Y-12

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OAK RIDGE Y-12 PLANT

MARTIN MARIETTA

BEST MANAGEMENT PRACTICES (BMP) PLAN FOR POTABLE WATER DISCHARGES Y-12 PLANT

July 1995

Prepared by

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Environmental Management Department
Health, Safety, Environment, and
Accountability Division
Oak Ridge Y-12 Plant
Oak Ridge, Tennessee 37831
managed by

LOCKHEED MARTIN ENERGY SYSTEMS, INC.
for the

U.S. DEPARTMENT OF ENERGY
Under Contract DE-AC05-84OR21400

MANAGED BY
MARTIN MARIETTA ENERGY SYSTEMS, INC.
FOR THE UNITED STATES
DEPARTMENT OF ENERGY

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BEST MANAGEMENT PRACTICES (BMP) PLAN FOR POTABLE WATER DISCHARGES Y-12 PLANT

PURPOSE

This plan provides guidance to minimize the environmental effects from discharges of chlorinated waters, including:

- Flushing of potable water lines.
- Releases from fire hydrants during testing and maintenance of fire protection systems.
- Releases from sprinkler systems for maintenance or testing purposes.
- Other significant releases of chlorinated water.

This BMP plan is intended to meet the Y-12 Plant National Pollutant Discharge Elimination System (NPDES) permit condition, Part I (page 5) and Part III.L. (page 44), requiring that BMPs be used for flushing potable water lines and similar activities.

Close adherence to the steps provided in this plan will help prevent the discharge of chlorinated waters *"in concentrations sufficient to be hazardous or otherwise detrimental to humans, livestock, wildlife, plant life, or fish and aquatic life in the receiving stream"* (Y-12 Plant NPDES permit, page 26).

This plan is in keeping with the Y-12 Plant Best Management Practices Plan, Y.SUB/92-DGF20 V/1, the plantwide plan required by Title 40, Code of Federal Regulations, Part 125, Subpart K.

BACKGROUND

The Y-12 Plant potable water distribution system originates at the Water Filtration Plant on Pine Ridge, to the north of the main plant area. The treatment facility is operated for the Department of Energy by Johnson Controls, Inc., personnel. The same system supplies water to the Oak Ridge National Laboratory and the city of Oak Ridge; the raw water is obtained from the Clinch River. The distribution system is within the watersheds of East Fork Poplar Creek (EFPC), Bear Creek, McCoy Branch, and some unnamed tributaries to the Clinch River.

Potable water with an approximate 1.5 mg/L chlorine level is supplied from the filtration plant. Typical concentrations in the Y-12 Plant system are 1.0 to 1.2 mg/L. Periodic discharges, or blowdowns, are needed to clean the sediments from the system and to maintain the 0.2 ppm minimum chlorine content in potable water, as required by state regulations for human consumption.

Based on the 1992 Environmental Protection Agency (EPA), Region IV, Criteria Chart, the in-stream limitation for total chlorine residual is 0.019 mg/L (1-hr average concentration not to be exceeded more than once every 3 yr). The Y-12 Plant staff has effectively reduced the concentrations of chlorine in EFPC in recent years by installing dechlorination systems for the treatment of cooling and noncontact cooling water discharges. Sodium bisulfite is used in these systems, with the after-treatment in stream result being maintained below the detection level of 0.050 mg/L. Two of these dechlorination systems, along with other control measures, will be utilized as part of the BMP plan for discharges of potable water at EFPC. Care will be given to not overtreat since sodium bisulfite can react with oxygen and lower the effluent dissolved oxygen. The 96-hr LC_{50} values for warm freshwater species of fish range from 0.09 to 0.30 mg/L chlorine. Because the potable water system discharges are infrequent and of very short duration (15 min maximum annually), a BMP designed not to exceed a target in-stream total residual chlorine (TRCl) concentration at or below 0.09 mg/L would be protective of fish and aquatic life and would include a margin of safety.

Tests have been performed at potable water blowdown points to reduce chlorine using sodium bisulfite tablets and to ensure that a negative impact was not placed on the fish in EFPC. In cooperation with personnel from the Y-12 Plant Utilities and Environmental Management Departments, these outfalls were discharged for 10 to 15 min each through 5-gal perforated buckets filled with sodium bisulfite tablets. Technicians trained in EPA protocol collected samples from the treated effluent and tested for TRCl. In all cases, contact with the tablets reduced the chlorine concentrations of the discharge to near zero. As an extra precaution before the release of potable water was made, the System 1 dechlorination unit (located at Outfall 200/135) was increased by 30 percent, thus increasing concentrations of sodium bisulfite upstream. The System II Dechlorination Unit (located on Outfall 21) can also be used as a BMP measure when extra chlorinated discharge is anticipated in its drainage area. As typical with potable water systems, some water line sediments were released when the water line was first opened. Outfall 13 cleared up in less than 30 sec; the other outfalls cleared up in less than 2 min. Water system blowdown is the only flow for Outfall 13 and 31. Inspections were made at several points downstream, and the fish were observed to be unaffected by the operation.

CHARACTERISTICS

The potable water distribution system located on EFPC and Bear Creek has the following characteristics:

- The flushing discharge flows are relatively large (1,250 to 5,000 gpm), however, the discharges are of short duration (5 to 15 min maximum).
- The configuration is such that most of the low points of the system are immediately adjacent to the stream; therefore, retention ponds are not a viable option.
- The high velocities (6 to 10 ft/s) and related volumes of the flushing discharges are required to effectively clean the system.
- The chlorine residual concentration in the discharges without bisulfite tablets is approximately 1.20 mg/L because of close proximity to the water treatment plant.

BMP PLAN FOR FLUSHING POTABLE WATER LINES TO EFPC AND BEAR CREEK

The primary environmental concern associated with flushing potable water lines is the release of chlorinated water and the potential for harm to aquatic life. This BMP plan will include measures to be taken to minimize the effects of chlorine and to prevent erosion of nearby soils that can cause siltation of the stream. Frequency of flushing will be at least annually, but not more than semiannually (under normal circumstances).

These BMPs will be implemented when discharging from the following potable water lines (see attached Y-12 Plant map).

Potable Water Discharge Line	Building	Total Gallons Discharged (Average)	Discharge Point to EFPC
8"	Southeast of 9720-6	14,960	Outfall 8
12"	South of 9720-4	33,250	Outfall 13
12"	East of 9404-5	33,250	Outfall 31
16"	South of 9733-3	52,600	Outfall 109
12"	South of 9417-1	33,250	Outfall 200 North/South Pipe System 1
10"	Southwest of 9204-4	23,500	Outfall 200 North/South Pipe System 1
8"	Southwest of 9401-3	14,960	Outfall 200 North/South Pipe System 1
12"	West of 9720-58	33,250	South of Bear Creek

BMP REQUIREMENTS

The BMPs to be followed for flushing potable water lines to EFPC and Bear Creek are as follows:

1. Schedule potable water discharges for weekends when fewer process waters are discharged and fewer interruptions to flushing activities will occur. If possible, discharge following a rain event to lessen the possibility that this activity would effect the aquatic life. Discharge shall not be scheduled concurrent with fire hydrant or sprinkler system testing or similar activities if the discharge is in the same drainage area.

2. Notify the Plant Shift Superintendent (PSS) at 574-7172 that a discharge of potable water is planned.
3. Should an adverse condition exist on the creek (e.g., spill), postpone the discharge to another time. The PSS and/or the Environmental Management Department (EMD), Water Compliance Section, staff will provide guidance as to current stream and aquatic life conditions. The EMD, Water Compliance Section, staff can be reached at 576-8108 or pager 417-5261.
4. Notify the Utilities Department staff at 574-0502 to send an operator to Dechlorination System 1 at the North/South Pipes. Chemical feed is to be increased by 25 to 30 percent or as directed.
5. Use sodium bisulfite tablets in a 5-gal bucket perforated with 2-in. holes (approximately) at the point of discharge to maximize treatment. A plastic mesh bag or similar item may be used for storm drain catch basins in order that there is maximum contact between tablets and flow. Configuration will depend on the location (e.g., bucket with tablets placed around the end of the pipe at Outfall 13 and inside the pipe at Outfall 31).
6. Make all preparations prior to opening valves; maintain radio contact between flushing point and dechlorination stations.
7. Valve open slowly to avoid triggering alarms on the potable water/fire protection systems; do not fully open so that the volume of water discharged can be minimized.
8. Enter in the logbook the start time of the discharge, the location, chlorine readings, and stop time. Maintenance of the logbook shall be the responsibility of Utilities Department personnel.
9. Report to the PSS any unusual conditions on or near the creek that may effect the fish or aquatic life.
10. Personnel from EMD will conduct periodic oversight inspections during blowdown operations to determine the effectiveness of and compliance to this BMP plan.
11. **DISCHARGE TIME MUST BE MINIMIZED (15 minutes or less).**

TER STA.

Y-12 PLAN

POTABLE WATER DISCHARGE

○ = BLOWDOWN POINT

RAW WATER LINES ----- } ALL UNDERGROUND
 TREATED WATER LINES ----- }
 PRESSURE - 55 TO 85 P.S.I.G. IN TREATED WATER LINES
 90 TO 100 P.S.I.G. IN RAW WATER LINES

P2D54943

LINE SIZE INDICATED IN INCHES

- ⊗ - MOTOR OPERATED VALVE
- ⊠ - BLOCK VALVE
- ⌞ - CHECK VALVE
- ⊞ - PRESSURE REDUCING VALVE

RAW AND TREATED WATER

BMP PLAN FOR POTABLE WATER DISCHARGES AT THE Y-12 PLANT LANDFILL FACILITIES BUILDING

A separate BMP plan was written in February 1995 for potable water discharges at the Y-12 Plant Landfill Facilities Building (9616-11). This facility is unique in that it is a dead end distribution point, a considerable distance from the main plant area (over 1,600 ft). The Landfill Facilities Building and associated facilities are newly built and are not fully operational; therefore, the potable water system at this facility is under used. This makes it difficult to maintain the required 0.2 mg/L (or greater) chlorine content in the distribution system required for human consumption. More frequent blowdowns are needed for this system than the rest of the Y-12 Plant.

The point of discharge is a 1-in. blowdown line approximately 30 ft to the north of Building 9616-16, located between Landfills V and VII on the south side of Chestnut Ridge. The 1-in. blowdown line discharges into a rip rapped ditch that is normally dry, except for rainy periods. The ditch runs approximately 800 ft from the point of discharge to the point where mixing occurs with the unnamed tributary to the Clinch River. The discharge from the 1-in. blowdown is small (400 to 1,800 gal/day). The discharge flows over the rip rap ditch allowing contact with air and ultra violet light for chlorine dissipation. Typical discharges from this system are in the 0.3 to 0.5 mg/L chlorine range. Samples taken from the ditch before mixing with the unnamed tributary have shown chlorine levels reduced to <0.05 mg/L or undetectable.

See Attachment A (internal memo dated February 17, 1995) for the BMPs to be followed regarding potable water discharges at the Y-12 Plant Landfill Facilities Building.

BMP PLAN FOR DISCHARGES OF FIRE HYDRANTS AND SPRINKLER SYSTEMS

For the testing and maintenance of fire hydrants, BMPs will be implemented during nonemergency situations to minimize the effects on the environment.

Chlorine from the potable water system and sedimentation from erosion are the primary threats to nearby streams during fire hydrant and sprinkler testing.

FIRE HYDRANTS

In cooperation with personnel from the Y-12 Fire Department and the Y-12 EMD, tests were conducted to develop measures to reduce the potential effects on fish and aquatic life and to determine if sufficient treatment was provided to reduce chlorine to below 0.05 mg/L before entering the receiving stream. The tests were performed on hydrants that discharge to storm drains within close proximity to EFPC (south of Buildings 9720-8 and 9720-23).

Ten tablets of sodium bisulfite were placed inside a diffuser, and the diffuser was attached to the hydrant to reduce the energy of the discharge. The hydrant was allowed to flow for about 3 min while flow and pressure readings were made. Water samples were collected by the EMD sampling technicians at the initial discharge and for the final discharge near EFPC. In both cases, the chlorine level measured zero due to contact with the tablets. The chlorine concentration without treatment was 1.3 mg/L.

Additional tests were done on hydrants in the Y-12 Plant with the same result--dissipation of chlorine to near zero as measured before reaching the creek. Sediments are not a problem when flushing fire hydrants since they are generally not located on a dead end distribution point. Visible sediments usually clear up in 5 sec or less. Average total volume discharged from a typical hydrant is 800 gal.

The BMPs to be followed for fire hydrant testing include the following:

1. Contact the EMD, Water Compliance Section, staff at 576-8108 or pager 417-5261, the day before scheduling this activity to ensure there are no ongoing problems or adverse conditions on the creek. Flushing activities may be postponed if there are problems (e.g., threats to the aquatic life).
2. Contact the PSS at 574-7172 and the Utilities Department (Radio Code--Delta 20) to inform them that a release is planned and to ensure that the dechlorination systems on EFPC are functional.
3. Note weather conditions; sunny days are preferred since ultraviolet light can help dissipate the chlorine. Another preferred condition is immediately following a precipitation event when stream flows are naturally increased.
4. Lay tarps on the ground or gravel areas where there is the potential for erosion to occur. (This is not needed for paved areas.)

5. Temporarily cover storm drains adjacent to fire hydrants (within 15 ft) using plastic and sand bags. This will allow for additional time for chlorine to dissipate before entering the drain system.
6. Attach diffuser to the hydrant with approximately ten tablets of sodium bisulfite inside.
7. Log the start time for the discharge, location of the hydrant, and stop time; estimate the total volume discharged. Logs will be maintained by the Y-12 Plant Fire Department personnel.
8. Minimize the amount of chlorinated water discharged by closing off the hydrant as soon as possible (i.e., approximately 3 min) and limit the number of hydrants tested to no more than 10 per day.

SPRINKLER SYSTEMS

There are various types of sprinkler systems in use at the Y-12 Plant that are required for fire protection. Some generate a release of just a few gallons, and some generate approximately 400 gallons (average for larger systems). These systems have less potential to have impacts on the receiving streams since less volume of water is discharged and at much smaller velocities. Some systems, after being tested, are simply drained and do not present an erosion problem.

The BMPs to be followed for sprinkler systems are as follows:

1. Contact the EMD, Water Compliance Section, staff at 576-8108 or pager 417-5261 to determine if an adverse condition is in progress at the receiving stream.
2. Contact the PSS at 574-7172 and Utilities Department (Radio Code--Delta 20) to inform them that a release is planned and to ensure that the dechlorination systems on EFPC are functional.
4. Lay tarps on the ground where there is the potential for erosion to occur.
5. Should a sprinkler test require a discharge greater than 400 gal, the flow should be passed through sodium bisulfite tablets before entering an EFPC storm drain or EFPC directly. Consult with the EMD, Water Compliance Section, staff for guidance concerning these discharges and for those systems that would discharge directly to Bear Creek or unnamed tributaries to the Clinch River.
6. Log the start time for the discharge, the location, and the stop time. The Y-12 Plant Fire Department staff is responsible for maintaining logs.
7. Minimize the amount of chlorinated water discharged by closing off the valve as soon as the test has been performed.

BMP PLAN FOR FLUSHING WATER LINES WITH CALCIUM HYPOCHLORITE (HTH)

It is necessary to flush out new or repaired potable water lines with HTH or a similar agent to ensure that all bacteria is eliminated. To prevent discharges to the storm drain/creek that could potentially harm aquatic life, the following BMPs will be followed:

1. Contact the EMD, Water Compliance Section, staff at 576-8108 or pager 417-5261 for approval to discharge and to confirm that an adverse condition is not in progress at the receiving stream; estimate the number of gallons proposed to be discharged.
2. Contact the PSS at 574-7172 prior to discharge. If discharge will flow to the EFPC watershed, contact the Utilities Department staff (Radio Code--Delta 20).
3. Divert water away from nearby storm drains/creeks (within 15 ft) by using sandbags and plastic. Discharging to an excavated pit will require that water be treated before pumping.
4. Use sodium bisulfite tablets in a 5-gal perforated bucket or plastic mesh bag for treating the HTH/chlorinated water; pass the flow of water through the tablets, maximizing contact.
5. Use tarps/plastic or other measures where applicable to avoid erosion and/or siltation of streams.
6. Log start time of discharge, location, estimated volume discharged, and stop time.
7. When complete, remove any obstructions around storm drains to avoid problems with standing water.
8. For questions or to report any water quality concerns, contact the EMD, Water Compliance Section, staff at 576-8108 or pager 417-5261.

ATTACHMENT A

Internal Correspondence

MARTIN MARIETTA ENERGY SYSTEMS, INC.

Date: February 17, 1995

To: D. G. Ailey, E. T. Collins, C. W. Hutzler, E. M. Murrill,
B. E. Skaggs, T. C. Surratt, L. O. Vaughan, S. D. Weaver,
M. L. Willoughby, File-EMD-RC

From: M. C. Wiest Jr., 9116, MS-8098, 4-3390 *mcwest*

Subject: **Best Management Practices (BMP) Plan for Potable Water
Blowdown at Y-12 Landfills Facilities Building 9616-11**

Purpose: The purpose of this BMP Plan is to allow for the discharge (periodic blowdown) of the potable water system serving Y-12 Landfills Facilities Building 9616-11 and prevent environmental impacts to the unnamed tributary of the Clinch River downgradient from this discharge. Periodic discharges are needed to maintain the 0.2 ppm chlorine content in the potable water system as required by state regulation for human consumption.

Location: The point of discharge is a 1-in blowdown line, approximately 30 ft to the north of Building 9616-11, which is located between Landfills V and VII on the south side of Chestnut Ridge. Building 9616-11 provides showers and restroom facilities (which discharge to the sanitary sewer) and office space for those that work in the landfills area. The 1-in blowdown line discharges into a rippapped ditch that is normally dry (except for rainy periods), and bypasses the nearby sedimentation basin. The ditch runs approximately 1,000 ft from the point of discharge to the point where the unnamed tributary (hereafter referred to as Chestnut Branch) begins to see a natural flow from groundwater sources.

Background: Potable water is supplied to Building 9616-11 via the Y-12 Plant to the north. An application to discharge from potable water systems has been submitted as part of the Y-12 Plant National Pollutant Discharge Elimination System permit. Flow tests and chlorine readings have been performed in an effort to minimize chlorine releases and conserve water. A flow meter has been installed on the potable water line in Building 9616-11 and is maintained by the Waste Management Organization (WMO) staff.

Potable water is supplied to the Y-12 Plant water system with a 1.5 chlorine level from the Department of Energy water plant, operated by Johnson Controls personnel. Typical concentrations in the Y-12 Plant system are 1.2 to 1.0 ppm. Since Building 9616-11 is at a dead end distribution point, periodic blowdown is to be expected. Recent flow tests have shown chlorine readings between 0.4 and 0.8 ppm by running sinks and showers

... tied to the sanitary sewer. It is not expected that the blowdown to the ditch will have a negative impact on the receiving stream, since the chlorine will dissipate in the open ditch before it reaches Chestnut Branch.

Aquatic life surveys of Chestnut Branch have been performed by the Y-12 Environmental Management Department (EMD) and the Oak Ridge National Laboratory (ORNL) Environmental Sciences Division personnel. It has been documented that this stream has aquatic life that is healthy and diverse in species. These surveys will continue to ensure that industrial activities in this watershed do not have a negative environmental impact.

The following BMPs will be followed to ensure environmental protection regarding the potable water blowdown.

1. The amount of potable water discharged to the ditch will be minimized to lessen the amount of chlorine released to the environment. A log will be maintained at Building 9616-11 by WMO personnel to note the start and stop times and estimated volume of any discharges. The log will be dedicated for blowdown releases and/or flow data. The log shall be made available for inspection upon request.
2. Periodic operational chlorine readings will be made for the first year of operation and documented on the log. In the event that this discharge causes no environmental concerns after one year, the chlorine readings (for compliance with the BMP Plan) may be discontinued. It is expected that this blowdown point will present a low risk, as do blowdown points within the Y-12 Plant that are approved to discharge using BMP Plans.
3. Off-normal releases, i.e., water breaks and other large releases, will be monitored for chlorine. Contact the EMD staff for sampling.
4. Aquatic life surveys, such as the one conducted by ORNL staff on January 27, 1993 (letter to file dated February 9, 1993), will continue to be made at the request of EMD staff to ensure that Chestnut Branch is not impacted. Aquatic life surveys will be made no less than annually and kept on file with the EMD, Water Compliance Section, personnel.
5. In an effort to maintain a properly purged potable water system and conserve water resources, a fitting will be installed on the 1-in blowdown line to allow for uses such as filling water trucks for dust control, watering vegetation, etc.

Questions or comments regarding this BMP Plan can be addressed to me or L. O. Vaughan at 6-8108.

Distribution

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