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Permit

Department of Energy
Field Office, Albuquerque
Los Alamos Area Office
Los Alamos, New Mexico 87544

NOV 19 1993

Glen

Reports

CERTIFIED MAIL - RETURN RECEIPT REQUESTED

Mr. Jim Piatt, Chief
Surface Water Quality Bureau
Harold Runnels Building
1190 St. Francis Drive
P. O. Box 26110
Santa Fe, New Mexico 87502

Dear Mr. Piatt:

The United States Department of Energy (DOE), Los Alamos Area Office (LAAO), is planning to construct the Technical Area (TA)-21 Waste Water Treatment Plant Modifications project at Los Alamos National Laboratory (LANL).

Enclosed are two sets of plans for this project. These plans are being submitted for filing under Section 1-202 of the New Mexico Water Quality Control Commission Regulations.

Please call Joe Vozella of my staff at 665-5027 or Neil Williams of LANL's Environmental Protection Group at 665-0454 if you have any questions concerning this project.

Sincerely,

Jerry L. Bellows
Area Manager

LESH:9JV-046

Enclosures (2)

cc w/o enclosures:
A. Tiedman, ADO, LANL, MS-A120
T. Gunderson, EM-DO, LANL, MS-J591
K. Hargis, EM-8, (EM-8:93-2758-1), LANL, MS-K490
S. Rae, EM-8, LANL, MS-K490
D. Lucero, ENG-DO-UPO, LANL, MS-M718
Circ. File

15348

TA-21 WASTEWATER TREATMENT PLANT

PRELIMINARY DESIGN REPORT

Prepared by

JOHNSON CONTROLS WORLD SERVICES, INC.

MECHANICAL UTILITIES SECTION

SEPTEMBER 1993

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TA-21 WASTEWATER TREATMENT PLANT

PRELIMINARY DESIGN REPORT

CHAPTER ONE - INFLUENT CHARACTERISTICS

A. Average Daily Flow

Average daily flow for this facility is highly variable, and in fact it is this irregularity of flow that has necessitated consideration of restarting the TA-21 plant. The facility was designed for 17,000 gallons per day average flow. Through the years the flow gradually dropped until, in the summer of 1991, flow was around 1,000 gallons per day. By the Fall of 1991, flow had dropped to 600-800 gallons per day, about what should be expected from the population at the facility. A decision was made to turn off the plant because of the low contributing population, and the very low flows. In January, 1992, the plant was shut down, and hauling operations began. Within one month of initiation of hauling, flows rose to around 3-4,000 gallons per day, and were highly variable.

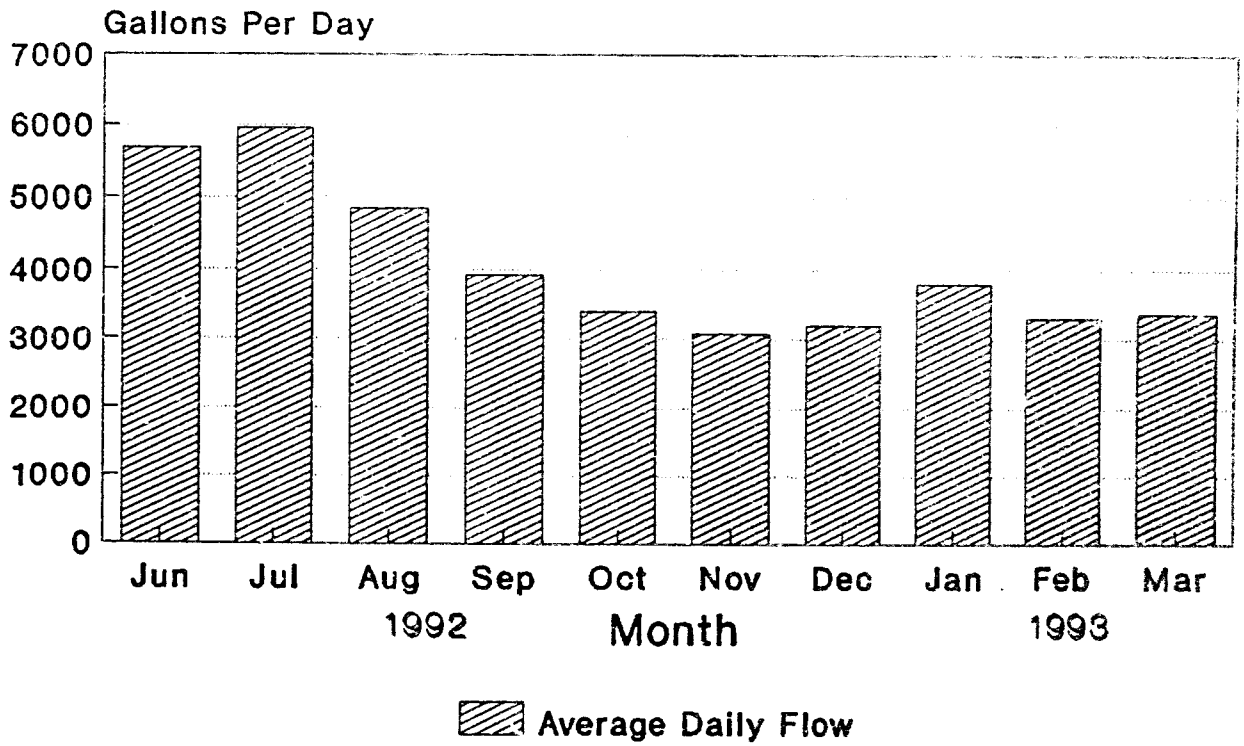
In this design report, flow records from an ISCO variable gate influent flow meter were used to arrive at an average daily flow. A graph of the average daily flow for each month from June, 1992 through March, 1993 is shown below. One year's worth of data was used to obtain a design average daily flow. Individual daily records were examined to determine the expected maximum peak daily flow. Average daily flow at the plant during the time period examined was 3,946 gallons per day, and the maximum daily flow seen was 11,784 gallons. For the purposes of design, average daily flow will be assumed to be 4,000 gpd, with a maximum expected flow of 12,000 gallons per day. Minimum flows seen have typically occured on weekends, and average 600-700 gallons per day.

B. Influent BOD_5

During the past year of hauling operations, no BOD_5 tests were run at the TA-21 plant, because there was no process to monitor or control, and the facility was not discharging. Records from 1990 and 1991 were averaged to get historical loading, and tests were run in January of 1993 to compare the current BOD_5 content of the influent wastewater with recent historical values. The average BOD_5 value from 1990

TA-21 WASTEWATER FLOWS

DAILY INFLUENT FLOW



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and 1991 is 182.7 mg/l, while the average of two values measured in February, 1993 is 120 mg/l. Flows into the plant are greater now than in the recent past, while BOD_5 concentrations are lower. For the purposes of design, an assumed influent BOD_5 of 150 mg/l will be utilized.

C. Influent TSS

Similar to derivation of the BOD_5 value used above, the historical average influent TSS concentrations from 1990 and 1991 were used, together with two samples from January, 1993 to calculate an expected average influent TSS value for design purposes. The TSS average from 1990 and 1991 is 159.7 mg/l and the average January, 1993 value obtained is 65.0 mg/l. The TSS value used for design purposes is 100 mg/l.

2. SELECTION OF PROCESS

A. Available Basin Size

Within the limitations of the existing structure, there are two basins available for treatment of sewage, the existing aeration basin, and an aerobic sludge digester basin immediately next to the aeration basin. The aeration basin size is 1587 cu. ft., while the sludge digester basin size is 406 cu. ft.

B. Available Clarifier Size

There is an existing 593 cu. ft. clarifier at the plant, which will be used again. Wier length is 8.25 ft. Clarifier SWD is only 8 ft.

C. Process Recommendation

Using the existing aeration basin would result in a hydraulic detention time of 71 hrs, while using the digester basin for an aeration basin would mean a detention time of 18 hrs. Since the shorter detention time available through using the digester would allow use of the extended aeration process, which typically requires a 12-24 hr. detention time, the old digester will serve as an aeration basin.

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3. ANALYSIS OF PROCESS

A. Liquid Treatment

At a design flow of 4,000 gallons per day, and an assumed BOD_5 concentration of 150 mg/l, loading on the plant will be 5 lbs. of BOD_5 per day. Ten States standards requires application of 2000 standard cubic feet (SCF) of air to be supplied per lb. of BOD_5 for the extended aeration process. This would mean a requirement of 10,000 SCF of air per day must be supplied to the aeration basin.

Due to the age of the blowers at the TA-21 plant, their standard cubic feet per minute (SCFM) output is unknown. However, in the past, when operating the plant, the blowers had to be run on a timer to keep from over-aerating the process basin. The timer was set at 5 minutes on and 15 minutes off in the summer, and 5 minutes on and 25 minutes off in the winter, when oxygen solubilities were higher. Even at these settings, oxygen levels were usually reaching 4.0 mg/l when the blower shut off, dropping to around 2.5 mg/l just before the blower turned back on. It is anticipated that the blowers may have to be resheaved to provide less SCFM if the timer alone can not be set to provide an acceptable air flow.

The clarifier would allow a hydraulic loading rate of 46 gallons per square ft, with a wier loading rate of 485 gallons per day per ft., both well below the standard parameters of 300 gallons per day per square foot, and 5,000 gallons per day per lineal foot, respectively, for extended aeration secondary clarification.

Secondary effluent will be passed through a sand filter prior to discharge to DP Canyon through the existing permitted outfall. Two sand filters at the plant permit rotation for cleaning between uses. Refer to Drawing 1.

B. Solids Treatment

The existing strainer basket would be relocated from its present spot at the head of the grit chamber to a location just where the influent pipe will daylight at the new aeration basin (old sludge digester). There will be no other primary treatment.

Sludge will be stabilized in the aeration basin, with MLSS directly wasted to sand drying beds at the plant. No further sludge treatment, other than air drying, will occur.

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Sludge and the sand cleaned from the filter beds will be stored on site pending analysis results, then taken to the TA-54 landfill and used as cover soil conditioner. Underdrain water from the sludge beds, goes to a holding tank, from which it is pumped and returned back through the plant. Refer to Drawing 2.

C. Hydraulic Profile

Wastewater enters the plant at elevation 7104.46, and will enter the aeration basin at elevation 7103.30. Water level in the aeration basin will be at elevation 7102.30. Discharge from the aeration basin will carry the mixed liquor to the clarifier, which will also operate at an elevation of 7102.30. Air lift pumps will move RAS back to the aeration basin through existing piping. Clarified effluent will flow into the sand filter dosing pit, from where it will be pumped to the sand filters, which have a surface elevation of 7100.75. The discharge point from the plant is at elevation 7083.70.

D. Disinfection

Although there is currently no disinfection requirement for this plant, the new proposed NPDES permit will have a limit for fecal coliform bacteria. A study will be performed beginning in October, 1993 to determine the best disinfection method for this plant. As soon as the recommendation of the report is received, design will begin on the system, with installation proceeding thereafter as soon as possible.

4. OPERATIONS RECOMMENDATIONS

A. Process Control

Low BOD_5 loading on the plant means that it will be difficult to maintain an adequate MLSS concentration. In the past, dog food was added to supply additional BOD_5 to keep the microorganisms alive. It is likely that the same procedure will be necessary again.

Daily microscopic examination of the MLSS will be performed as well as settleometer readings to help determine sludge age and viability. Dissolved Oxygen readings will be taken on a daily basis before the blower starts up and just as it stops to determine the need for timer adjustment. The

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blower times are adjusted to achieve a DO low level of 1.0, and a high level of 2.0-2.5.

Twice weekly measurements of pH, MLSS, and influent and effluent BOD_5 and TSS will be taken for process control purposes. Sludge age is calculated weekly to keep up with the need to waste sludge. Based on past experience, very little sludge wasting will likely be necessary. Laboratory tests will be performed at the TA-46 Wastewater Plant.

B. Routine Maintenance

Equipment at the plant requiring maintenance consists of the blowers and the filter dosing pump. The pump is a sealed submersible unit, and has no maintenance associated with it, and is simply replaced upon failure. The blowers must be lubricated weekly. Records of maintenance of the blowers are kept in the control room at the TA-21 plant.

General cleaning and grounds keeping are performed by Laborers on an as-needed basis. The plant itself is washed down twice per week, and rags are removed from the influent strainer basket daily.