Los Alamos National Laboratory

Environment, Safety, and Health Division
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Date: March 23, 1999
Refer to: ESH-DO:99-51

Ms. Phyllis Bustamante
Ground Water Quality Bureau
Pollution Prevention Section
New Mexico Environment Department
P.O. Box 26110
Santa Fe, New Mexico 87502

SUBJECT: INSTALLATION OF MECHANICAL EVAPORATOR, GROUND WATER DISCHARGE PLAN APPLICATION FOR THE TA-50 RADIOACTIVE LIQUID WASTE TREATMENT FACILITY, DP-1132

Dear Ms. Bustamante:

In our March 12, 1999, letter (ESH-DO:99-046) we reported to you that it is the Laboratory's goal to have a mechanical evaporator operating at the Radioactive Liquid Waste Treatment Facility (RLWTF) at TA-50 within 18 months. Additionally, we informed you that on March 19, 1999, after bids for the mechanical evaporator were opened, the Laboratory would then be able to confirm whether or not the 18 month goal was achievable.

On March 15, 1999, the Laboratory received six bids for an evaporator system. Delivery times for the evaporator systems range from two months to seven months after placement of the order. The Laboratory has formed a team of 24 individuals to evaluate the bids and select the most appropriate evaporator treatment technology. In addition to reviewing the bid packages submitted by each vendor, evaluation team members will visit proposed treatment units at their current sites. On April 5th and 6th, vendors are scheduled to make presentations to the evaluation team at the Laboratory. Final selection of an evaporator system is scheduled for April 7, 1999.

Once a vendor has been selected and a delivery date for the evaporator has been established, the Laboratory will complete a detailed Critical Path Schedule for the installation and start-up of the selected equipment. The project schedule will account for: (1) facility modifications required for installation of the evaporator and related treatment equipment; (2) environment, safety, and health (ESH) permitting and documentation requirements; (3) operational testing and check-out; (4) a DOE Readiness Assessment (RA); and (5) other DOE requirements for nuclear facilities.

On April 14, 1999, the Laboratory will submit to you a detailed project schedule with a commitment to a final completion date for an operational evaporator at the RLWTF at TA-50.

On a related matter, we would like to bring to your attention a problem with one of the attachments in the March 12, 1999, letter referred to previously. Attachment 3.0, *Description of Chemical Denitrification Process*, was erroneously stamped "Confidential" when it should have been labeled "For Official Use Only". Please return the "Confidential" copy of Attachment 3.0 to Bob Beers of the Laboratory's Water Quality and Hydrology Group and replace it with the attached "For Official Use Only" copy. Thank you for your cooperation in this matter.

If you would like additional information concerning this response, please contact Bob Beers of the Laboratory's Water Quality and Hydrology Group at 667-7969.

Sincerely,

J. M. Graf
for Dennis J. Erickson
Division Director
Environment, Safety, and Health Division

Sincerely,

Thomas E. Baca
Division Director
Environmental Management Division

DJE:TEB:RB/em

Attachments: a/s

Cy: M. Leavitt, NMED/GWQB, Santa Fe, New Mexico, w/att.
J. Davis, NMED/SWQB, Santa Fe, New Mexico, w/att.
B. Garcia, NMED/HRMB, Santa Fe, New Mexico, w/att.
D. Gurule, DOE/LAAO, w/att., MS A316
J. Vozella, DOE/LAAO, w/att., MS A316
R. Burick, DLD-OPS, w/att., MS A100
T. Gunderson, DLD-OPS, w/att., MS A100
B. Stine, ALDNW, w/att., MS F629
R. Michelotti, CST-7, w/att., MS E525
D. Broxton, EES-1, w/att., MS D462
S. Hanson, EM/RLW, w/att., MS E518
D. Moss, EM/RLW, w/att., MS E518
P. Worland, EM/RLW, w/att., MS E518
K. Hargis, EM/WM, w/att., MS J591
S. Rae, (ESH-18/WQ&H:99-0105) ESH-18, w/att., MS K497
B. Beers, ESH-18, w/att., MS K497
M. Saladen, ESH-18, w/att., MS K497
N. Williams, ESH-18, w/att., MS K497
D. Woitte, LC/GL, w/att., MS A187

Cy: (Continued)

B. Matthews, NMT-DO, w/att., MS E500
S. Schriber, NMT-2, w/att., MS E511
S. Yarbro, NMT-2, w/att., MS E511
S. Gibbs, NW-MM, w/att., MS A102
H. Ruppel, ALDSSR, w/att., MS B260
CIC-10, w/att., MS A150
ESH-DO File, w/att., MS K491
WQ&H File, w/att., MS K497

ATTACHMENT 3.0
(REVISED MARCH 18, 1999)

Description of Chemical Denitrification Process

FOR OFFICIAL USE ONLY

Enclosure

UPSTREAM TREATMENT OF NITRATE WASTE

A non-thermal chemical denitrification process which converts nitrate ions to nitrogen gas has recently been developed at Los Alamos National Laboratory. The waste streams to the radioactive liquid waste collection system which contain the highest concentration of nitrates will be collected at points of generation in plastic carboys, transferred to TA-50-1 Room 34, and treated prior to discharge to the headworks of the RLWTF. The following diagram shows the nitrate waste treatment train.

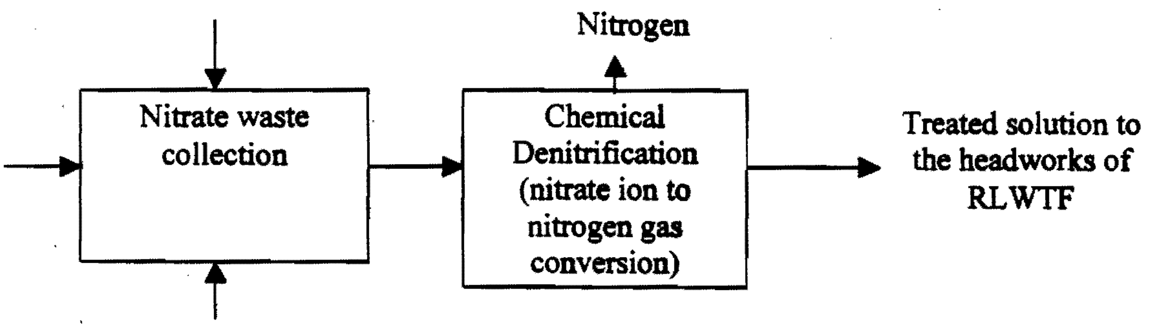

Figure 1. Nitrate Waste Treatment Train.

During the nitrate conversion, process nitrate waste will be introduced to a 20 gallon agitated tank containing a metal slurry (cadmium or zinc). An amide reagent (sulfamic acid) will be added to the reactor tank and reduce the nitrate ions to nitrogen gas. The metal will oxidize to M^{+2} in this process. The denitrified waste will then be transferred to an electrochemical cell where the metal reagent will be recovered and returned to the reactor tank. In the initial implementation stage of this technology, sodium hydroxide will be used to neutralize the acid generated in the electrochemical cell. In a later stage of implementation, a membrane electrochemical cell will be used to recover this acid. Residual cadmium in the treated water will be removed by a polishing column composed of iron filings. The polishing column will be regenerated every 5 – 6 months by dissolving its contents in the acid and recovering the cadmium metal by an electrolysis process. If zinc is used, the polishing column is not expected to be required. The denitrified stream will be collected in a tank and analyzed before discharging to the headworks of the RLWTF. Figure 2 shows the flow diagram for the chemical denitrification system.

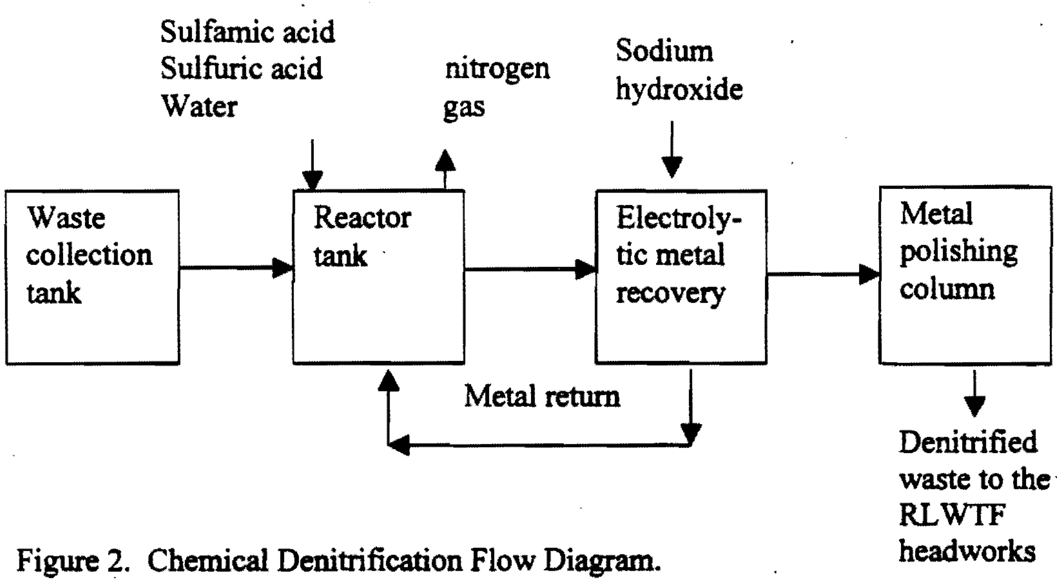

Figure 2. Chemical Denitrification Flow Diagram.

The following part shows the average input and output flow streams as well as the chemical use. These streams were calculated based on the survey of the main nitrate waste generators (other than TA-55) described in the Draft Radioactive Liquid Waste Survey Report, by Benchmark Environmental Corporation, December, 1998.

INPUT (per week)

Volume: 110 L
Nitrate content: 477 g/L NO_3^- (or 108 g/L N)
Composition: 40 % Nitric Acid (HNO_3)
Total N: 11.8 kg
Total nitrate: 52 kg

OUTPUT

Volume: 700 L*
Nitrate content: 742 mg/L NO_3^- (or 168 mg/L N)
Composition: $NaNO_3$, 742 mg/L
Na_2SO_4 195 g/L
Total N: 118 g
Total nitrate: 522 g

* Water will be added to the process due to the high nitric acid concentration in the input. Otherwise, at these high concentrations the resulting salts would precipitate.

CHEMICAL USE (per week):

Sulfamic acid (H_2NSO_3H) 82 kg
Sodium hydroxide (NaOH) 68 kg
Sulfuric acid (H_2SO_4) 4 kg