tote.

5. Training
   - A request to train all personnel making them sensitive to the quick settling rate of 14AM, 7CF, and 9CM particles.

B. Training of MAGNAFLUX Personnel

MAGNAFLUX personnel shall be trained to respond to customer quality complaints by:

- Immediately informing the appropriate Product Manager, the Sales Representative, and Sales Manager.

C. Recall/Warning Issued

MAGNAFLUX has recalled the following batches:

90E01P
90F12P
90H01K

Although no evidence has been found, due a similarity in process, MAGNAFLUX has also issued a WARNING for the following batches:

90A01K	90E02P
90E03P	90K08K
91A02P	91A03P

Our investigation continues at this time and in the event any evidence of further errors is found, you will be informed immediately.

No other batches are affected.

Appendix 1
14AM Batches Using Totes

Recall Issued

Batch #	Cans
90E01P	10,284
90F12P	10,711
90H01K	10,716

Warning Issued

90E02P/90E03P	3,924
90A01K	10,465
90K08K	10,180
91A02P	3,996
91A03P	10,560

Not Affected

89J04K/89J05K	8,984
89L04K	10,564
90C06K	10,716
90K01K(Gov't.)	3,770
91B03K	10,536
91C01P	10,560
91C01K *	2,650

* All subsequent batches are not affected.

LIST OF RECENTLY ISSUED
NRC INFORMATION NOTICES

Information Notice No.	Subject	Date of Issuance	Issued to
91-30	Inadequate Calibration of Thermoluminescent Dosimeters Utilized to Monitor Extremity Dose at Uranium Processing and Fabrication Facilities	04/23/91	All fuel cycle licensees and other licensees routinely handling unshielded uranium materials.
86-21, Supp. 2	Recognition of American Society of Mechanical Engineers Accreditation Program for N Stamp Holders	04/16/91	All holders of OLs or CPs for nuclear power reactors and all recipients of NUREG-0040, "Licensee Contractor and Vendor Inspection Status Report" (White Book).
91-29	Deficiencies Identified During Electrical Distribution System Functional Inspections	04/15/91	All holders of OLs or CPs for nuclear power reactors.
91-28	Cracking in Feedwater System Piping	04/15/91	All holders of OLs or CPs for pressurized water reactors (PWRs).
91-27	Incorrect Rotation of Positive Displacement Pump	04/10/91	All holders of OLs or CPs for nuclear power reactors.
89-90, Supp. 1	Pressurizer Safety Valve Lift Setpoint Shift	04/10/91	All holders of OLs or CPs for nuclear power reactors.
91-26	Potential Nonconservative Errors in the Working Format Hansen-Roach Cross-Section Set Provided with The Keno and Scale Codes	04/02/91	All fuel cycle licensees and other licensees, including all holders of operating licenses for nuclear power reactors, who use physics codes to support criticality safety in the use of fissile material.

OL = Operating License
CP = Construction Permit

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*SEE PREVIOUS CONCURRENCES

	D/DOEA:NRR CERossi 05/9/91	*C/OGCB:DOEA:NRR CHBerlinger 05/01/91	*RPB:ADM TechEd 04/24/91	*MQS Inspection JFaloon 04/26/91
*OGCB:DOEA:NRR NCampbell 04/25/91	*RVIB:DRIS:NRR JJPetrosino 04/25/91	*C/RVIB:DRIS:NRR GCwalina 04/26/91	*D/DRIS:NRR BKGrimes 04/26/91	*Magnaflux Corp. JChase 04/25/91

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Document Name: IN 91-31

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Attachments:
1. Magnaflux Magnetic Particle (14AM) Prepared Bath Recall Notice
2. List of Recently Issued NRC Information Notices

Document Name: INFO NOTICE - CAMPBELL

*SEE PREVIOUS CONCURRENCES

OGCB:DOEA:NRR	RVIB:DRIS:NRR	C/RVIB:DRIS:NRR	D/DOEA:NRR	C/OGCB:DOEA:NRR
NCampbell	JJPetrosino	GCwalina	CERossi	CHBerlinger
04/25/91 N.E.C.	04/26/91	04/26/91	04/ /91	05/ 1 /91

D/DRIS:NRR	*RPB:ADM
BKGrimes	TechEd
04/29/91	04/24/91

Magnaflux Corporation
JChase, VP
Joe Petrosino for 4/25/91 by telephone to (708) 867-3363

MQS Inspection
for T. Faloon, Exec. V.P. by telephone on 4/26/91 @ (708) 981 8777

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			D/DOEA:NRR	C/OGCB:DOEA:NRR
			CERossi	CHBerlinger
			04/ /91	04/ /91
OGCB:DOEA:NRR	RVIB:DRIS:NRR	C/RVIB:DRIS:NRR	D/DRIS:NRR	RPB:ADM
NCampbell	JJPetrosino		BKGrimes	TechEd
04/ /91	04/ /91	04/ /91	04/ /91	04/ /91