3.0 ENVIRONMENTAL PROGRAM INFORMATION

The principal objective of MEMP environmental monitoring programs is to ensure that any threat to human health or the environment is promptly detected and mitigated. It is MEMP's policy that meeting this goal be viewed as a minimum standard of practice; better performance should always be pursued. The philosophy is evident in the extent and scope of MEMP's effluent and environmental monitoring programs. It is also supported by MEMP's commitment to successful programs in the areas of:

- ALARA (As Low As Reasonably Achievable),
- Regulatory compliance,
- Waste minimization and pollution prevention,
- Environmental restoration.

3.1 Environmental Monitoring Program

The MEMP environmental monitoring program (BWXTO, 2000) generates data on surface water, groundwater, sediment, foodstuffs, and air. These media are pathways for migration of hazardous materials from the site to the public. The monitoring program includes effluent monitoring, environmental surveillance, and meteorological monitoring. Effluent monitoring focuses on releases from the site, i.e., stack and wastewater discharges. The environmental surveillance program focuses on environmental conditions in the area surrounding the site and in local communities. Meteorological monitoring focuses on weather conditions which are used to determine the environmental impact from air emissions.

3.2 Effluent Monitoring

Air Emissions

Stacks through which radioactive materials are released are sampled for tritium and/or particulate radionuclides. These samples are collected to demonstrate compliance with radionuclide NESHAPs regulations and to provide early warning of abnormal emissions so that timely corrective actions can be undertaken. An outline of the routine stack radionuclide sampling program is shown in Table 3-1. Stacks are also equipped with real-time monitors that operate continuously. Samples may be collected at any time if one of the real-time monitors should alarm. MEMP also releases very small quantities of nonradiological constituents into the atmosphere. Annual nonradiological emission rates are calculated using a material balance or emission factor approach. The releases are governed by State of Ohio EPA permits and regulations.

Table 3-1. Effluent Monitoring at MEMP

	Parameter Measured[a]	No. of Sampling Locations	Collection Frequency
Air Emissions			
	HT, HTO	10	Weekly
	^{238}Pu, $^{239,240}Pu$	7	Weekly
	$^{233,234}U$, ^{238}U	6	Weekly
Water Effluents			
	Flow rate	5	Daily
		1	When well is pumped
	HTO, gross alpha	4	Daily
	^{238}Pu, $^{239,240}Pu$	4	Daily
	$^{233,234}U$, ^{238}U	4	Daily
	^{228}Th, ^{230}Th, ^{232}Th	4	Daily
	pH	1	Daily
		3	Weekly
		1	1/2 Weeks
		1	When well is pumped
	Chlorine	1	Daily *
	Dissolved oxygen	1	Weekly
	Dissolved solids	1	1/2 Weeks
	Suspended solids	1	2/Week
		2	Weekly
		1	1/2 Weeks
	COD	1	Weekly
	$CBOD_5$	1	2/Week
		1	Monthly
	Fecal coliform	1	Weekly *
	Ammonia	1	1/2 Weeks
	Oil and grease	1	Monthly
		1	Quarterly

[a] HTO = Tritium oxide
HT = Elemental tritium
Pu = Plutonium
U = Uranium
Th = Thorium
$CBOD_5$ = Five day carbonaceous biochemical oxygen demand
COD = Chemical oxygen demand
* Summer Months: May 1 – October 31

Table 3-1. Effluent Monitoring at MEMP (continued)

	Parameter Measured [a]	No. of Sampling Locations	Collection Frequency
Water Effluents			
	Free cyanide	1	Monthly
	Cadmium	2	Monthly
	Chromium	1	Weekly
		2	Monthly
	Copper	1	Weekly
		2	Monthly
	Lead	1	1/2 Weeks
		2	Monthly
	Mercury	1	Weekly
	Nickel	1	1/2 Weeks
		2	Monthly
	Selenium	1	Monthly
	Silver	1	Monthly
	Zinc	1	1/2 Weeks
		2	Monthly
	VOCs	1	Monthly
		1	Quarterly
		1	When well is pumped
	Toxicity testing		
	Ceriodaphnia dubia		
	acute	1	Quarterly
	chronic	1	Quarterly
	Pimephales promelas		
	acute	1	Quarterly
	chronic	1	Quarterly

[a] VOC = Volatile organic compound

Water Releases

Water released from the site is also sampled at the discharge points. Effluents include process wastewater, sewage water, and storm water. Extensive sampling and analysis are required to demonstrate compliance with the site's NPDES permit and the OU1 ATD. An outline of the effluent water sampling program is also shown in Table 3-1.

3.3 Environmental Surveillance

MEMP maintains an extensive environmental surveillance program designed to evaluate potential impacts from the site on human health and the environment. The environmental surveillance program involves sample collection and analysis of ambient air, regional water supplies, sediments, onsite and offsite groundwater, and foodstuffs. This program complements the effluent monitoring program which focuses on releases from the site, i.e., stack and water discharges. An outline of the environmental surveillance program is shown in Table 3-2.

Radionuclides of Concern

The principal radionuclides of concern at MEMP are tritium and plutonium-238; no other radionuclides contribute significantly to the dose estimates for the site (see Appendix E). Other radionuclides, however, have been used at the site. Where there is a strong probability of detecting such radionuclides in the environment, they have been added to the appropriate sampling schedule. The primary example is uranium. Because U-234 is a decay product of Pu-238, U-233,234 is a part of MEMP's routine environmental monitoring program. MEMP analyzes drinking water and river water samples to monitor the ingrowth of U-233,234. No significant concentrations have been encountered. Radioisotopes of thorium were also used historically in MEMP operations. To ensure that no significant dose impact from thorium is occurring, monitoring is performed. These data show that thorium concentrations are at or very near environmental levels.

Ambient Air

MEMP maintains a network of ambient air surveillance stations to monitor the impact of airborne radiological emissions on the local and regional environments. The network includes both onsite and offsite stations. The number and placement of offsite stations is based on the population distribution, the prevailing winds, and project activity.

Collection of Ambient Air Samples

Surface Water and Sediment

The Great Miami River and other regional surface water locations are sampled routinely for radionuclides. Since plutonium and thorium in river water tends to accumulate in sediments, sediment samples are collected from these locations and analyzed for isotopes of these radionuclides.

Table 3-2. Environmental Surveillance at MEMP

Environmental Medium	Parameter Measured [a]	No. of Sampling Locations [b]	Collection Frequency
Onsite			
Ambient air	HTO	8	Weekly
	^{238}Pu, $^{239,240}Pu$	8	Weekly
	^{228}Th, ^{230}Th, ^{232}Th	4	Weekly
	Particulates	8	Weekly
Drinking water	HTO	3	Weekly
	^{238}Pu, $^{239,240}Pu$	3	Monthly
	$^{233,234}U$, ^{238}U	3	Monthly
	^{228}Th, ^{230}Th, ^{232}Th	3	Monthly
	^{226}Ra, ^{228}Ra	5	Annually
	Gross Alpha	5	Annually
	Gross Beta	5	Annually
	VOCs	5	Quarterly
	MCL Inorganics	5	Annually
	Nitrate	5	Annually
	Lead and Copper	20	Semi-annually
	Total coliform	2	e
Groundwater	HTO	71 [c]	e
	^{238}Pu, $^{239,240}Pu$	17	e
	$^{233,234}U$, ^{238}U	17	e
	^{228}Th, ^{230}Th, ^{232}Th	16	e
	^{226}Ra, ^{228}Ra	10	e
	VOCs	71 [c,d]	e
	Inorganics	25 [c,d]	e

[a] HTO = Tritium oxide, Pu = Plutonium, U = Uranium, Th = Thorium, Ra = Radium, VOC = Volatile organic compound

[b] Includes background location when applicable

[c] Groundwater sampling includes wells, capture pits, and seeps

[d] Non-detects are not reported in App. D
[e] Sample collection frequency varies

Table 3-2. Environmental Surveillance at MEMP (continued)

Environmental Medium	Parameter Measured [a]	No. of Sampling Locations [b]	Collection Frequency
Offsite			
Ambient air	HTO	12	Weekly
	^{238}Pu, ^{239,240}Pu	12	Weekly
	^{228}Th, ^{230}Th, ^{232}Th	2	Weekly
	Particulates	12	Weekly
River/stream water	HTO	7	Monthly
	^{238}Pu, ^{239,240}Pu	6	Monthly
	^{233,234}U, ^{238}U	6	Monthly
	^{228}Th, ^{230}Th, ^{232}Th	6	Quarterly
River/stream sediment	^{238}Pu, ^{239,240}Pu	7	Quarterly
	^{228}Th, ^{230}Th, ^{232}Th	7	Quarterly
Pond water	HTO	7	Annually
	^{238}Pu, ^{239,240}Pu	7	Annually
Pond sediment	^{238}Pu, ^{239,240}Pu	7	Annually
Drinking water	HTO	7	Monthly
	^{238}Pu, ^{239,240}Pu	2	Monthly
	^{233,234}U, ^{238}U	2	Monthly
	^{228}Th, ^{230}Th, ^{232}Th	2	Semi-annually
Groundwater	HTO	18	e
	^{238}Pu, ^{239,240}Pu	7	e
	^{233,234}U, ^{238}U	7	e
	^{228}Th, ^{230}Th, ^{232}Th	7	e
	VOCs	13	e
	Inorganics	13	e
Foodstuffs	HTO	8	Annually
	^{238}Pu, ^{239,240}Pu	3	Annually

[a] HTO = Tritium oxide, Pu = Plutonium, U = Uranium, Th = Thorium, Ra = Radium, VOC = Volatile organic compound

[b] Includes background location when applicable

[c] Groundwater sampling includes wells, capture pits, and seeps

[d] Non-detects are not reported in App. D

[e] Sample collection frequency varies

Foodstuffs

Locally-grown vegetables are collected and analyzed to estimate a dose via the ingestion pathway from radionuclides of MEMP origin. Root crops such as potatoes are analyzed since the roots may come into long-term contact with subsurface plutonium. Tomato samples, conversely, are of use due to their high water content making them excellent indicators of tritium uptake.

Groundwater

MEMP maintains an extensive groundwater monitoring network designed to provide information on the impact of site activities on local and regional groundwater. Groundwater samples are collected from onsite and offsite monitoring wells, onsite and offsite production wells, private wells, and regional community water supplies. Samples are analyzed for radionuclides, volatile organic compounds (VOCs), and inorganic parameters.

Environmental Levels

To evaluate MEMP's impact on the environment, it is necessary to establish background or baseline levels of contaminants in a variety of media. MEMP accomplishes this task by collecting samples at locations where the impact from site discharges is not observable. These locations are usually in a direction upwind and at a distance too great to be impacted by the site. Concentrations measured at these reference locations are referred to as "environmental levels" in this Report. Measurable concentrations at these locations are due to naturally occurring or non-MEMP activities.

3.4 Meteorological Monitoring

Meteorological monitoring provides information on weather conditions that can be used to forecast atmospheric dispersion following planned or unplanned releases of airborne material. Atmospheric dispersion is a function of wind speed, wind direction and atmospheric stability. Atmospheric stability determinations are made by estimating the amount of atmospheric turbulence in the lateral wind direction using a bi-directional wind vane. The parameters which characterize dispersion (wind speed, wind direction and atmospheric stability) are closely monitored at the site with the aid of two meteorological towers.

50-meter meteorological tower

3.5 Effluent Treatment and Waste Management

Effluent Treatment

Air. High efficiency particulate air (HEPA) filters remove particulate radionuclides from process air emissions. Air effluents are filtered first at their point of origin (e.g., a glove box), and again just before reaching the release point (i.e., the stack or vent). The filtering system in place at each stack with particulate emissions is composed of two banks of HEPA filters connected in series. Each filter bank has a nominal collection efficiency of 99.95% for 0.2-micron particles. Tritium is not trapped by HEPA filters. A chemical process is used to recover tritium from waste gas streams.

Water. An onsite sanitary waste treatment plant manages all domestic wastewater generated at the site. Treatment is provided via an activated sludge process operated in the extended aeration mode. A continuous backwash sandfilter serves as tertiary treatment. The influent and effluent at the sewage treatment plant are monitored to ensure that radionuclides are not inadvertently discharged to the environment. All wastewater, after appropriate treatment and monitoring, is discharged to the Great Miami River. Digested sludge from the sanitary treatment plant is managed as Low Specific Activity (LSA) waste.

Waste Management

The waste management focus has shifted from support of routine operations to environmental restoration and disposition of legacy wastes. In 2000, 129,700 pounds of hazardous and other regulated wastes were shipped offsite. Of that amount, 65,985 pounds were RCRA-regulated wastes, 35,109 pounds were asbestos and PCB wastes, and 28,606 pounds were other wastes not suitable for sanitary landfilling.

Hazardous wastes. BWXTO operates two hazardous waste storage units for the MEMP; one is used for hazardous wastes and the other is used for mixed wastes, i.e., radioactive wastes that are also regulated by RCRA. The storage units are operated in accordance with a RCRA Part B permit issued by the Ohio EPA in October 1996.

Radioactive Wastes. MEMP currently has two disposal options for low-level radioactive wastes. The waste can be shipped to the Nevada Test Site (NTS) or to Envirocare, a commercial disposal facility. In 2000, 56 truck shipments (77,763 ft^3) of low-level waste were shipped to NTS and 8 railroad shipments (16,338 ft^3) and 5 truck shipments (4,860 ft3) of low-level waste were shipped to Envirocare.

Mixed wastes. Hazardous wastes that are radioactively-contaminated are referred to as mixed wastes. These wastes are stored onsite in a RCRA-permitted facility until treatment/disposal options have been evaluated. In 2000, four mixed waste streams were shipped off-site for treatment and disposal. BWXTO will continue to explore new treatment options as they become available to reduce turnaround times associated with the disposition of newly discovered mixed waste streams.

Nonhazardous solid wastes. Nonhazardous, nonradioactive solid wastes generated by BWXTO are disposed of in a licensed, permitted sanitary landfill. The volume of materials requiring landfill disposal has been reduced as a result of recycling programs for paper and scrap metal.

3.6 Environmental Permits

MEMP activities are routinely measured against the compliance requirements of state air and state water permits. Additionally, the hazardous waste program operates pursuant to a RCRA Part B permit. Table 3-3 lists permits applicable to MEMP and BWXTO activities.

3.7 Waste Minimization and Pollution Prevention

BWXTO has established programs to reduce the volume and toxicity of hazardous, radioactive, mixed, and solid waste streams. These goals are accomplished by preventing waste generation, recycling, and reclamation. Programs include recycling of expended vehicle batteries, scrap metals, white recyclable paper, and toner cartridges. Recycling bins are also provided for aluminum cans, which are accumulated and recycled by employees. In 2000, MEMP recycled 16.5 tons of white paper and 347 tons of scrap metal.

3.8 Environmental Restoration

MEMP's primary focus is environmental restoration of the site in preparation for transition of the property to the community for economic development. The site was added to the CERCLA NPL in 1989. DOE, U. S. EPA, and Ohio EPA administer CERCLA activities in accordance with the terms of a FFA. In 1995, the traditional CERCLA program at MEMP was reorganized to increase the efficiency of the environmental restoration effort. The resulting process, termed "MOUND 2000," has accelerated clean-up of the site so that the land can be released for economic development much more quickly than originally planned. The MOUND 2000 process is described in Section 2.1.

E Building and Building 68 were demolished as a CERCLA removal action. The Action Memorandum was in public review from December 1999 to January 2000. Field work was initiated in mid-April. By August, the demolition of the structures was complete. Removal of E Building's slab material began in October and will be complete in calendar year (CY01). Completion of the removal action will be documented in an On-Scene Coordinator Report in CY01.

Completion of the PRS99 removal action was documented in an On-Scene Coordinator report (Final, August 2000). PRS 99, also known as Area 6 or WD Building Filter Cleaning Waste, is a former trench in the parking lot south of GH Building. Sampling performed in February 1999 produced one sample with an elevated (with respect to risk based guideline values) concentration of plutonium-238. Subsequent trenching investigation yielded evidence of greater contamination. A removal action was performed in CY99 and subsequent verification sampling documented the remaining plutonium-238 concentration below risk based guideline values.

In 2000, several other key environmental restoration projects and waste management initiatives were completed. Descriptions of key accomplishments are provided in the following sections.

Table 3-3. Environmental Permits

Operation	Permit Type	Permit No.	Valid Through	Issuing Agency
9 Standby Power Diesel Generators	air	B009 - B017[a]	permanent	Ohio EPA
SW/R Fumehoods	air	P012, P014, P015 (registration)	permanent	Ohio EPA
Wastewater Discharge (NPDES)	water	1IO00005*HD	3/31/02	Ohio EPA
Wastewater Discharge (OU1 ATD)	water	1IN90010*AD	permanent	Ohio EPA
Building 48	air	P008 (registration)	permanent	Ohio EPA
Crusher	air	F003	5/29/01	Ohio EPA
Roadways and Parking Lots	air	F001 (registration)	permanent	Ohio EPA
Underground Line Removal (diesel generator)	air	B008 (registration)	permanent	Ohio EPA
Gas Dispensing Facility	air	G001 (registration)	permanent	Ohio EPA
Open Burning (fire training)	air	Letter permit (registration)	permanent	RAPCA
Powerhouse Boiler 1 and Boiler 2	air	B001 B006	7/31/05	Ohio EPA
Fuel Oil Storage	air	T005	2/17/01	Ohio EPA
R/SW HEFS Stack	air	P030	1/24/01	Ohio EPA
Hazardous Waste Storage	RCRA operation	05-57-0677	10/18/01	Ohio EPA

[a] Applied for registration status with Ohio EPA

OU1 Treatment Systems. OU1 addresses volatile organic chemicals in the groundwater near the site's former solid waste landfill. Two treatment systems are operating there. A groundwater pump and treat system is used to create a hydraulic barrier to contain contaminated groundwater in the vicinity of the landfill. Groundwater is continuously pumped from a series of extraction wells and passed through an air stripper to reduce VOC concentrations before the water is discharged. The water discharges are governed by an ATD issued by the Ohio EPA in July 1997. In 2000, approximately 41,800,000 gallons of water were treated, removing approximately 3 pounds of VOCs. Since its inception, the system has removed 24 pounds of contaminants.

An air sparge/vapor extraction system became operational in December 1997. It sparges (injects) air into the groundwater to volatize VOCs already in the groundwater. Recovery wells above the water table extract the VOC vapors liberated by air sparging as well as pulling in VOC vapors liberated from the soil above the water table. The captured vapors are passed through granular activated carbon (GAC) to absorb the VOCs before the air is vented to the atmosphere. Since start-up, the air sparge/soil vapor extraction system has recovered approximately 3,698 pounds of VOCs.

Miami-Erie Canal Project. The Miami-Erie Canal Project addressed contamination of a one-mile section of the abandoned canal within the City of Miamisburg. Clean-up of the canal to levels consistent with recreational use was completed in May 1998. Planting grass and trees and constructing a bike path has restored the site. The easement to perform remediation was cancelled in May 2000 and no further environmental monitoring is required. A CERCLA On-Scene Coordinator Report documenting the clean-up was issued in May 1999.

Building demolition projects. E Building and Buildings 67, 68, and 88 were demolished in 2000.

E Building Demolition Project

Selentec Study. The objective of the Selentec pilot scale treatability study for transuranic (TRU) soil was to determine the ability of the ACT*DE*CON process to reduce radionuclide concentrations in soil. The process provides a highly selective dissolution of contaminants from the soil by the use of a chemical wash. The study evaluated process effectiveness on MEMP and Nevada Test Site (NTS) TRU soil. Test runs were completed on nine separate "batches" of NTS soil. Results indicate that the process did not effectively remove the plutonium from NTS soils. Test runs performed on Mound soils indicate that the process could achieve the site cleanup goal on high fines clay soil. However, it is not clear that the process would be as effective on natural clay soil.

3.9 Cost Recovery Grant

The Cost Recovery Grant (CRG) represents an added dimension to the environmental monitoring programs in place at MEMP. The CRG replaced the Agreement-in-Principle grant in July of 1998. These agreements establish a framework under which the State provides oversight and monitoring activities at MEMP.

Under the CRG, various state agencies review DOE environmental monitoring (Ohio EPA and Ohio Department of Health) and emergency management (Ohio Emergency Management Agency) programs. The agencies perform independent monitoring, data collection, and oversight of project activities.

3.10 Release of Property Containing Residual Radioactive Material

Real Property Management

Real Property Management is responsible for all real property issues arising at Mound. This includes the preparation of easements for utilities and other purposes on the site, and the disposal of modular and Butler buildings. Real Property Management oversees the Facility Information Management System (FIMS), which is a computerized database that provides DOE/HQ with a summary of real property data relating to MEMP. Because of FIMS requirements, it is necessary to notify the Real Property Coordinator anytime a trailer or other structure is leased, purchased, or demolished and when hazardous substances are moved into or out of a building or structure.

Personal Property Management

Excess personal property is dispositioned in accordance with the 41 CFR Parts 101 and 109 and Federal Property Management Regulations. Before excess property is made available to other government agencies through the reutilization process, the property is made available to the MMCIC. Depending on the type and condition of equipment, and the associated acquisition cost, excess property is also made available to DOE facilities through the Energy Asset Disposal system (EADS), General Services Administration (GSA) database or gifted to educational institutions. Through access to either of these two databases, other state and federal entities may acquire property. If other federal or state entities do not acquire property within an allotted time, the property may then be donated to educational institutions or dispositioned through auctions. Net proceeds from these auctions are entered into a General Site Fund dedicated exclusively to MEMP.

No equipment is accepted that has been: 1) exposed to radiological contamination, 2) located inside a Radioactive Materials Management Area (RMMA), Radiation Buffer Area (RBA), Contamination Area (CA) or High Contamination Area (HCA). See Table 3-4 for Radioactive Surface Contamination Limits for Unrestricted Release.

No equipment that has been exposed to heavy metals, beryllium, asbestos or energetic materials contamination is accepted into excess. The equipment must be evaluated and released by Industrial Hygiene/Safety to Waste Management.

Table 3-4. Radioactive Surface Contamination Limits for Unrestricted Release

Radionuclide [2]	Direct Total or Average Total (Fixed + Removable) (dpm/100 cm^2)[1]	Maximum Total (Fixed + Removable) (dpm/100cm^2)[1]	Removable (dpm/100cm^2)[1]
Transuranics, I-125, I-129, Ra-226, Ac-227, Ra-228, Th-228, Th-230, Pa-231	100	300	20
Th-natural, Sr-90, I-131, I-133, Ra-223, Ra-224, U-232, Th-232	1,000	3,000	200
U-natural, U-235, U-238 and associated decay product, alpha emitters	5,000	15,000	1,000
Beta-gamma emitters (radionuclides with decay modes other than alpha emission or spontaneous fission) except Sr-90 [3]	5,000	15,000	1,000
Tritium, all forms (surface and subsurface)	NA	NA	10,000

Notes:

(1) As used in this table, disintegrations per minute (dpm) means the rate of emission by radioactive material as determined by correcting the counts per minute measured by an appropriate detector for background, efficiency, and geometric factors associated with the instrumentation.

(2) Where surface contamination by both alpha and beta-gamma-emitting radionuclides exists, the limits established for alpha and beta-gamma-emitting radionuclides should apply independently.

(3) This category of radionuclides includes mixed fission products, including the Sr-90 which is present in them. It does not apply to Sr-90 which has been separated from other fission products or mixtures where the Sr-90 has been enriched.

Surplus Property Donations/Gifts

In accordance with governing documents, BWXTO "gifts" or "donates" equipment deemed appropriate for use in improving math and science curricula or activities for elementary and secondary school education, or for the conduct of technical and scientific education research activities. Eligible recipients are local (to MEMP) elementary and secondary schools (public and private), encompassing kindergarten through twelfth grade and non-profit organizations. Excess property screened through the EADS system database is circulated for colleges and universities through the Energy-Related Laboratory Equipment (ERLE) program.

2000 Activities. Excess equipment was donated to the First United Methodist Church, Hickorydale International Heritage Academy, Germantown Police Dept., Stivers School of the Arts, Kettering Middle School, McGuffey Foundation School, Germantown Christian Schools, Jackson Township, Bishop Fenwick High School, Chautauqua Baptist Fellowship Park, Christ Memorial Missionary Baptist Church, and Kinder Elementary School.

3.11 Protection of Biota

DOE Order 5400.5 requires that populations of aquatic organisms be protected at a dose limit of 1 rad/day (10 milliGray/day). The draft DOE Technical Standard, "A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota (ENVR-0011)" and supporting software (RAD-BCG) were used in the evaluation and reporting of compliance with biota dose limits. The Technical Standard provides a graded approach for demonstrating compliance with the biota dose limit and for conducting ecological assessments of radiological impact. The Manual was developed by DOE through the Department's Biota Dose Assessment Committee (BDAC) , an approved committee organized through the DOE Technical Standards Program. The BDAC is sponsored and chaired by the Office of Environmental Policy and Guidance, Air, Water and Radiation Division.

The supporting software, or "RAD-BCG Calculator," provides a semi-automated tool for implementing screening and analysis methods contained in the DOE Technical Standard, "A Graded Approach for Evaluating Radiation Doses to Aquatic and Terrestrial Biota." This tool was also developed through the BDAC.

Because the biota protection standard is dose-based, a calculational method was developed to demonstrate compliance. Because of the inherent complexity of environmental systems and the vast array of biota that can be potentially exposed to any radionuclide contamination level, the DOE decided that a graded approach to evaluate compliance would be appropriate.

The graded approach consists of a three-step process which includes data assembly, general screening, and analysis. This three-tiered scheme helps to ensure that the magnitude of the evaluation effort is scaled to the likelihood and severity of potential environmental impacts.

In the general screening process, measured environmental concentrations are compared to very conservative Biota Concentration Guides (BCGs). The BCGs were set so that real biota exposed to such concentrations would not be expected to ever exceed the biota dose limits. Since the screening limits would be chosen to protect "all biota, everywhere" they would, by their nature be restrictive, and in many circumstances conservative with regards to specific environments.

BCGs that are considered to be conservatively protective of non-human biota were derived for twenty-three radionuclides. These radionuclides were selected because they are relatively common constituents in past radionuclide releases to the environment from DOE facilities. An additional set of BCGs will be derived for another set of approximately seventy radionuclides, for inclusion in the next version of the Technical Standard.

The results of MEMP's general screening are shown in Table 3-5. Using release results from calendar year 2000, MEMP "passed the site screen." Values used in the spreadsheet were obtained by averaging the maximum incremental concentrations of applicable radionuclides in the Great Miami River and river sediment. An additional measure of conservatism was added by including plutonium-238 release values in the input for plutonium-239 in the spreadsheet. MEMP's releases of Pu-238 were

greater than Pu-239. The spreadsheet did not include a BCG for Pu-238. The program estimated sediment values if not available.

Table 3-5. Aquatic System Data Entry/BCG Worksheet