



**UNITED STATES
NUCLEAR REGULATORY COMMISSION**
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SUBJECT: INDEPENDENT REVIEW OF A LICENSE AMENDMENT REQUEST FROM
BABCOCK SERVICES, INC. TO THE TENNESSEE DEPARTMENT OF
ENVIRONMENT AND CONSERVATION

Dear Mr. Arnott:

This letter provides a response to the State of Tennessee's request for the U.S. Nuclear Regulatory Commission (NRC) to perform an independent review of a proposed Agreement State licensing action and its possible ramifications on future licensing actions at both the Agreement State and national levels. Specifically, the Tennessee Department of Environment and Conservation (TDEC) requested the NRC's guidance on a proposed amendment to the Authorized Use section of the Babcock Services, Inc. (BSI) Radioactive Materials License (No. 47215-A23) that would allow them to survey and release potentially contaminated waste oil for unrestricted use (i.e., recycling). TDEC reviewed BSI's initial submittal and submitted a Request for Additional Information (RAIs) in the form of 17 specific questions. TDEC requested assistance from the NRC on technical issues discussed in BSI's RAI responses as well as the information included in the report titled "Bounding Exposures and Effluent Concentrations from Waste Oil at Lower Limits of Detection" that BSI provided with their RAI responses as Attachment 6 (hereafter referred to as Attachment 6). Although TDEC stated that they would approve the license amendment request based on their review and the State of Tennessee's regulations, they requested that the NRC perform an independent review of the proposed license amendment so that the acceptance could be based on NRC regulations and guidance. As part of the independent review, NRC staff consulted with the agency's Office of the General Counsel (OGC) regarding possible regulatory issues associated with this proposed action.

This response summarizes the NRC's review of the specific technical and policy issues associated with this license amendment request. This includes a discussion of the proposed process for recycling waste oil with small concentrations of radioactive material for commercial use. Additional technical issues related to the separation of waste oil based on the environmental lower limits of detection (LLDs) were also considered. Policy issues evaluated include the use of Title 10 of the *Code of Federal Regulations* (10 CFR) Part 20.2002, 10 CFR 30.11, corresponding State of Tennessee regulations, and the interactions between Agreement States and Non-Agreement States discussed in FSME-12-025, "Clarification of the Authorization for Alternate Disposal of Material Issued Under 10 CFR 20.2002 and Exemption Provisions in 10 CFR."

TECHNICAL ISSUE REVIEW

TDEC requested NRC staff input on the dose assessment and specific technical issues discussed in Attachment 6, which was provided in BSI's response to the TDEC's RAIs. The dose assessment included in Attachment 6 provides a description of the overall process proposed for the recycling of waste oil containing small concentrations of radioactive material. The process starts with the collecting of waste oil that may contain small concentrations of byproduct material from nuclear power plants and transporting it to BSI's Oak Ridge Service Center facility in Oak Ridge, Tennessee (TN). Upon arrival, BSI proposes sampling the waste oil and separating the waste oil identified as having no detectable activity above background (NRC staff refers to this as the clean oil) using measurement methods that achieve the environmental LLD values identified in Table 4.12-1 of NUREG-1301, "Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Pressurized Water Reactors," and NUREG-1302, "Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for Boiling Water Reactors." BSI proposes transferring the waste oil with no detectable radioactivity above background from the shipping containers to a tanker truck for transport to a third party processor for recycling. Waste oil with detectable radioactivity above background would be segregated and either filtered and resurveyed, returned to the generator, or disposed of at an appropriate facility.

Using the environmental LLD concentrations for the radionuclides of concern, which are greater than background radionuclide values, and the dimensions of the 55-gallon drums, the NRC staff concluded based on an evaluation using MicroShield, Version 8.03, that a worker transferring the waste oil from the 55-gallon drums would have to be in direct contact with a drum for more than four years of continuous exposure to receive a dose of 0.01 mSv (1 mrem). Furthermore, it would take decades to centuries for workers located at more reasonable distances to receive a dose of 0.01 mSv (1 mrem). Since the 55-gallon drums are typically stored in groups, additional analyses were also performed to evaluate the exposure to workers from groups of drums. Results from these analyses showed that even if a worker is in direct contact with a large group of drums, it would still take more than two years to receive a dose greater than 0.01 mSv (1 mrem). These results are documented in Tables 5 and 8 of Attachment 6, respectively. Exposures to the truck driver, who would be exposed to a larger volume of waste oil but who maintains a greater distance than the transfer workers, was also calculated to be minimal, requiring more than 25 years to receive an exposure of 0.01 mSv (1 mrem). These results are documented in Table 11 of Attachment 6. Similar conclusions can be made regarding the time needed to receive a significant dose to the skin using the environmental LLD concentrations. NRC staff obtained comparable results using MicroShield, Version 9.06, and the parameter values provided in Attachment 6.

NRC staff also agree that incineration products produced at the recycling facility following dilution with other waste oil will maintain radionuclide concentrations below the air limits listed in SRPAR 0400-20-05-.161, Schedule RHS 8-30, Table 2, Column 1. In addition, doses from incineration and combustion processes would be bounded by the doses received by workers associated with the transfer and transport steps of the overall process and would not be expected to be an issue of concern.

Based on the analyses discussed in Attachment 6, BSI assumes that a maximum volume equivalent to 100 55-gallon drums of waste oil will be shipped to Safety Kleen, the proposed recycling facility in East Chicago, Indiana, each week (i.e., 50 weeks), resulting in a total annual

volume of 275,000 gallons per year. At a worst case 50% capacity, Safety Kleen maintains a volume of 48,125,000 gallons of nonradioactive waste oil a year. Mixing BSI's waste oil with the nonradioactive waste oil at Safety Kleen would dilute the radionuclide contents by a factor of 176. NRC staff used the radionuclide environmental LLD values for water listed in Table 4.12-1 and the dilution factor of 176 calculated in the report to determine conservative radionuclide concentrations in the diluted oil following mixing with the non-radioactive oil. Dilution resulting from the proposed incineration process would result in effluent air concentrations well below the regulatory values listed for all of the radionuclides in Table 2, Column 1 of SRPAR 0400-20-05-.161, Schedule RHS 8-30. It is important to note that the proposed recycling process discussed is highly site-specific and additional considerations may be needed if changes are made to the proposed recycling process or if other recycling facilities are considered for this licensing action.

With regards to methods provided for measuring gross alpha and gross beta concentrations in waste oil, BSI proposes a process that incorporates the methods described in EPA 900.0. BSI anticipates that the waste oil would be evaporated and the remaining residue would be ashed and digested. The non-volatile gross alpha and gross beta concentrations would then be measured using gas proportional counting as described in EPA 900.0. Although other techniques have been developed (e.g., liquid scintillation counting), this proposed method is still considered acceptable for measuring gross alpha and gross beta concentrations and can be considered a general screening tool to assess whether further investigation into the activity of specific radionuclides is warranted.

POLICY ISSUE REVIEW

In addition to a review of the technical questions, TDEC also requested that NRC staff consider the NRC's policies and guidance on recycling as a method for disposing of material with small concentrations of radioactive material in anticipation that other facilities may consider adopting these processes for dealing with waste oil or similar products. Compatibility with the NRC regulations would also provide further support to TDEC's decision to allow BSI to recycle waste oil containing no detectable concentrations of radioactive material. As part of its independent review, NRC technical staff had extensive discussions with the NRC's OGC regarding the acceptability of the proposed process from a regulatory perspective. Specific issues included the extent to which an Agreement State regulator can regulate the proposed process, the possible need for an exempt distribution license at some point in the process to enable the distribution of material known to contain radioactive material for commercial use in another state, and the use of recycling as an acceptable method of disposal.

As proposed in the submittal, determining whether the waste oil can be shipped for recycling is based on whether detectable levels of radioactive material are measured above background or if potential radioactivity in the waste oil is not detected above background. Using this approach, samples found with no detected radioactivity would be acceptable for transport and recycling without requiring an NRC or Agreement State review and exemption.

In the submittal, BSI indicates that it would release waste oil "for unrestricted use provided that analyses identify 'no detectable radioactivity' above background using environmental LLDs" in accordance with NRC Health Physics Position (HPPOS)-221. Specifically, BSI indicates that their decision to recycle the waste oil would be based on whether the radionuclide concentrations are detected or not detected based on previously established environmental LLD

values provided in Table 4.12-1 of NUREG-1301 and NUREG-1302. From a regulatory perspective, there can be a significant difference between these previously established environmental LLD values and the detection capabilities of current day instruments and analytical methods. As a result, it may be possible to measure radionuclide concentrations at levels below these published LLDs. From this perspective, NRC regulations would permit the transfer of waste oil to a licensed or unlicensed person via 10 CFR 30.41, "Transfer of Byproduct Material," provided that BSI's proposed values are less than the exempt concentration values listed in 10 CFR 30.70, "Schedule A – Exempt Concentrations." NRC staff confirmed that the proposed LLDs were less than the values published in 10 CFR 30.70.

Concentrations exceeding the exempt concentrations could be evaluated and allowed to be disposed of using the 10 CFR 20.2002 disposal process discussed in the NRC's "Review, Approval, and Documentation of Low-Activity Waste Disposals in Accordance with 10 CFR 20.2002 and 10 CFR 40.13(a)" guidance document. Additional discussions between NRC technical staff and OGC clarified NRC regulations and the approval process permitting recycling and reuse of the waste oil. The guidance provided in FSME-12-025 clarifies the use of 10 CFR 20.2002 and similar Agreement State processes when dealing with the disposal of licensed materials. This can include disposal (aka, burial) activities at Resource Conservation and Recovery Act disposal facilities, recycling, or other methods of reuse associated with unlicensed facilities. FSME-12-025 provides five different regulatory combinations that could be encountered as NRC, Agreement State, and Non-Agreement State staff consider the various possibilities for transferring waste material throughout the United States.

Scenario 3 in FSME-12-025, which describes the process in which an Agreement State licensee would request authorization under their 20.2002-equivalent regulation to transfer waste material to an unlicensed facility in a Non-Agreement State, is the scenario that most directly applies to the process proposed by BSI. The entire recycling process, as proposed in Attachment 6, takes place in Tennessee and Indiana. Tennessee is an Agreement State and is therefore responsible for the specific actions occurring within the state's boundaries. This includes the receipt, transfer, and transport of waste oil by BSI. Since Indiana is not an Agreement State, the NRC is responsible for the portion of the proposed action that occurs in Indiana. This includes the receipt of the waste oil upon arrival at the recycling facility and the activities specific to the proposed recycling and distribution process.

Using the guidance provided in FSME-12-025, the State of TN, as an Agreement State, could use their 20.2002-equivalent regulation to permit recycling as an alternate disposal option. As part of the approval process TN would also be required to issue a 10 CFR 30.11-equivalent specific exemption to allow BSI to transfer waste oil with non-detectable levels of radioactive material to the Safety Kleen recycling facility in Indiana without requiring an exempt distribution license in accordance with the NRC's 10 CFR 32.11 regulation. As dictated by FSME-12-025, activities performed by Safety Kleen, including acquisition of waste oil containing small concentrations of radioactive material, mixing of the oil with other used oil, and distributing recycled oil for commercial uses would be overseen by the NRC since Indiana is a Non-Agreement State. Similar to the process discussed above, the NRC staff would review these processes and authorize the recycling of the used oil with non-detectable concentrations of radioactive material in accordance with 10 CFR 20.2002 and concurrently issue a 10 CFR 30.11 specific exemption allowing Safety Kleen to distribute the recycled oil without obtaining an exempt distribution license under 10 CFR 32.11.

CONCLUSION

In response to the request sent by the TDEC, NRC staff reviewed the technical and policy questions provided as well as performed an independent review of the entire process. As a result of its review NRC staff found that the scenarios and conservative radionuclide concentrations considered by TDEC provide adequate estimations of the low worker doses that could be expected as a result of the transfer, transport, and recycling of waste oil that contains small concentrations of radioactive material. Additionally, although other methods for measuring gross alpha and gross beta concentrations in oil have been developed, the proposed method provided by BSI is acceptable.

NRC staff concluded that the approach proposed in the submittal would not require an NRC or Agreement State review and exemption if the radionuclide concentrations in the waste oil samples are determined to be below background. NRC technical staff, in coordination with OGC, determined that, if requested, the review process for recycling oil with small concentrations of radioactive material could be implemented using the guidance provided in FSME-12-025. Using the guidance provided in Scenario 3, TDEC would regulate the portion of the process occurring within the state of Tennessee using their NRC-equivalent 10 CFR 20.2002 and 10 CFR 30.11 regulations. Any actions impacting the waste oil that occur at the Safety Kleen facility in Indiana would be regulated by the NRC.

As for the radionuclide concentrations that are acceptable for this license amendment request, as long as the proposed concentrations included in the license amendment request are less than the exempt concentrations in 10 CFR 30.70 and Tennessee maintains regulations equivalent to the NRC with regards to recycling and disposal of waste oil containing small concentrations of radioactive material, BSI would be permitted to transfer the waste oil to a "person", licensed or unlicensed, via 10 CFR 30.41. Again, it should be noted that since Tennessee is an Agreement State they must maintain equivalent regulations in order for recycling of the waste material to occur as proposed.

Based on these conclusions the NRC staff finds no technical issues with the anticipated radionuclide concentrations and corresponding doses associated with the proposed recycling process. However, since multiple states, including both an Agreement State and a Non-Agreement State, are involved in this process, the NRC staff suggests that BSI and Safety Kleen work with the NRC and TDEC to ensure that the waste oil containing small concentrations of radioactive material can be transferred to Indiana for recycling using the appropriate processes and procedures. It should be noted that these conclusions are based on these specific processes occurring at BSI's Oak Ridge Service Center facility in Oak Ridge, Tennessee and the use of the Safety Kleen recycling facility in East Chicago, Indiana discussed in this proposed licensing action. Additional reviews may be needed if other processes or sites are considered.

In accordance with 10 CFR 2.390 of the NRC's "Agency Rules of Practice and Procedure," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

If you have any questions concerning the above, please contact Adam Schwartzman at (301) 415-8172 or via email at Adam.Schwartzman@nrc.gov.

Sincerely,

/RA/

John Tappert, Director
Division of Decommissioning, Uranium Recovery,
and Waste Programs
Office of Nuclear Material Safety
and Safeguards

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