

November 16, 1998

Mr. Peyton S. Baker
[]
Babcock & Wilcox of Ohio, Inc.
1 Mound Road
Miamisburg, Ohio 45343-3030

EA 98-12

Subject: Preliminary Notice of Violation and Proposed Imposition of Civil Penalty - \$165,000 (NTS-OH-MB-BWO-BWO04-1998-0001, NTS-OH-MB-BWO-BWO04-1998-0002, and NTS-OH-MB-BWO-BWO06-1998-0001)

Dear Mr. Baker:

This letter refers to the Department of Energy's (DOE) investigation of the facts and circumstances concerning a number of significant deficiencies in Babcock & Wilcox of Ohio, Inc., (BWO) radiological work controls and bioassay program at the DOE Mound Site and its corrective actions to remedy those deficiencies.

DOE initiated an investigation in March 1998 for the radiological work control deficiencies during the WD-Building filter change and in May 1998 for the bioassay program deficiencies. Based on a review of relevant facility documentation and discussions with BWO and DOE's Miamisburg Environmental Management Project Office (DOE-MEMP) personnel during July 7-8, 1998, and September 29-30, 1998, DOE has concluded that violations of 10 CFR 830, ANuclear Safety Management,@and 10 CFR 835, AOccupational Radiation Protection,@occurred. These violations are described in the enclosed Preliminary Notice of Violation (PNOV) and Proposed Imposition of Civil Penalties.

Section I of the enclosed PNOV describes numerous violations associated with the changing of exhaust ventilation system pre-filters for the WD-Building on February 12, 1998. DOE's investigation of this event found numerous deficiencies in the work planning and conduct of the pre-filter replacement, and in the initial response activities to this event that resulted in workers being unknowingly exposed to radiological conditions that exceeded the protection factor of their respiratory protection by a factor of 2 to 5 times. For example, (1) contrary to your established procedures, the work control documents did not have adequate management review prior to being put into use, (2) an as low as reasonably achievable (ALARA) review was not conducted to determine if radiological work planning was appropriate, (3) a timely pre-job survey of the area was not conducted to determine current radiological

conditions, and (4) appropriate air monitoring equipment was not utilized although three radiological work permits (RWPs) identified stop work conditions for airborne radioactivity. During the work activity itself, the monitoring of the air filters was inadequate to estimate elevated airborne radioactivity levels; and the field response at the conclusion of the HEPA pre-filter change-out was inadequate to establish in a reasonable time frame that elevated airborne radioactivity levels had occurred during the work evolution. When it was finally realized two weeks later that airborne radioactivity levels had exceeded the RWP stop work conditions necessitating that the workers be restricted from further radiological work, one worker was not informed that he had been restricted from further radiological work until 6 days after the restriction was in effect .

Section II of the enclosed PNOV identifies violations associated with various aspects of the internal dose evaluation program which includes (1) failure to ensure the continuity of bioassay services as required by the Mound Radiobioassay Laboratory Quality Assurance Plan, (2) failure to meet bioassay sample cycle times as required by the Internal Dosimetry-Radiobioassay Laboratory Memorandum of Understanding, (3) failure to provide timely notification to workers of positive bioassay results, (4) failure to adequately implement quality improvement processes for the bioassay program, (5) failure to formally control design interfaces between vendor software and Mound data bases, and (6) failure to adequately assess management processes to ensure that management tools, i.e., internal audits, were adequate to identify and correct bioassay program problems. These problems occurred because of a continuing culture of non-adherence to your established bioassay program requirements by your staff. Additionally, there was a clear lack of communication between the Radiobioassay Laboratory analytical function and the Dose Assessment function as well as failure to understand the implications to the workers when the bioassay program did not fulfill its obligations.

DOE is concerned because the violations and deficiencies associated with these issues are not isolated events and reflect a management failure across several organizations responsible for the safe operation of the site. Further, despite the attention to the Mound bioassay program over the last several years by DOE, including the issuance of civil penalties to the previous contractor, significant deficiencies continued to go uncorrected. Therefore, in accordance with the criteria set forth in Appendix A (Enforcement Policy) to 10 CFR 820, "Procedural Rules for DOE Nuclear Safety Activities," the violations in Section I and II of the PNOV associated with the WD-Building filter change out and the bioassay program respectively have each been classified as Severity Level II problems.

To emphasize the need for assuring the proper control of work-related activities and to ensure that effective actions are taken to preclude a recurrence with potentially more

serious consequences, I am issuing the enclosed PNOV and Proposed Imposition of Civil Penalty in the amount of \$165,000. In accordance with the Enforcement Policy in effect at the time of this event, the base civil penalty for each of the four Severity Level II violations is \$55,000.

DOE has concluded that no mitigation of the proposed civil penalty is warranted for the violations described in Section I of the PNOV involving the WD-Building pre-filter replacement violations. Although BWO reported this event in the Noncompliance Tracking System, the deficiencies were not identified and reported until after the air sampler filters' radiation levels were identified and it was determined that the workers were potentially exposed to radiation levels well above their respiratory protection equipment safety factors. No evidence of pro-active self-identification of the deficient areas was identified, despite a number of opportunities that existed for management to self-identify these problems during the work planning and approval process and correct the deficiencies before the work was performed.

With respect to your corrective actions to the problems identified in the WD-Building pre-filter replacement, the initial post-event critique and root cause analysis were not comprehensive in identifying all significant deficiencies and their causal factors, and several responses to employee concerns about this event were inaccurate and misleading. DOE is encouraged that BWO management conducted additional assessments of this event and identified more complete corrective actions. Because of your positive action in this regard and to provide incentive to improve your self-identification and corrective action process, DOE has elected to consolidate the numerous noncompliances pertaining to the WD-Building pre-filter changing and issue two violations for this event rather than cite each noncompliance separately.

With respect to the violations identified in Section II of the enclosed PNOV involving the Bioassay Program deficiencies, DOE has determined that the civil penalty for these violations should be reduced by 50 percent. Specifically, 25 percent mitigation of the base civil penalty has been determined to be appropriate in recognition of the self-identification and reporting of the problems identified by the new Dosimetry Supervisor involving the backlog of [isotopic] samples awaiting bioassay in the counting laboratory, problems in the turn-around times of off-site vendor bioassay sample analysis and problems with the on-site certification of vendor bioassay data. An additional 25 percent mitigation of the base civil penalty has been deemed appropriate for your corrective actions including, among other things, an internal reorganization that for the first time has both the Internal Dosimetry Group and the Radiobioassay Group reporting to a single accountable manager. This change has led to measurable improvement in the administration of the bioassay program and the completion of corrective actions necessary to resolve the program deficiencies. While the bioassay program is now showing substantial improvement, full mitigation of the civil penalty is inappropriate given the long standing nature of the deficiencies in the program.

You are required to respond to this letter and you should follow the instructions specified in the enclosed PNOV when preparing your response. Your response should document any additional specific actions taken to date and planned to prevent recurrence. After reviewing your response to this Notice, DOE will determine whether further action is necessary to ensure compliance with applicable nuclear safety requirements.

Sincerely,

A black and white image of a handwritten signature in white ink on a black background. The signature is cursive and appears to read 'Peter N. Brush'.

Peter N.
Brush

Acting Assistant Secretary
Environment, Safety and Health

CERTIFIED MAIL
RECEIPT REQUESTED

Enclosures:

Preliminary Notice of Violation and
Proposed Imposition of Civil Penalty
Enforcement Conference Summaries
List of Attendees

cc: M. Zacchero, EH-1
K. Christopher, EH-10
S. Adamovitz, EH-10
S. Zobel, EH-10
G. Podonsky, EH-2
O. Pearson, EH-3
J. Fitzgerald, EH-5
J. Owendoff, EM-1
L. Vaughan, EM-10
M. Gavrilas-Guinn, EM-4
O. Vincent, DOE-MEMP
J. Simak, DOE-MEMP
T. Brown, DOE-OH
R. Krasnonski, BWO
J. Lieberman, NRC
D. Thompson, DNFSB
Docket Clerk, EH-10

**PRELIMINARY NOTICE OF VIOLATION
and
PROPOSED IMPOSITION OF CIVIL PENALTY**

**NTS-OH-MB-BWO-BWO04-1998-0001,
NTS-OH-MB-BWO-BWO04-1998-0002, and
NTS-OH-MB-BWO-BWO06-1998-0001**

Babcock and Wilcox of Ohio, Inc.
Mound Plant

EA 98-12

As a result of a Department of Energy's (DOE) evaluation of activities associated with radiological work control and bioassay program deficiencies that have occurred, violations of DOE nuclear safety requirements were identified. In accordance with 10 CFR 820, Appendix A, AGeneral Statement of Enforcement Policy,@DOE proposes to impose civil penalties pursuant to Section 234A of the Atomic Energy Act of 1954, as amended, 42 U.S.C. 2282a, and 10 CFR 820. The particular violations and associated civil penalties are set forth below.

I. WD-BUILDING PRE-FILTER CHANGING PROJECT

A. 10 CFR 835.401(a)(2) requires that monitoring of individuals and areas shall be performed to document radiological conditions in the workplace.

10 CFR 835.401(a)(5) requires that monitoring of individuals and areas shall be performed to verify the effectiveness of engineering and process controls in containing radioactive material and reducing radiation exposure.

Contrary to the above, monitoring of areas was not performed to document radiological conditions in the workplace, or to verify the effectiveness of engineering and process controls to contain radioactive material and reduce radiation exposure in that

1. Contamination surveys of the WD-Building ventilation penthouse were not

performed in the HEPA pre-filter replacement areas prior to initiation of decontamination activities on February 10, 1998. Radiological surveys were also not performed prior to the commencement of pre-filter replacement activities on February 12, 1998, following the decontamination work of February 10, 1998. As a consequence, during pre-filter replacement work, one worker received an unplanned uptake of airborne radioactive material equivalent to 10 millirem committed effective dose equivalent.

2. Area radiological monitoring was not performed to verify the adequacy of the temporary ventilation system used during the WD-Building HEPA pre-filter replacement on February 12, 1998, while the building ventilation exhaust fan was shut down. Specifically, the temporary ventilation system drew air from the highly contaminated areas of the ventilation penthouse past the workers thus contributing to a significant increase in the airborne radioactivity to which the workers were exposed.

B. 10 CFR 835.401(a)(3) requires that monitoring of individuals and areas shall be performed to detect changes in radiological conditions.

Contrary to the above, on February 12, 1998, monitoring of areas to detect changes in radiological conditions was not performed during WD-Building HEPA pre-filter replacement, and airborne radioactivity levels in the vicinity of two radiation worker groups reached 270 derived air concentration (DAC) and more than 4,000 DAC respectively.

Collectively, these violations constitute a Severity Level II problem
Civil Penalty - \$55,000

C. 10 CFR 835.1001(b) requires that for specific activities where use of physical design features are demonstrated to be impractical, administrative controls and procedural requirements shall be used to maintain radiation exposures as low as reasonably achievable (ALARA).

Contrary to the above, administrative controls and procedural requirements to maintain personnel radiation exposures ALARA were not implemented or adhered to and work was not performed in accordance with established administrative controls using approved procedures, or procedures were inadequate in that

1. Technical Manual MD-10314, *EG&G Mound ALARA Program*, Issue 3, dated July 6, 1995, required that an ALARA review be performed at a trigger level of 50 DAC. Although, the radiological stop work limits of 50 DAC and 2000 DAC identified in the WD-Building Radiological Work

Permits (RWPs)

(LW-28-98, LW-29-98 and LW-30-98) met or exceeded the 50 DAC trigger level, no ALARA review of the WD-Building Filter Replacement work package was performed.

2. Technical Manual MD-80036, Operation 90018, *Radiological Work Permit Preparation*, Issue 4, dated September 18, 1997, Section 6.13.3 required an ALARA review to be performed if RWP trigger levels, in addition to the 50 DAC hours, could be exceeded, i.e., a work area having removable contamination greater than 100 times the values of MD-10019, Table 2-2, [20 disintegrations per minute per 100 square centimeters (dpm/100 cm²) for removable transuranics] or for any infrequently conducted activity in a facility with a routine, recurring process operation. However, an ALARA review was not performed even though the last radiological survey conducted on June 18, 1997, more than six months earlier, indicated that alpha activity in ventilation penthouse was greater than 200,000 dpm/100 cm², and that the last filter change of the WD-Building HEPA filters had been performed approximately three years prior the current work evolution.
3. Technical Manual MD-80042, Operation 2030, *DAC Fraction Calculation*, Issue 2, dated April 15, 1997, Section 2.5 stated A[f]or areas where radon interference is significant, the DAC Fraction Calculation should be performed based on counts obtained after a 24 hour decay.@ However, this procedure was inadequate to ensure that air filter activities were quantified in a timely manner in that on February 12, 1998, HEPA pre-filters in the WD-Building were replaced; but it was not until two weeks later that area air sampler activity was quantified, at which time, it was realized that workers had been exposed to airborne radioactive [material] in concentrations in excess of the safety protective factors of the respiratory equipment they had worn.
4. Technical Manual MD-10432, Operation 306, *Radiation Work Restrictions*, Issue 3, dated May 8, 1997, Section 5.2[2] described the procedure for performing a radiological work restriction due to a radiological incident. However, the procedure was inadequate in that it did not require the worker to be notified of the work restriction prior to allowing the worker to continue radiological work. As a result, a worker was officially placed on work restriction on February 25, 1998, but was not notified of the restriction until March 3, 1998, during which time, the worker continued to perform unrestricted radiological work.

5. Technical Manual MD-50001, Procedure FM-PM-039, *Fan Shutdown and Start-Up Procedure for WD-Building*, Issue 2, dated February 2, 1996, Section 5.12 required that "[w]hen exhaust fans are shut down in the WD- Building, personnel entering the building must wear full-face respirators, as posted by Health Physics." However, during the during the February 12, 1998, WD-Building pre-filter replacement, while exhaust fans were shut down, the building entry requirement for full face respirators was not posted. As a consequence, working personnel routinely entered the building on February 12, 1998, without wearing full face respirators as required.

Collectively, these violations constitute a Severity Level II problem.
Civil Penalty - \$55,000

II. BIOASSAY PROGRAM ISSUES

- A. 10 CFR 830.120(c)(2)(i), *Performance, Work Processes*, requires that work shall be performed to established technical standards and administrative controls using approved instructions, procedures or other appropriate means.
 1. Technical Manual MD-10462, *Radiobioassay Quality Assurance Plan*, Issue 2, dated December 11, 1997, Section Q5.2.3 stated that "Mound has a four level contingency plan to mitigate programmatic impact if equipment or personnel fail to perform as required and to ensure continuity of service. Section Q5.2.3(d), *Contract Laboratory Support*, further stated that "Contracts with the[se] commercial laboratories have provisions for contingent processing of samples normally processed at Mound." However, though the Mound Radiobioassay Laboratory experienced an approximate fifty percent loss of alpha counting capability in 1997 that led to a backlog of bioassay samples in need of americium-241 (Am-241) analysis, contingency plans were not implemented to ensure continuity of service, thus leading to a DOE imposed stand down on May 1, 1998, of all radiological work activities involving bioassay monitoring.
 2. Technical Manual MD-10462, *Radiobioassay Quality Assurance Plan*, Issues 1 and 2, dated June 17, 1997, and December 11, 1997, respectively, Section Q8.1 stated that "Radiobioassay management identifies the type of processes, materials, and equipment that require formal inspections or acceptance testing to assure that they perform as intended." However, radiobioassay management failed to identify that new alpha spectroscopy hardware and related software, acquired by October 1, 1998, required formal inspection and/or acceptance testing and, as a consequence, the system did not perform as intended in that calculational errors were introduced into dose determinations for approximately 1400 bioassay sample results during December 1997 and January 1998.

3. Memorandum of Understanding (MOU) dated January 15, 1998, between the Mound Internal Dosimetry and the Mound Radiobioassay Laboratory:

a. A Technical Requirements, @ Section 1, stated that A . . . and associated cycle times shall be in accordance with the specifications of Table 1. @ Table 1 cycle time, i.e., sample turn around times, for Priority 3 urine samples (i.e., routine bioassay samples) to be analyzed for [a radionuclide] was stated to be 24 business days. However, the sample times agreed to in the MOU were not met since [the] bioassay samples submitted as long ago as July 1997 were not quantified until May of 1998, thus exceeding the 24 business day cycle requirement of the MOU. Workers continued to perform radiological work even though their previous exposures to radioactive materials were unknown.

b. A Administrative Requirements, @ Section 3, A Off-Site Sample Analysis Time Limitations, @ stated that A the following time limitations shall be applied . . . obtaining analytical results from off-site vendor laboratories: . . . time to validate/post [bioassay results] - 8 business days. @ However, the time limitations for validation and posting of two [] bioassay samples was not met in that positive bioassay results were received at Mound on January 26, 1998, and on February 9, 1998, but were not validated and posted for dose assessment as required until April 26, 1998. As a result, the eight business day limitation required by the MOU was exceeded and workers continued to perform radiological work without having their previous radiological exposures assessed for compliance with DOE exposure limits.

4. MD-10435, *Internal Dosimetry Technical Basis Document*, Issue 4, dated September 30, 1997, Section 9, Paragraph 9.3.3 stated A that the results of any positive bioassay should be reported to the individual involved and the individual's supervisor within five working days after the positive indication has been determined.... @ However, this procedure was inadequate to ensure that positive bioassay results were reported to personnel in a timely manner in that for the 123 workers that were determined to have positive bioassay results on February 2, 1998, notifications of potential exposures were not initiated until February 19, 1998, and were not completed until May 1998 a period of time ranging from 17 days to greater than 80 days.

B. 10 CFR 830.120(c)(2)(ii), *Design*, requires that design interfaces shall be designed and controlled, and that verification and validation work shall be completed before approval and implementation of the design.

10 CFR 830.120(c)(2)(iv), *Acceptance and Testing*, requires that inspection and testing of specified items, services, and processes shall be conducted using established acceptance and performance criteria.

Contrary to the above, design interfaces between the newly obtained alpha spectroscopy system software and the Mound Environment, Safety & Health Radiological Records (MESH) database between December 9, 1997, and January 26, 1998, were not controlled, and verification and validation of the interface was not completed before using the new alpha spectroscopy software in the process for assessment of employee radiation doses, thus leading to erroneous calculations for approximately 1400 bioassay samples.

Collectively, these violations constitute a Severity Level II problem.
Civil Penalty - \$27,500

- C. 10 CFR 830.120(c)(1)(iii), *Quality Improvement*, requires that processes to detect and prevent quality problems shall be established and implemented, that items, services, and processes that do not meet established requirements shall be identified, controlled and corrected according to the importance of the problem and the work affected, and that correction shall include identifying the causes of problems and working to prevent recurrence.

Contrary to the above, processes to detect, prevent and correct quality problems in the Radiobioassay Laboratory and in the Internal Dosimetry Group were not sufficiently comprehensive in depth and in scope to identify or to prevent recurrence of bioassay program inadequacies in that although deficiencies had been identified during the last four months of 1997, bioassay program inadequacies continued to occur during the first five months of 1998 that included an accumulation of a backlog of bioassay samples to be processed[], failure to ensure continuity of Radiobioassay Laboratory services during equipment outages as specified by the *Radiobioassay Quality Assurance Plan*, Section Q 8.1, and failure to meet cycle turn around times for bioassay samples for both in-house processed bioassay samples as well as off-site vendor processed samples as established by the Memorandum of Understanding dated January 15, 1998.

- D. 10 CFR 830.120(c)(3)(i), *Management Assessment*, requires that managers shall assess their management processes, and that problems that hinder the organization from achieving its objective shall be identified and corrected.

Contrary to the above, although the management assessment performed in March 1998 and issued on June 15, 1998, reviewed facility compliance against the requirements of the Memorandum of Understanding (MOU) originating between the Internal Dosimetry Group and the Radiobioassay Laboratory on January 15, 1998, the management assessment failed to identify that bioassay sample cycle times did not meet the cycle times established by the MOU. This practice allowed workers to continue to perform radiological work for extended

periods of time, e.g., two to more than six months, although previous potential exposures of the workers to radioactive materials in the workplace and compliance with DOE annual exposure limits were unknown.

Collectively, these violations represent a Severity Level II problem.
Civil Penalty - \$27,500

Pursuant to the provisions of 10 CFR Part 820, Babcock and Wilcox of Ohio, Inc., is hereby required within 30 days of the date of this Notice to submit a written statement or explanation to the Director, Office of Enforcement and Investigation, Attention: Office of the Docketing Clerk, EH-10, 270CC, P.O. Box 2225, Germantown, MD 20874-2225, with copies to the Manager, DOE, Miamisburg Area Office, and to the Cognizant DOE Secretarial Office for the facility that is the subject of this Notice. This reply should be clearly marked as a "Reply to a Preliminary Notice of Violation" and should include the following for each violation: (1) admission or denial of the alleged violation; (2) the facts set forth above which are not correct and the reasons for the violations if admitted, and if denied, the reasons they are not correct, (3) the corrective steps that have been taken and the results achieved, (4) the corrective steps that will be taken to avoid further violations, and (5) the date when full compliance will be achieved.

Any request for remission or mitigation of civil penalties must be accompanied by a substantive justification demonstrating extenuating circumstances or other reasons why the assessed penalties should not be imposed in full. Unless the violations are denied, or remission or mitigation is requested within the 30 days after the issuance of the Preliminary Notice of Violation and Civil Penalty, Babcock & Wilcox of Ohio, Inc., shall pay the civil penalties totaling \$165,000 (imposed under Section 234A of the Act) by check, draft, or money order payable to the Treasurer of the United States (Account Number 891099) mailed to the Director, Office of Enforcement and Investigation, at the address given above. Should the contractor fail to answer within the time specified, an order imposing the civil penalty will be issued.

If requesting mitigation of the proposed penalty, Babcock & Wilcox of Ohio, Inc., should address the adjustment factors described in Section VIII.C. of 10 CFR 820, Appendix A.



Peter N. Brush
Acting Assistant Secretary
Environment, Safety and Health

Dated at Washington, DC,
this 16th day of November 1998