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July 25, 2012
12-087

Mr. Merritt N. Baker, Senior Project Manager
Mailstop E2 C40
Division of Fuel Cycle Safety & Safeguards, NMSS
U.S. Nuclear Regulatory Commission
11545 Rockville Pike
Rockville, MD 20852

References: (1) License No. SNM-42, Docket 70-27

(2) E mail dated June 29, 2012, Baker (NRC) to Spangler and England (B&W NOG), Request for Additional Information - (TAC L33190)

Subject: Reply to Request for Additional Information (TAC L33190)

Dear Sir:

Babcock & Wilcox Nuclear Operations Group, Inc. ("B&W NOG") is providing its response to the NRC's request for additional information that was submitted in the NRC's June 29, 2012, E mail (Reference 2). Our response can be found in the Enclosures. Enclosure 1 provides B&W NOG's response to RAI questions. Enclosure 2 is a diagram of the Sanitary Wastewater System. Enclosure 3 is a diagram of the Denitrification Process. Enclosure 4 is a copy of the proposed amendment to Chapter 9. The proposed amendment is an addition to the chapter and in no way alters any current text.

If you have questions or require further information, please contact me at 434-522-5665.

Sincerely,

Kenneth Kirby for CAE

Charles A. England
Manager, Licensing & Safety Analysis
Babcock & Wilcox Nuclear Operations Group, Inc. - Lynchburg

Enclosure

cc: NRC, Resident Inspector
NRC, Region II, Regional Administrator

ENCLOSURE 1
Reply to Request for Additional Information

Set forth below is information provided pursuant to the NRC Request for Additional Information (RAI) by E mail dated March 6, 2012. The RAI Comments are repeated below. B&W NOG's responses are denoted as B&W Response.

NRC RAI Comments

The following questions were requested regarding B&W NOG's Amendment request to Chapter 9 (TAC L33190).

NRC RAI -1

Please provide process descriptions (waste type and origin) and a brief description in the text of proposed paragraph 9.6.4, which ensures that the "...industrial or other waste treatment processes..." are not connected to the radioactive processes, and assurances that any new processes would be subject to the review and record keeping required by 10 CFR 70.72

B&W Response to the request for process descriptions (*waste type and origin*):

The primary non-radiological processes in waste water treatment related to the production of solids for disposal are;

- Sanitary waste water processing- consisting of all waste water from non-industrial processes. The sanitary waste system is separate from other effluent systems.
- Denitrification waste water processing (planned).
- Non-radiological processes are separate from radiological processes. The piping and equipment are not in common use.

Sanitary Treatment System Overview

The system is an activated sludge process. In the aeration tanks, microorganisms are mixed with the organic-laden wastewater. As the microorganisms grow, they clump together (flocculate) to form an active mass of microbial floc called activated sludge. Wastewater in the aeration tanks (or mixed liquor) is pumped into a clarifier for settling. In the clarifier, aggregated or flocculated solids, settle to the bottom of the tank and form a layer of concentrated sludge. Most of this sludge, (return sludge) is pumped back into the aeration tanks to facilitate the breakdown of organics. However, since the bacteria are constantly growing, some of the sludge eventually has to be removed from the system. Small amounts of sludge, referred to as waste sludge, are removed from the clarifier to a Sanitary Sludge Holding Tank (SSHT) for eventual disposal. A diagram of the Sanitary Treatment System is provided as Enclosure 2.

Process Specifics

The sanitary treatment system consists of a mechanical bar screen, a screenings screw compactor, two lift pumps, a sock filter, a flow equalization tank, a flow splitter box, two aeration tanks, a sanitary circular clarifier, an ultraviolet disinfection system, a return/waste sludge pumping station, a sanitary sludge holding tank, and a mixing chamber.

Raw wastewater flows through the mechanical bar screen, removing floating and suspended materials, which are discharged to a screenings screw compactor, which de-waters, compacts and conveys screened solids to a drum for disposal as Rake Solids.

The wastewater is pumped through a flow meter and a sock filter, into the flow equalization tank. The wastewater is pumped into a splitter box, mixing the wastewater with return activated sludge (RAS) and then to the aeration tanks.

The mixed liquor flows to the clarifier. Most solids settle to the bottom. Floating solids and scum are scraped from the surface by a skimmer arm. The scum may be mixed with the RAS and routed to the secondary treatment process, or to the Sanitary Sludge Holding Tank (SSHT). Clear water flows to the Ultraviolet (UV) disinfection unit.

Sludge is scraped to the center sludge sump. Most sludge is pumped back to the splitter box as RAS. Periodically, sludge is pumped to the SSHT.

The SSHT has a gravity overflow that returns supernatant to the aeration tanks. Clarifier effluent flows to the UV unit.

Sanitary wastewater flow from the UV system to a mixing chamber combining with treated wastewaters. The effluent is discharged to the James River via a diffuser.

Overview Planned Denitrification Process

The typical biological denitrification process for nitrate-laden wastewater involves the use of facultative bacteria. Bacteria of this sort are adapted such that they are able to switch back and forth between aerobic (dissolved oxygen present) and anoxic (no dissolved oxygen) environments by changing the source from which they get their oxygen for cell growth. In an aerobic environment, the bacteria get their oxygen directly from the dissolved molecules in the water. In an anoxic environment, the bacteria are able to scavenge oxygen by stripping it from other chemical constituents. The biological denitrification process for nitrate-laden wastewater exploits facultative bacteria by creating an anoxic environment and thereby forcing the bacteria to get their oxygen from the nitrate molecules. As long as there is carbon source material (e.g., methanol, glycerol, acetic acid, sugar water, etc.) present for bacteria to feed on, they will strip oxygen from the nitrate molecules, thereby reducing nitrate to free nitrogen, which recombines and is eventually released from the process as N_2 gas. A diagram of the Denitrification Process is provided as Enclosure 3.

Process Specifics

The influent pump station pumps will transfer non-radiological treated pickle acid effluent into a wet well and discharge to the influent equalization tanks, which reduce the variability in nitrate mass loading to the biological treatment system.

A transfer pumping station transfers process wastewater from the influent equalization tanks to the anoxic sequencing batch reactors (SBRs), which provide for biological denitrification. A supplemental carbon source is added in excess to provide the carbon necessary for denitrification. Phosphorus and micronutrients and methanol as needed are added. Following the anoxic fill, anoxic mixed react, and settle phases, the batch volume will decant to the aerobic SBR using a floating weir.

Following the aerated react phase, the aerobic SBR will enter the settle phase and a fraction of the settled sludge will be wasted to the aerobic digester. The treated volume decants from the aerobic SBR to the post treatment equalization tank.

Denitrification increases the alkalinity in the biological treatment basin. The sulfuric acid addition system provides acid for pH control during denitrification.

The polymer feed system adds a polymer solution to the filter press feed to aid in sludge conditioning.

Treated effluent is pumped to the polishing disk filter. The pumps lift wastewater from the post treatment equalization tank to the effluent disk filter. Filtered wastewater flows by gravity to the effluent pond.

A backwash cycle will periodically remove solids from the filter. Backwash water and collected solids will drain to the Decant and Filtrate Pumping Station for transfer to the system headworks or back to the post-EQ tank.

The waste activated sludge (WAS) from the activated sludge process will be pumped from the anoxic and aerobic SBRs to the two stage aerobic digestion system. A solids handling pumping station will be installed at the digesters to transfer digested sludge to the filter presses to be dewatered. Filter cake will be disposed of offsite.

B&W Response to the request for *(a brief description in the text of proposed paragraph 9.6.4, which ensures that the "...industrial or other waste treatment processes..." are not connected to the radioactive processes, and assurances that any new processes would be subject to the review and record keeping required by 10 CFR 70.72):*

This is addressed in the enclosed amendment to Chapter 9 (Enclosure 4).

NRC RAI -2

Please describe the number of samples and over what period of time is associated with the data provided in Table 1 on page 2 of Enclosure 2 of the request.

a. Were the sample analyzed for isotopic uranium (U-234, U-235, U-238)

B&W Response

The sampling results shown in Table 1 were from a campaign conducted in September 2008. The purpose of the campaign was to determine if the potential issue identified in NUREG 1775, that of elevated uranium content of non-radiological process sludges in POTWs was occurring at B&W and to examine if the B&W results were unusual in comparison with regional POTWs. Area POTWS and the B&W site POTW were contacted and agreed to provide samples which were sent for uranium isotopic analysis at GEL Laboratories LLC in Charleston SC. Two samples were requested from each POTW to examine different types of solids. The B&W POTW has two types of solids; SSHT and Rake Solids. The other POTW solids obtained were similar considering the individual facility practices and equipment. As NUREG 1775 did not have numerical results listed for U235

(ND notation), and all of POTW results had U235 results below MDA, the values below reflect the sum of U234 and U238 data.

POTW	SAMPLE TYPE	U-Total (pCi/g)	95% Error (+/-)
Amherst	Influent Solids	0.054	0.22
Amherst	Dry Bed Solids[1]	0.94	0.42
Appomattox	Screen Solids[2]	5.96	0.97
Appomattox	Digester Solids[1]	0.959	0.42
B&W	SSHT[1]	0.774	0.41
B&W	Rake Solids[2]	4.19	0.81
Bedford	Solid Effluent[1]	1.79	0.57
Bedford	Solid Influent	0.28	0.21

1. SSHT-Concentrated natural solids from sewage processing.
2. Rake Solids- Materials that did not break up during processing, includes; non digestible paper, plastics, pens, coins, concentrated natural solids, feminine hygiene products et al.

NRC RAI -3

Please add or confirm that waste disposal will cease and an investigation, including isotopic sample analyses, will be performed if the results of the waste treatment sample analyses exceed 30 picocuries per gram.

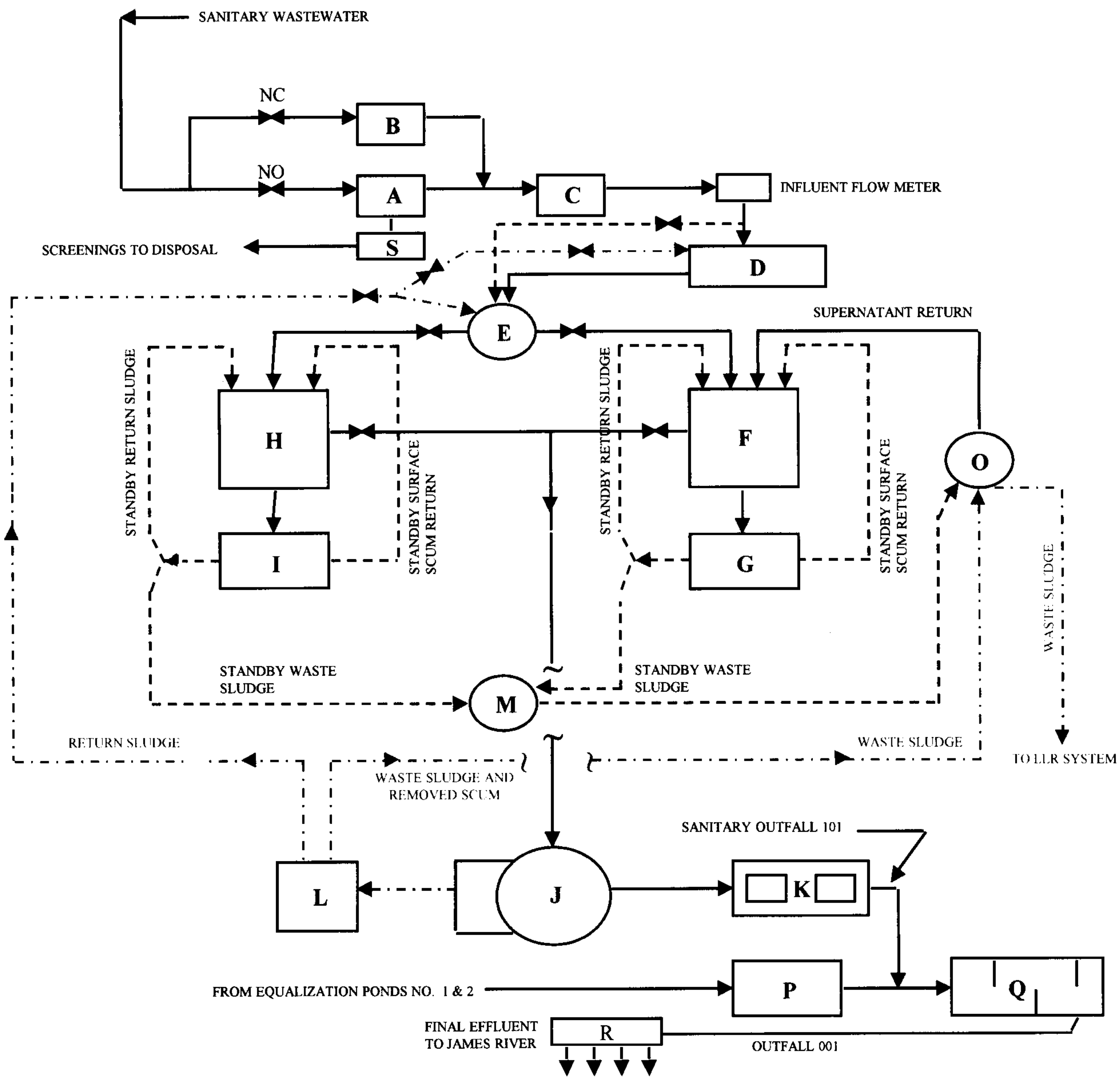
B&W Response
This is addressed in the enclosed amendment to Chapter 9 (Enclosure 4).

NRC RAI -4
Please add a step to perform baseline isotopic sampling at a semi-annual frequency.

B&W Response
This is addressed in the enclosed amendment to Chapter 9 (Enclosure 4).

ENCLOSURE 2
Sanitary Wastewater System

ENCLOSURE 2
SANITARY WASTEWATER SYSTEM



LEGEND

(A) MECHANICAL BAR SCREEN

(B) COMMINUTOR

(C) LIFT STATION

(D) FLOW EQUALIZATION BASIN

(E) FLOW SPLITTER BOX

(F) AERATION TANK #1

(G) STANDBY CLARIFIER #1

(H) AERATION TANK #2

(I) STANDBY CLARIFIER #2

(J) SECONDARY CIRCULAR CLARIFIER

(K) UV DISINFECTION SYSTEM (OUTFALL 101)

(L) SLUDGE PUMP BUILDING

(M) STANDBY WASTE SLUDGE COLLECTION TANK

(O) SLUDGE HOLDING TANK

(P) PARSHALL FLUME

(Q) MIXING CHAMBER (OUTFALL 001)

(R) OUTFALL 001 DIFFUSER

(S) SCREENINGS SCREW COMPACTOR

PROCESS PIPING

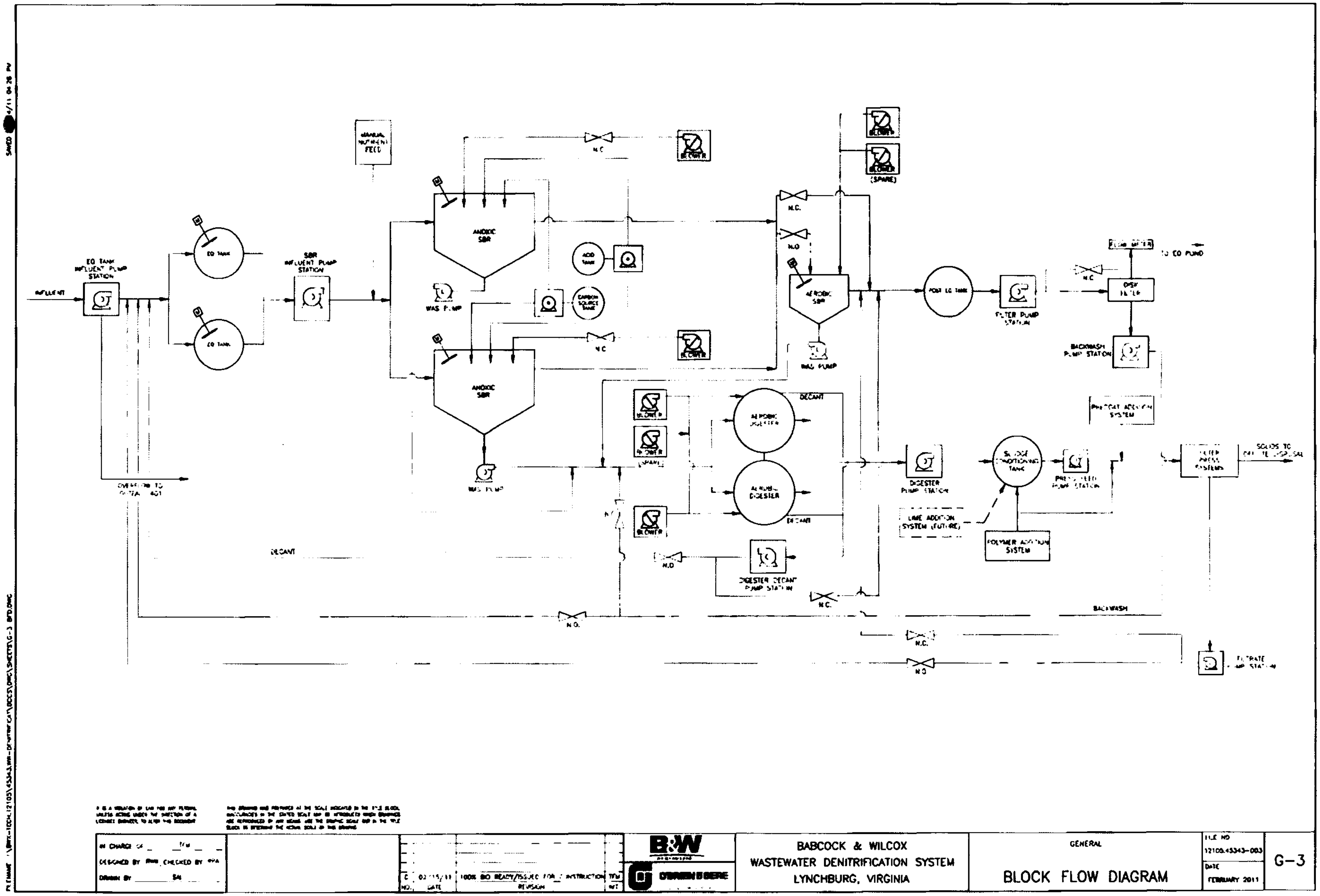
SLUDGE PIPING

STANDBY PIPING

ENCLOSURE 3
Denitrification Process

ENCLOSURE 3

Denitrification Process



ENCLOSURE 4
Proposed Amendments to Chapter 9

Below is the proposed amendment to Chapter 9:

9.6.4 B&W NOG may dispose of industrial and other waste treatment products, from processes not connected to or employing radioactive materials, which have been demonstrated not to exceed 30 pCi total Uranium per gram, in a Subtitle C or Subtitle D facility, without continuing NRC controls. An annual uranium isotopic analysis shall be performed of these processes. If 30 pCi total Uranium per gram is exceeded, disposal of the waste shall be suspended and an appropriate investigation and corrective action(s) will be taken. New processes or modifications to existing processes shall be evaluated and records maintained in accordance with 10CFR70.72. Records of the analysis and disposition location(s) of the material shall be maintained by B&W NOG for 3 years.