WITCO Waste Inspection Technology Co.

August 10, 1998

Mr. Robert S. Dinwiddie
Manager
RCRA Permits Management Program
Hazardous and Radioactive Materials Bureau
New Mexico Environment Department
2044A Galisteo St.
Santa Fe, NM 87505

SUBJECT: Radiography Comments on the Draft RCRA Permit for WIPP and a Request to Permit High-Energy (2 MV) Digital Radiography (DR) and Computed Tomography (CT) for TRU Waste Drum Nondestructive Examination (NDE)

Dear Mr. Dinwiddie:

Thank you for the opportunity to provide comments on the draft RCRA permit for WIPP.

This letter discusses the use of high-energy (2 MV or million-volt) digital radiography (DR) and computed tomography (CT) as technically superior radiography techniques and as alternatives to conventional lower energy (400 kV or kilovolt) real-time radiography (RTR) which is currently recommended in the draft RCRA permit. CT is the same technology that revolutionized medical diagnostic radiology in the 1970s and 80s. WITCO's parent company, BIR, is a pioneer in both medical and industrial CT with experience dating back to the mid 1970s and its invention. WITCO seeks to add high-energy DR and CT to the WIPP RCRA permit as acceptable radiography techniques for all TRU drums.

WITCO (Waste Inspection Technology Company) is an Illinois corporation and a wholly-owned division of Bio-Imaging Research, Inc. (BIR) of Lincolnshire, Illinois. Since 1990, BIR, and within the past year WITCO, have been DOE contractors with revenues exceeding $6M employing 2 MV (million-volt) x-ray digital radiography (DR) and computed tomography (CT) for the nondestructive examination (NDE) and gamma emission CT for nondestructive assay (NDA) of nuclear waste (TRU) drums. This letter and its attachments discuss the NDE or the radiography nature of WITCO/BIR capabilities as they relate to the draft RCRA permit for

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WIPP. WITCO and BIR have been providing DOE with a mobile 2 MV x-ray DR and CT characterization service with successfully demonstrated performance capabilities that cannot be duplicated by the conventional RTR techniques mentioned in the RCRA permit.

The WITCO waste drum NDE/NDA characterization service is provided in a mobile trailer designed and built by BIR and operated by WITCO called Waste Inspection Tomography (WIT). WIT is now at the DOE Nevada Test Site (NTS) undergoing a DOE "approval" process to certify WIT for the NDE/NDA characterization of TRU waste drums. WIT NDE radiography has just completed its first DOE Carlsbad quality assurance audit and has been approved by DOE for NDE of TRU drums using 2 MV DR and CT. WIT is part of a team of commercial companies called the TRUtech team, which has just finished its first DOE audit. TRUtech is a Thermo Remediation Company located in Albuquerque, New Mexico. WITCO is a subcontractor to TRUtech.

The above discussion relates to the following sections of the draft RCRA permit for WIPP.

1. Section B-3c Line 33 appears to conflict with the last two lines (40 and 41) of page B11 of 58 and the first two lines (1 and 2) on page B12 of 58 from permit attachment B1.

   Note: Line 33 allows use of an "equivalent" radiography technique to RTR, yet lines 40 and 41 on page B-11and Lines one and two on page B-12 require a "permit modification" for using radiography techniques other than RTR.

2. Section B1-3a on Line 31 in Attachment B1, page B1-19 of 40 specifies the accepted RTR radiography method, and at the same time on page B1-20 of 40, discusses the technical limitations of RTR on dense drums in Lines 7 and 8 of page B1-20 of 40.

   Note: Section B1-3a recommends 400 kV RTR and at the same time discusses its limitations, as RTR is an unacceptable technique for dense waste drums, with which we (WITCO/BIR) whole-heartedly concur.

WITCO/BIR seeks the following:

1. Permit high-energy (2 MV) DR and CT as an acceptable radiography technique for TRU waste drums that are both lightweight and dense, including lead-lined drums and sludge without the requirement of a "permit modification."

2. Add 2 MV DR and CT as an acceptable radiography technique for both low-density and high-density TRU waste drums.

To make our case for the above request, I am enclosing information that demonstrates WIT capabilities for x-ray inspecting lightweight and dense TRU waste drums. I am also enclosing a draft Verification Statement from a Rapid Commercialization Initiative (RCI). The RCI has occurred over the past two years and includes environmental regulators from the U. S. EPA and numerous states and state organizations that have observed and witnessed WIT capabilities for the NDE and NDA inspection of light and dense TRU waste drums. Most importantly, the RCI statement includes the names and contact telephone numbers of those regulators involved in the RCI process that can verify this because they have witnessed WIT capabilities. WIT has more than 15,000 miles of experience over the past two years. WIT has been demonstrated and field-tested on TRU waste drums at four DOE sites and one commercial site (INEEL, LLNL, RFETS, NTS, and B&W Lynchburg, Virginia). The attached WIT results show WIT can x-ray examine both low- and high-density waste with the same 2 MV x-ray technique, which is not possible with RTR or any other radiography technique currently employed for the examination of TRU drums.

There are basically four reasons for WIT DR and CT technical superiority compared to conventional RTR:

1. 2 MV vs. 400 kV x-rays

   WIT with 2 MV can penetrate and image all dense and lightweight TRU waste drums. On the other hand, 400 kV or less is limited in its ability to penetrate dense, lead-lined drums, sludge, and cement. The lower energy is absorbed by dense waste and there is little or no measurable x-ray signal with 400 kV or less RTR systems. Since more than half of the WIPP waste is dense, WIT offers the better solution.

2. RTR x-ray detection is limited to a dynamic range of 6- to 8-bits, whereas WIT x-ray detectors have a dynamic range of 16- to 18-bits.

   Simply put, WIT can computer-display greater than 256,000 shades of grey or colors, whereas RTR typically has 256 shades of grey or colors. This allows WIT to 2 MV DR and CT view sludge, cement, combustibles, and air in the same viewed image with grey scale (or color) separation. RTR can only view combustibles or lightweight waste and air with limited grey scale resolution. All denser materials appear totally black, white, or a solid color with RTR.

3. CT is a three-dimensional viewing technique, whereas RTR is a two-dimensional viewing technique.

WIT CT eliminates superpositioning (the overlapping of structures) by providing a thin cross-section slice of drum content. RTR presents a projection x-ray, which overlaps all drum content which makes RTR more difficult to interrupt. CT allows for the separation and easier identification of matrix parameters (drum content) through cross-sectional imaging. CT also allows for dimensioning and relative density determination due to its 3-D capability, all of which is not possible with RTR. The WIT CT grey (or color) scale can be made nearly proportional to density to identify heavy RCRA metals. WIT CT can stack CT slice images together and produce a 3-D CT volume-rendered image of drum content for better visualization of drum content at any viewed cut-away slice and angle of orientation by computer control to better view unobstructed drum content. RTR cannot.

4. DR views an entire drum in a single freeze-frame x-ray projection image all at one time, whereas RTR views only a 10-inch diameter x-ray projection of a portion of a drum in a moving television view.

   Like an airport x-ray baggage inspection system can image an entire handbag, WIT can DR image an entire drum (up to 110-gallons) with a single DR image. WIT tilts drums to view tilted liquid in a freeze-frame format. RTR x-ray views only about a 10-inch diameter area at one time, requiring area TV scanning of small portions of an entire drum. WIT DR takes about one minute for either an entire sludge or combustible waste drum view. RTR needs to scan for at least five minutes to image the entire drum with its limited viewing area.

I enclose the following information for your review of WIT capabilities in support of the above:

- One page WIT advertising sheet describing WIT capabilities
- Draft RCI Verification Statement for WIT
- WIT sludge drum DR and CT
- WIT lead-lined drum DR and miscellaneous DR and CT images
- WIT lead-lined steel pipe overpack with Ur fuel rod/pellet DR and CT images
- WIT cemented drum images
- WIT liquid drum content with sludge DR
- Two one-page handouts describing WIT contracts with DOE over the years
- A general BIR brochure describing the BIR non-medical CT business

BIR views WIT as another non-medical application of CT for NDE. BIR has CT scanners inspecting NASA mission-critical space shuttle components, jet engine turbine blades for the U. S. Navy and Air Force, at General Motors inspecting automobile components, and at 70 other installations around the world including the WIT trailer for DOE for various other inspection applications. By sales volume, BIR is the world's leading manufacturer of industrial CT scanners.

Aside from our obvious commercial interest in having WIT accepted as a TRU waste drum radiography technique, it is our intent to supply the best radiography technology to DOE to identify TRU waste drum content for WIPP. WIT 2 MV DR and CT is the best and will allow for high-quality radiography inspection of all WIPP-destined TRU waste drums, including dense waste that will save money by reducing the need to open of some of these dense TRU waste drums since RTR cannot see inside them. Most importantly to NMED, by permitting WIT to inspect TRU waste drums, you will be permitting the latest state-of-the-art x-ray NDE technology proven to identify all of the TRU waste drum contents destined for WIPP to assure compliance with WIPP disposal requirements.

If you would like more information on WITCO, WIT, or BIR, please contact us by telephone, mail, bernardi@interaccess.com, or at www.bio-imaging.com, as we will be happy to reply.

Again, thank you for allowing WITCO to comment on the draft RCRA permit for WIPP. I look forward to your response.

Sincerely,

Richard T. Bernardi
Vice President and General Manager
WITCO Division of BIR, Inc.

tls/RTB-1223

Attachments

Radiography Comments on the

Draft RCRA Permit for WIPP

-Attachments-

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