Information Concerning the WIDE System for Application of the Categorical Exclusions in Appendix A to Subpart D of DOE's NEPA Regulations (10 CFR 1021.410b) (Appendix A Exclusions that Apply B 6, B 6.2, and B 6.8)

The following is justification for including the WIDE system, being used to remediate Battelle's Abandoned North Filter Bed, in the site's 1990 categorical exclusions in Appendix A to Subpart D of DOE's NEPA regulations. We believe the 1990 EA and FONSI is not changed by and actually covers this action. From a memorandum on August 7, 1992 to all NEPA Compliance Officers (NCOs) by Carol M. Borgstrom, Director of Office of NEPA Oversight, the policy to periodically review potential activities under their jurisdiction that would fit within the typical classes of action in Appendix A to ensure compliance with 10 CFR 1021.410(b) was given (See Attachment 1). It also allowed the NCOs to judge whether any future Appendix A actions would present extraordinary circumstances that may affect the significance of environmental effects of the proposals. This document is written to provide specific data on the WIDE system to show that this remediation action not only fits within the categorical exclusions of Appendix A of the NEPA regulations but provides even less environmental impact and risk than the approved excavation methodology.

The task at hand, as part of the DOE/Battelle cost shared Battelle Columbus Laboratories Decommissioning Project (BCLDP), is to remediate an abandoned north filter bed at Battelle's West Jefferson site with above free release levels of Cesium-137 contamination. The filter bed is located inside the flood plain of the Big Darby Creek, a designated Ohio pristine river. The Cesium contamination ranges from slightly over 15 pCi/gm to 200 pCi/gm in an area approximately 35 meters long by 20 meters wide by 2.5 meters deep. The contamination is presently immobile as verified by monitoring wells and periodic sampling. The present method of remediation is by soil excavation and consequent radioactive disposal at a DOE approved radioactive disposal site. This methodology can be engineered safe but contains significant containment controls to limit the silt and excavation fines from affecting the Big Darby Creek. It also involves excavating, packaging and shipping approximately 84,000 cubic feet of radioactive soil to Utah for radioactive burial. The use of the WIDE system involves the *in-situ* removal of the Cesium in the soil with a closely controlled well injection/extraction method. The Cesium is essentially stripped from the clays holding it by injecting, through wells, a lixiviant liquid and, within 3 feet of its origin, extracting with the liquid out of the ground by vacuum wells. This system would fall under B6 - Categorical exclusions applicable to environmental restoration and waste management activities, B6.2 – Siting/ construction/ operation of pilot-scale waste collection/ treatment/ stabilization/ containment facilities, and B6.8 – Modifications for waste minimization/ reuse of materials of Appendix A – Categorical exclusions (See Attachment 2).

System Background

The WIDE system was developed by West Virginia University, North Carolina State University and the NILEX Corporation through DOE funded grants from the National Energy and Technology Laboratory (NETL) in Morgantown, West Virginia. It has been commercialized by the Informatics Corporation of Richland, Washington. It was originally used to extract volatiles (gasoline) in Weston, West Virginia and has recently been used to extract jet fuel, JP-4 from Lockborne Air Force Base in Columbus, Ohio. During a DOE pilot demonstration at the Ashtabula Environmental Management Project, Ashtabula, Ohio, the system was found to not only extract TCE from a Corrective Action Management Unit (CAMU) but also Technectium 99 and Uranium that had become soluble in the liquid. Since Cesium can also become soluble in water, this system is a suitable candidate for the Battelle project. Both the West Virginia and the Ashtabula projects required Surface Water Discharge Permits since the wastewater was discharged. The Ashtabula and Columbus projects received Permits to Install – Air de Minimus and Underground Injection Permits – Class Vs.

Upon contacting the Ohio EPA, Battelle found that they we're very familiar with this process. Providing we supply them with our design and use, they are allowing us to apply for and receive an exemption from formal permitting procedures for Class V aquifer remediation projects (See Attachment 3). Since Informatics has utilized a Quality Assurance program to validate their methods and sampling, there was no Contaminate Removal Certificate or Chemical Removal Certificate required at Ashtabula. Battelle does not anticipate these requirements either for the same reason but will provide final status survey results to the NRC upon completion.

Battelle's North Abandoned Filter Bed area has been extensively characterized for radioactive constituents. The only radioactive constituent above free release levels is Cesium-137. Battelle must remediate this area as part of their NRC D&D plan to terminate their NRC Material License SNM-7. The area had previously been remediated by removing the leach field tiles and sand from the area. However, small amounts of soluble Cesium were apparently left in the wet field and became entrained on the clay fines during the re-grading effort prior to the installation of the one-foot clay cap. It is this Cesium that the WIDE system is attempting to extract without exposing the surface and underground soil to the environment such as wind, water, etc. by excavation as had been previously done. Since these soils are not physically handled, packaged, or disposed of, this process should significantly reduce the radiological impacts to the D&D workers and to the general public.

System Description

The WIDE system is a hybrid soil flushing/soil de-watering and vapor extraction tool that uses prefabricated vertical wells (PVWs^{TM}) for the *in-situ* remediation of contaminated, fine-grained and low-permeability soils. It has been field demonstrated as suitable for removal of dissolved-phase contaminates and has been successfully permitted by the Ohio EPA and the NRC (through the Ohio Department of Health).

For the Battelle deployment (once online), a solution will be pumped through the WIDE system wells into the contaminated subsurface clay and sand soil mixture. This solution, made up of water and a PNNL developed lixiviant, will separate the Cesium from the soil particles so that contaminated liquid can then be collected through the vertical vacuum sealed wells. The liquid is then transferred up through a vacuum tight PVC pipe matrix and into a collection tank. It is then processed through a pre-filter to separate particulates, including Cobalt and Americium (if any) and a 3M Selective Separation Cartridge to remove the concentration of now soluble Cesium. The liquid is placed into a tank where it is recharged with lixiviant. Re-injecting it into the ground then recycles it.

The WIDE system is a particularly effective fluid delivery system for removing contamination within low permeability, high clay fraction soils such as Battelle's. Conventional technologies such as pump and treat groundwater remediation, and vapor extraction using conventional well fields, are typically ineffective when applied to these conditions. The PVW's, used in lieu of conventional wells and sumps, can extract liquids/gases and/or inject liquid flushing agents. From the outside, PVW's look like a large drinking straw, but with multiple openings up and down the length of the well. Internally, PVW's are constructed of a geosynthetic composite system consisting of an inner core; and an outer filter jacket. The tightness of the fabric weave varies to allow liquids to pass back and forth, while keeping a minimum of soil particles from entering the well. Since vacuum is used for the extraction of the liquid, it is imperative that the PVW's are sealed from the surface. This seal allows the PVW's to remove the liquids from the adjacent injection well, through the fines, and into the PVC transfer tubes that carry the liquid to the filters. The vacuum transfer system not only requires the PVC and wells to be sealed but any air leakage with the atmosphere is immediately detected. Since the underground well openings to the separation filters are sealed so well, the vacuum system would actually work better if the surface were flooded (i.e. the environmental impacts on this approach has been minimized if the area were to have undesirable surface conditions or flood).

System Operational Characteristics

The Wide system is essentially a closed-cycle extraction system with no contaminate emissions. There is essentially total liquid recycle with 99.95% Cesium and particulate removal from the transfer liquid. There is no air or noise emission concerns with this system. Noise suppression and air/water vapor separation equipment has been installed on this equipment. Even though there is no air-water contact of compressor air with the transfer liquid under normal operations, Battelle has also installed a double HEPA filter on the compressor exhaust as a precaution and as a radioactive monitoring point for operational assurance. Sampling and monitoring of the transfer liquid, the contaminated well field, the particulate and Cesium collection filters, and the injection tank is performed continuously during the eight-hour per day processing period. This will significantly minimize the radiological impacts to the D&D workers and the general public. The system is not designed to be run in extended below freezing temperatures since no heat generating equipment is included. The scheduled time for processing with the WIDE system is from March to mid-October.

In addition, the WIDE system has several physical and operational limitations that make it environmentally safe and environmentally isolated from the Big Darby Creek flood plain. The PVW's in the contaminated well field are spaced only two feet apart, due to the low permeability of the soils, and are alternated between injection and extraction wells. The pressures used in the injection wells cannot move the liquids two feet to the extraction wells without aid of the vacuum system. An operator is always present during injection to monitor the system and to control/balance the injection/extraction rates. Furthermore, the outside PVW's in the area worked are all extraction wells, which boundaries the movement of the lixiviant transfer liquid to the area of concern. When the system is shut off or if there is a power failure, the movement of fluids within the low permeable soil is extremely slow. It is even slower in the natural soils surrounding the abandoned filter bed, which have even lower permeability.

The stripping of the Cesium from Battelle's soils and its cleanup from the transfer liquid is both contaminant-specific and site-specific. The lixiviant developed by PNNL has been adjusted specifically for Battelle's high clay fines soil. A treatability study was performed on the north abandoned filter bed soil to prove it would strip Cesium from Battelle's clay fines. A dynamic test on additional soil is presently being conducted with the lixiviant simulate field process conditions. The filter developed by 3M is also selective removal cartridge system specifically for Cesium. It has been proven to perform well with the citric acid base used in the lixiviant.

It is anticipated that approximately 2000 PVW's approximately 9 feet deep will be used for the *in-situ* injection/extraction process to remove the Cesium. The wells will be abandoned properly per EPA guidance at the conclusion of the remediation process. Minor excavation will be performed, as necessary, following the WIDE process on the surrounding areas and the surface. This will leave the area in a stable, radioactively free released state without relocating active filter bed systems, underground utilities, or requiring extensive upgrades to the area's infrastructure (roads, power requirements, etc.)

Waste Issues

During the WIDE system operation, radioactive constituents will be collected on both the pre-filters and the Cesium separation filters. The lixiviant liquid is not capable of creating a mixed waste through its chemical stripping action. The present chemical analysis of the area in question does not indicate a mixed waste situation either. Both the particulate filters and the Cesium filters will be changed out as radiological activities and will be disposed of as LLW at Envirocare or Hanford just as other Cesium and spent fuel contaminated filters are processed in the BCLDP presently. The filters are generally removed inside local containment using a bag-in/ bag-out method. The wet filter is then transported to JN-1 where it is dried, packed with absorbent and placed in B-25 boxes for disposal. It is anticipated that four to six particulate filters and up to four Cesium filters could be processed in this manner.

In addition to radiological waste, some non-radiological and chemical waste could have to be processed. Although the WIDE system process calls for flushing the field with water at the end of the remediation, the citrus based lixiviant acid could need to be neutralized for disposal. Our Waste Management organization has performed this type of work before. We anticipate that limited quantities of this type of work will be required. The Cesium stripping process performed by the lixiviant is anticipated to produce a underground soil rich in nitrogen and salt. Although far below the re-seeded grass, this soil would be ideal for plant growth.

Considering the details of the WIDE system process, this activity fits firmly within the categorical exclusions in Appendix A. It also provides a significantly safer and more environmentally friendly approach to the Cesium remediation of Battelle's North Abandoned Filter Bed than exposing 84,000 cubic feet of soil to the environment during excavation.