R-023-204.3

3082

URANYL NITRATE INFORMATION PACKAGE

04-06-1992

DOE/EPA
DOE-1326-92
3122
LETTER

~~R-023-101.3~~
R-023-204.3

Department of Energy
Fernald Environmental Management Project
P.O. Box 398705
Cincinnati, Ohio 45239-8705
(513) 738-6357

APR 0 8 1992

DOE-1326-92

3082

Mr. James A. Saric, Remedial Project Director
U. S. Environmental Protection Agency
Region V - 5HRE-8J
77 W. Jackson Boulevard
Chicago, Illinois 60604-3590

Mr. Graham E. Mitchell, Project Manager
Ohio Environmental Protection Agency
40 South Main Street
Dayton, Ohio 45402-2086

Dear Mr. Saric and Mr. Mitchell:

URANYL NITRATE INFORMATION PACKAGE

Enclosed is an information package on the Uranyl Nitrate (UN) Removal Action which is scheduled to begin in mid-April 1992. The information includes the Plant Test Authorization (PTA), the Task Specific Health and Safety Plan, and an outline which discusses Applicable or Relevant and Appropriate Requirements (ARARs).

The PTA (Enclosure 1) provides a flow chart and information on the processing of the UN solutions. The Task Specific Health and Safety Plan (Enclosure 2) supplements the sitewide plan by providing additional information involving the processing of UN solutions. The outline (Enclosure 3) discusses regulatory issues and includes background information on the UN Removal Action.

The current schedule allows us to start this process as early as April 16, 1992. The Fernald Environmental Management Project (FEMP) plans no shutdown of processing the UN solutions until the action is complete.

If you or you staff have any questions, please contact Rod Warner at FTS 774-8916 or (513) 738-8916.

Sincerely,

Johnny Reising

for Jack R. Craig
Fernald Remedial Action
Project Manager

FN:Warner

Enclosure: As Stated

Recycled and Recyclable

cc w/o enc.:

3092

J. J. Fiore, EM-42, TREV
K. A. Hayes, EM-424, TREV
J. Benetti, USEPA-V, AT-18J
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R. S. Shirley, WEMCO
K. A. Solomon, WEMCO
J. D. Wood, ASI/IT
J. E. Razor, ASI/IT

cc w/enc.:

AR Coordinator

bcc w/o enc.:

W. J. Quaider, DOE-FN
R. J. Janke, DOE-FN

3082

ENCLOSURE 1

[redacted] 3082

PLANT TEST AUTHORIZATIO

SAFETY SYSTEM, DESIGN FEATURE FOR SAFETY, OR OSR-AFFECTED PROCEDURE INCLUDED? ☐ YES ☒ NO	TEST NUMBER/REV.: PTA-90-2/3-003-0
TEST COORDINATOR: D. J. Dravland/J. B. Patton	TEST REQUESTOR: R. L. Gardner [redacted]

ESTIMATED START DATE:	ESTIMATED COMPLETION DATE:	REPORT DATE:	IMPACT LEVEL: (Check one)
3/6/92	6/6/92	7/15/92	☐ LEVEL 1 ☒ LEVEL 2 ☐ LEVEL 3 ☐ LEVEL 4

REPORTING REQUIREMENTS: ☒ INTERNAL ☐ EXTERNAL

EQUIPMENT AFFECTED:
Refinery Storage Tanks, Refinery Sump System, Plant 8 Filtration

CURRENT APPLICABLE SPECIFICATIONS (SOP, MANUFACTURING SPECIFICATION, ETC.):
See Attachment

SAFETY ASSESSMENT REFERENCE:	RISK ASSESSMENT REFERENCE:

DESCRIPTION OF TEST *(Print or Type Proposed Test)*:
Disposition of Refinery UN Solutions

ESTIMATED DIRECT COST OF TEST:

TEST CONDITIONS:
See Attachment

CHARGE TO: SKA00

INSTRUCTIONS. *Write test requirements, including all controlled or measured variables. (Use attachments as necessary.)*
See Attachment

RATIONALE FOR TEST:
See Attachment

APPROVALS *(See reverse side for Approval Levels)*

SIGNATURE	DATE	LEVEL
FACILITY OWNER: C. A. Glassmeyer	3/3/92	4, 3, 2, 1
TEST COORDINATOR: Bunny Leach	3/3/92	4, 3, 2, 1
NUCLEAR & SYSTEM SAFETY: J. E. Dick	2/28/92	4, 3, 2, 1
PROCESS ENGINEER: [illegible]	3/3/92	4, 3, 2, 1
Systems Eng. Manager: [illegible]	3/3/92	4, 3, 2, 1
EC&QA: J. M. Lopez	2/28/92	4, 3, 2, 1
Safety Manager: [illegible]	3/3/92	2, 1
PROGRAM MANAGER: [illegible]	3/4/92	2, 1
ISR COMMITTEE CHAIR:		
OTHERS:		

[redacted]

DISPOSITION OF REFINERY URANYL NITRATE SOLUTIONS

PTA-90-2/3-003-0

PLANT TEST AUTHORIZATION

REVISION 0

FEBRUARY 1992

PREPARED BY:

D. J. Dravland
J. B. Patton

WESTINGHOUSE ENVIRONMENTAL MANAGEMENT COMPANY OF OHIO
Cincinnati, Ohio

1.0 PURPOSE/SCOPE

All uranium solutions now stored in the various tanks located in the Refinery area will be converted to a solid form and packaged for storage. The contents of the tanks will be blended to reduce each composite blend to an isotopic level less than 1.00% U^{235}. The solutions will also be blended to achieve a nominal uniform concentration of < 100 g U/liter prior to precipitation and filtration. The product filter cake will be packaged into drums.

2.0 REQUIREMENTS/ACCEPTANCE CRITERIA

2.1 21 tanks in the Refinery area contain uranyl nitrate solutions in various concentrations. The total quantity amounts to approximately 226,000 gallons of solution, with a nominal 100 Metric Tons of Uranium (MTU). The criterion for this PTA is to develop the optimum parameters and methods for converting various solutions of Uranyl Nitrate into a stable filter cake that can be stored in drums. The PTA outlines parameters for blending, pH adjustment, precipitation methods, and filtering techniques that will be used. Specific parameters will be determined for various concentrations as they are blended and precipitated. This will be done by first, blending the solutions to a uniform mix, adding water to create the optimum concentration for neutralization, then precipitating the uranium from solution by magnesium hydroxide and lime addition, filtering the slurry, and loading into drums. The filtrate will be analyzed to verify full recovery of uranium from filtration and acceptable levels of other contaminants. The drums of filter cake product will be sampled and analyzed for final inventory control and material classification.

2.2 The conversion to solid form will be conducted in a series of ten or more "batches", each of which will be designed to mix solutions from two or more tanks that will satisfy the enrichment criteria of <1.00% U^{235} and concentration standards of < 100 g U/l. Before each solution is transferred from its storage tank to the blending tank, it will be heated to approximately 150°F and mixed to dissolve all settled material. The heating will be performed by steam jackets or steam jet spargers as determined by the Test Coordinator (TC). The TC will determine the sequence of the batches and will make adjustments to the specific recipes when required to maintain acceptable results.

2.3 Blending of solutions will be done in blend tanks F1-25 & F1-26, located in the refinery digestion area. The contents of the blend tanks will be thoroughly mixed. Transfers from the various storage tanks will be made in accordance with the designated piping routes and the blend recipes. Transfers are predetermined by the TC and shown in Section 1 of the "Batch Information and Record Sheet," (Attachment 1) to achieve the desired concentration and isotopic result. All tanks of uranyl nitrate solution will be heated and agitated prior to transfer. As each storage tank is emptied, it will be rinsed/flushed to assure removal of all uranium-containing solution and bottom sediment. Each batch will be held in the blend tank until authorization is received from the Test Coordinator to proceed (based on analysis results).

2.4 Each blend batch will be transferred through the designated pipe route to receiving tank F2E-601 or F2E-608 in the refinery sump. Following the Refinery Sump SOP (SOP 2-C-601), the solution will be fed into the continuous precipitation operation of the Refinery Sump. All health and safety requirements in SOP 2-C-601 will be followed during processing in addition to the Task Specific Health and Safety Plan requirements. The precipitation will be brought about by the addition of magnesium hydroxide slurry purchased in bulk tanker truck quantities. If required, Hydrated Lime Slurry ($Ca(OH)_2$ will also be added to optimize full precipitation. Tank 12 in the General Sump will receive each tanker truck load of $Mg(OH)_2$. The as-received slurry will be diluted with water as needed for use. The magnesium hydroxide (MgOH) slurry will be periodically transferred to the MgOH makeup tank (F1-617) as needed where it will be used per SOP 2-C-601. The precipitate slurry will be transferred to Plant 8 receiving tanks F1-203/F1-203A. The optimum concentration will be determined by the TC based on results of prior laboratory test results and prior filtration under this PTA.

2.5 The slurry from the refinery sump will be received in Plant 8 and filtered on the East and/or West Eimco filter, according to SOP 8-C-116 "Filtering Refinery Thickener Underflow". All health and safety requirements in the SOP will be followed in addition to the Site Specific Health and Safety Plan specific requirements. The wet filter cake will be collected into drums and packaged according to the FEMP Lot Marking and Color Coding System. Sampling will be performed according to Sampling Plan #0001 dated January 17, 1992 (Attachment D). After sampling in Plant 8, the drums will be stored on the Plant 1 pad until the analysis of the filter cake is complete. If determined to have RCRA constituents, the drums will be subject to all applicable hazardous waste rules and regulations. If determined non-RCRA, the drums will be transferred to a non-RCRA storage area.

2.6 An organizational chart is included in Attachment C designating the lines of authority for this project. The operation is to be controlled by the Manager of Facilities & Warehousing. Systems Engineering, Project Management, and IRS&T personnel will be matrixed to the Area Supervisor who will direct the operations. The Test Coordinator (TC) will be the Project Engineer.

3.0 REFERENCES

FMPC-2185	"Sampling Plan for Drummed Waste at the FMPC'
FMPC-721	"Plant Test Authorization"
FMPC-2181	"Implementing FMPC Policies and Procedures for Plant Test Authorization" (Topical Manual)
FMPC-503	"FMPC Spill Incident Reporting and Cleanup"
FMPC-204	"Minor Event Reporting System"
FMPC-2194	"Spill Prevention Control and Countermeasure Plan"
PMP-515	"Systems Operability (SO) Testing"
PMP-515-1	"Systems Operability Testing Guidelines"
PO-D-012	"Facilities/Process Startup"
SOP 2-C-601	"Refinery Sump"
SOP 8-C-104	"Makeup of Precoat Slurry & Precoating Rotary Vacuum Filter"
SOP 8-C-116	"Filtering Refinery Thickener Underflow"
SOP 2-C-916	"Plant 2/3 Emergencies"
SOP 8-C-914	"Plant 8 Emergencies"
C92-008	"Sampling UNH Tanks"
MS 8-BN/E 490-2	"Disposal of Waste Filtrate and Effluent"
PL-FMPC-3002	"Asbestos Management Plan"
IH&S-IH-03	"Control of Work Involving Asbestos"
SP-P-41-006	"Issuing Permits for Asbestos Work"

02A-5500-N-03355-1, Rev. 1 "UNH Stabilization Process Flow Diagrams
02A-5500-N-03356-1, Rev. 1 "UNH Stabilization Process Flow Diagrams
02A-5500-N-03357-1, Rev. 1 "UNH Stabilization Process Flow Diagrams

"Processing Plan for Tanks of Refinery Solutions", WMCO:O:90-312, J. B. Patton and T. N. Huey, dated June 1990.

"Task Specific Health and Safety Plan for Processing of Refinery Solutions," J. B. Patton, dated February 21, 1992

"Safety Assessment - Plant 2/3 Uranyl Nitrate Disposal," Rev. 3, WEMCO:IRS&T(NFS):91-1022.

Startup Plan SP91-SU-002 - "Uranyl Nitrate Disposal," B. Y. Ledbetter, dated May 1991.

"Plant 2/3 UNH Neutralization Project, Systems Operability Test," C. A. Glassmeyer, dated June 1991.

"Uranyl Nitrate Stabilization System Integrity Test Procedure," Rev. 1, B. Y. Ledbetter, dated October 1991.

"Uranyl Nitrate Disposal Operational Readiness Review," P. C. Weddle, dated July 1991.

4.0 PREREQUISITES

4.1 Verify that tanks 203 and 203A are empty and ready to receive from Plant 2/3.

Verified by _____
Test Coordinator Date

Verified by _____
Area Supervisor Date

4.2 Verify that Systems Operability Tests and Maintenance Work Orders have been completed and documented.

Verified by _____
Test Coordinator Date

Verified by _____
Area Supervisor Date

4.3 Verify that System Integrity Tests and all resulting corrections have been completed and documented.

Verified by _____
Test Coordinator Date

Verified by _____
Area Supervisor Date

4.4 Verify that all operator and supervisor training (including Health and Safety and Operating Procedures) have been completed and documented.

Verified by _____
Test Coordinator Date

Verified by _____
Area Supervisor Date

4.5 Verify that the Analytical Department is prepared to support the project.

Verified by _____
Test Coordinator Date

4.6 Verify that the MEF and Sampling Plan are in place for sampling drummed filter cake in Plant 8 as the drums are filled

Verified by _____
Test Coordinator Date

4.7 Verify that Emergency Preparedness is notified that the project will be initiated and Spill Response may be required.

Verified by _____
Test Coordinator Date

4.8 Verify that all valves are closed as specified in the System Integrity Test procedure.

Verified by _____
Test Coordinator Date

Verified by _____
Area Supervisor Date

4.9 Verify that the Magnesium Hydroxide Slurry is available and in Tank 12 in the General Sump area.

Verified by _____
Test Coordinator Date

Verified by _____
Area Supervisor Date

4.10 Verify that the 48 gallon drums and 55 gallon drums are available in Plant 8.

Verified by _____
Test Coordinator Date

4.11 Verify that the appropriate drum numbers have been issued from MC&A and communicated to the responsible supervisor in Plant 8.

Verified by _____
Test Coordinator Date

4.12 Verify that all required operator, supervisors, Maintenance craft people, etc., are scheduled and trained (including alternates).

Verified by _____
Test Coordinator Date

Verified by _____
Area Supervisor Date

5.0 TEST EQUIPMENT

Samples will be taken of each blended batch to verify the isotopic concentration and uranium concentration to identify possible need for additional blending.

Sampling of filtrate water and pH measurements are part of the Standard Operating Procedures and will be logged as required. Samples will be taken of the filter cake, as it is being drummed, according to Sampling Plan #0001 (Attachment D) which is based on FMPC-2185 "Sampling Plan for Drummed Waste at the FMPC". The FEMP Analytical Lab or an offsite lab will perform all MC&A and RCRA analyses.

Measurements of tank outages will be required as a part of the transfer of liquids from tank to tank. This is normally done with the use of a steel tape measuring to the nearest quarter inch. Process flow drawings 02A-5500-N-03355-1, 02A-5500-N-03356-1, and 02A-5500-N-03357-1 along with walkdowns will be used to determine valve alignments for tank transfers.

6.0 INITIAL PLANT CONDITIONS

The Refinery has not operated for an extended period of time. Therefore, all equipment which is to be operated will be subject to PO-D-012, "Facilities Startup Plan" as part of the preparation for use. All equipment and facilities will be prepared and verified in accordance with Section 4.0.

It is anticipated that all chemical operators involved will be relatively inexperienced in previous Refinery operations. The degree of required training will reflect this lack of experience. The training program is described in the "Task Specific Health & Safety Plan for Processing of Refinery Solutions." All operators will complete the specified training prior to participation in this operation. The Uranyl Nitrate Stabilization Training Plan details the required training.

7.0 SPECIAL PRECAUTIONS

Particular care is to be exercised to avoid leaks and spills when transferring the uranyl nitrate solution between tanks. All flanges, fittings, pump connections, etc., are to be verified by preliminary water test in the System Integrity Testing whenever possible. Each receiving tank is to be checked for available capacity before making any transfer.

Asbestos hazard protection must be observed by all workers who perform any duty within the indoor digestion area of the Refinery. All clothing and PPE requirements must be observed at each entry/exit of the area. Multiple operations should be combined, where possible, to minimize entry/exit cycles into the restricted area. The Site Specific Health and Safety Plan addresses the PPE requirements.

When using air to blow-out lines, use regulators provided by the supervisor to reduce airline pressure to 20-25 psi. This will reduce the likelyhood of "water hammer" occurrences.

During all pumping operations, operators will be stationed at the source tank and the receiving tank to moniotr conditions. In addition, when pumping is initiated, a walkdown of the line will be performed to check for leaks and unusual knocking which may indicate "water hammer." Any evidence of water hammer should be immediately brought to supervisors attention. Any leaks will be immediately reported to the supervisor who will follow Section 8.7 of this PTA.

Any circumstance which could result in an intake of radioactive materials by inhalation, ingestion, or absorption shall immediately be reported to a supervisor. The supervisor shall immediately report the circumstance of possible radioactive materials intake to Environmental and Radiation Monitoring for evaluation. The involved employees shall report to Medical Services at the end of their shift to submit a urine sample and again report at the start of their next shift to submit another urine sample.

All transfers of solutions from tank to tank are described in the valve alignment sheets (Attachment B) by designation of valves to be opened to allow such transfers to take place. Except for such designated valves, all other valves are to be closed. After each transfer is complete, the line is to be drained and/or blown out by air into the receiving tank and the valves which were opened for the transfer are to be closed.

8.0 DETAILED TEST PROCEDURE

8.1 Refinery Blending

Attachment A is the "Batch Information and Record Sheet" that is to be completed by the TC and used for all transfers in the blending portion of the project. This is the only reference to be used when transferring solutions for blending.

Attachment B contains the valve alignment instruction sheets which identify the valves to be used for the transfer of solutions from the source tanks indicated in each recipe to the blend tank being filled and also from the blend tanks to the refinery sump receiving tank. The first blend will be made in tank F1-26, in accordance with the first recipe. The second blend will be made in F1-25, in accordance with the second recipe, during which time the first blend may be transferred to the refinery sump receiving tank F2E-601 or F1-608. Thereafter, the blends will be made alternately in the two tanks and transferred to the refinery sump to provide a continuous supply of feed solution to the precipitation process. A listing of the blending recipes is shown in Attachment C.

8.1.1 The blending recipes will be predetermined by the TC and recorded on the "Batch Information and Record Sheet." The planned blending recipes are shown in Attachment C, but the TC may revise them if necessary.

NOTE: Only the "Batch Information and Record Sheet" is to be used for transferring solutions to the blending (receiving) tank. Do not use Attachment B or Attachment C of the PTA because conditions may change during the test that require adjustments. Make sure Section 1 is signed by the TC and Supervisor.

8.1.2 The TC will predetermine the correct valves to be opened to allow each tank transfer to take place. These valve alignments are described in Attachment B. The TC will record these valves on the "Batch Information and Record Sheet."

NOTE: Only the "Batch Information and Record Sheet" is to be used for transferring solutions to the blending (receiving) tank. Do not transfer solutions for blending without a Record Sheet signed by the TC and the Supervisor. Any deviations must be initialed by the TC and the Supervisor.

8.1.3 The TC will designate which tanks will be emptied during the transfer process for each batch. The TC will then inform the supervisors which tanks will have to be flushed and cleaned after a transfer is complete. Tank rinsing with Nitric Acid and flushing with water will be performed according to 8.4 of this procedure. The cleaning and flushing liquid will go into the batch with the solution.

8.1.4 After each tank transfer and rinse/flush is complete, the line is to be drained and/or blown out by air into the receiving (blending) tank and the valves which were opened for the transfer are to be closed.

8.1.5 The operator will monitor each transfer to/from the tanks by measurement of outage in accordance with the outage table of the specific tank. Outage tables for all tanks are available in the supervisors office. Supervisors will predetermine outage measurements before pumping begins and will then record the measurements on the "Batch Information and Record Sheet."

8.1.6 During pumping operations, one operator will be at each tank (UN tank and receiving tank). When pumping is initiated, the receiving tank operator will verify that the solution is being received. If the flow rate is not considered appropriate, pumping will be stopped until the cause is determined. Each time pumping is initiated, a walkdown of the lines will be performed to check for unusual conditions.

8.2 Tank Heating and Mixing

8.2.1 Each tank must be heated and mixed to redissolve/suspend the solids that may have settled out of the solution in the tank. This must be performed before any transfer is initiated.

8.2.2 The heating will be performed with either existing steam jackets and/or steam sparging equipment, as determined by the TC. The tanks will be heated to a temperature of approximately 150°F. Source and area NOx sampling will be performed to verify modelling assumptions in the Safety Assessment and to monitor H&S Plan criteria. If excessive NOx fuming occurs, discontinue steam use and evaluate steam heating techniques.

8.2.3 Site Specific Health and Safety Plan requirements will be followed when steam sparging equipment is used.

8.2.4 Tank volume and discharge valves will be monitored during the heating process to ensure volume increases are within tank capacity limits.

8.3 Procedure

8.3.1 The TC prepares and signs Section 1 of the "Batch Information and Record Sheet" for the batch to be initiated.

8.3.1.1 The Supervisor reviews the "Batch Information and Record Sheet" and signs Section 1 if correct.

8.3.1.2 The information will be reviewed with all operators that will be involved with the transfer and blending operations before operations begin.

8.3.1.3 The receiving (blending) tank will be checked to be sure that it can receive the specified volume.

8.3.2 Each tank to be blended will be heated and mixed before its contents are transferred to the blend/receiving tank. Heating and mixing should follow instructions in Section 8.2. After each transfer is complete, the involved valves will be closed before the next transfer is initiated.

<u>CAUTION:</u> MONITOR TANK VOLUME FOR VOLUME INCREASES, WHEN HEATING TANKS.

8.3.2.1 When the tank is heated and mixed sufficiently, as determined by the supervisor, the correct volume of solution as specified in Section 1 of the "Batch Information and Record Sheet" will be transferred to the receiving tank.

8.3.2.2 The valves will be opened which are specified in the Record Sheet. Tank transfers will follow requirements in Section 8.1.

8.3.2.3 If the tank is emptied, the tank will be rinsed/flushed as specified in Section 8.1.3.

8.3.2.4 Transfer valves will be closed as required in Section 8.1.4 when the transfer is complete.

8.3.3 When the blended batch is mixed sufficiently as determined by the supervisor, a sample will be taken from the batch. Using equipment provided by the supervisor, the sample will be taken and forwarded to the Analytical Department. If analysis shows a $\geq$ 1.00% U^{235}, additional blending will be necessary.

8.3.3.1 Tank sampling will be performed per Procedure C-92-008.

8.3.3.2 If analysis shows a U^{235} percent < 1.00, the batch will be processed according to plan. A blended batch will not be transferred from the blend tanks until it is determined through analysis to be < 1.00% U^{235}.

8.3.3.3 The blended batch will either be transferred to F2E-601 or F1-608 (Refinery sump receiving tanks) or directly to F1-609/F1-610 (precipitation tanks), as determined by the TC.

8.3.4 The TC completes Section 2 of the "Batch Information and Record Sheet" and verifies that all operations were completed. The TC notes in the comments section any problems or observations that he feels are relevant.

8.3.5 Follow the SOP 2-C-601 Refinery Sump procedure as required to process the batch through the precipitation cycle.

8.3.5.1 Water will be added to the blended batch in the Refinery Sump receiving tanks or the precipitation tanks, as directed by the Test Coordinator, to obtain the optimum concentration for the precipitation process.

NOTE: Make sure Plant 8 is ready to receive the precipitated slurry before initiating transfer.

8.3.5.2 The precipitated slurry will be pumped directly to Plant 8 receiving tanks F1-203/F1-203A.

8.3.5.3 At the begining of each shift, a walkdown of operating systems will be performed to check for leaks.

8.3.6 pH indicators will determine the flow rates of $Mg(OH)_2$ and/or lime additions as determined by Supervisors. When the TC determines the precipitation is at optimum level (as indicated by pH measurements) the transfer to Plant 8 will be authorized.

8.3.6.1 The lime water will be mixed by emptying bags of Hydrated Lime [Calcium Hydroxide - $Ca(OH)_2$] into water, using Tank 612 in the Refinery Sump.

8.3.6.2 Follow all task Health and Safety requirements as specified in the Task Specific Health and Safety Plan.

8.3.7 When the slurry is received in Plant 8, it will be processed according to SOP 8-C-116 "Filtering Refinery Thickener Underflow."

8.3.7.1 When sampling per 7.2.20.2 of SOP 8-C-116, request analysis of U (lb/gal), Cu(ppm), Cr(ppm), Ba(ppm), and pH. Use sampling equipment as provided by the supervisor.

8.3.7.2 Precoating the Eimco filters will follow SOP 8-C-104 "Makeup of Precoat Slurry and Precoating Rotary Vacuum Filters."

8.3.8 Take samples of the filter cake as specified in the Sampling Plan #0001 (Attachment D).

8.3.9 Filter cake will be packaged in double drums (48/55 gallon) instead of the single drum specified in SOP 8-C-116. According to the FEMP Lot Marking and Color Coding System, the drums will be black with a red stripe.

8.3.10 Drummed, marked, and skid mounted drums will be transported to the Plant 1 pad for temporary storage. If found to be RCRA, the drums will be transferred to an approved RCRA storage area. If the drums are non-RCRA, they will be transferred to the Plant 2/3 West Pad storage area. Because the enrichment is < 1.00% U^{235}, the drums satisfy the requirements for unlimited handling.

8.4 <u>Tank Rinsing With Nitric Acid and Flushing With Water</u>

8.4.1 Nitric Acid is stored in tanks F1-23, F1-24, and F3E-220.

8.4.2 When working around Nitric Acid, follow safety requirements in the Task Specific Health & Safety Plan and Plant 2/3 SOP 2-C-601.

8.4.3 The Nitric Acid distribution lines will be monitored for leaks whenever distribution is in progress. If significant leaking occurs, pumping will be stopped and corrective action taken per 8.7.3 and 8.7.4 of this procedure.

8.4.4 Dilute nitric acid (use ≤ 1.0 N) will be used to remove residual Uranium bearing sludge from tanks as determined by the TC.

8.4.4.1 Diluted nitric acid will be pumped into the tank to be cleaned and will be agitated for approximately one hour.

8.4.4.2 The diluted nitric acid will then be pumped to the blend tanks and neutralized in the same manner as the uranyl nitrate solutions.

8.4.5 Flushing Tank With Water

8.4.5.1 After tanks have been emptied of uranyl nitrate solution and rinsed with nitric acid, they will be flushed with water to ensure that all uranium bearing material has been removed.

8.4.5.2 The tank cleaning nozzle shall be used.

8.4.5.3 The tanks shall be flushed until the pH of the water used for flushing no longer changes.

8.5 Process Specifications

8.5.1 The following setpoints and criteria shall be used when processing the Uranyl Nitrate Solutions.

AREA	MINIMUM	TARGET	MAXIMUM
Blending Tanks (F1-25, F1-26)			
Isotopic	NA	NA	< 1.00% U^{235}
U-Concentration	NA	< 100 g U/l	NA
Receiving Tanks F1-608, F2E-601			
Final Feed Temperature (Before Precipitation)	140°F	150°F	160°F
Precipitation Tanks (F1-609/F1-610			
F1-609 pH Controller Setpoints	5.0	5.5	6.0
F1-610 pH Controller Setpoints	6.0	6.5	7.0
Plant 8 Eimco Filters			
U Content of Filtrate from Eimco Filter	As specified in MS BN/E-490-2 Plus Cr < 5 ppm, Ba < 100 ppm		

8.6 Sampling and Analysis Requirements

8.6.1 All sampling and analysis requirements are listed below and in Sampling Plan #0001 (Attachment D).

AREA	ANALYSIS REQUIRED	SAMPLE FREQUENCY
Blending Tanks[1][2] (F1-25, F1-26)	Isotopic (% U^{235}) U-Content (g U/l)	Each Batch
Blended Feed (F1-608, F2E-601)	pH[3]	Once Each Shift
Precipitated Slurry (F1-609/F1-610)	pH[3]	Once Each Shift
Plant 8 Eimco Filters Filter Cake[4] (Composite)	% U Isotopic (% U^{235}) TCLP pH	Per Sampling Plan
Filtrate (Composite)	pH Cr(ppm) Ba(ppm) U(lb/gal)	As receiving Tanks Fill Up

(1) Sample shall be recorded in the "Refinery Sump Log" FMPC-PRO-744. A "Report of Chemical Analysis" Form FMPC-T-200 shall be sumitted with the sample.

(2) Analysis of Isotopic value must show <1.00% U^{235} before batch is transferred to next stage.

(3) Use the portable pH analyzer. Operator can use the analyzer and not be required to take a sample.

(4) Sample collection and analysis to be determined by Sampling Plan #0001.

8.7 Environmental Compliance and Spill Response

8.7.1 The processing of the UNH Solution is being performed as an Emergency Removal Action under CERCLA regulations. The Emergency Removal Action is needed because of the current leakage of hazardous material from tanks, pipes, etc., and the potential for serious leaks or spills if the situation is not corrected.

Almost all of the tanks, pipes, etc. are in areas that have secondary containment (dikes, sumps) and leaks would immediately be washed down and pumped into holding tanks.

After completion of the planned batches for the project, the collected material in the holding tanks will be sampled for U, Cr, Ba, and pH to determine whether it needs to be processed or if it can be handled as normal sump water. The few pipe lines that don't have secondary containment have all welded fittings and joints and are considered unlikely to leak when processing the UNH solutions. No hazardous material is expected to be released to the environment (soil, stormsewer, surface water). If spills or releases occur outside of secondary containment areas, all applicable regulations and site SOPs will be followed with regard to reporting, spill response, and cleanup of the affected areas (FMPC-503).

8.7.2 Tank Emissions

Although this Emergency Removal Action is excluded from permitting requirements, the OEPA Permit to Operate (PTO) or renewals for all tanks and filters connected with the UNH project have been submitted to SWOAPCA as required in the Consent Decree. In addition to the following restrictions, the terms and conditions of the PTOs will be met during the processing of UNH solutions.

8.7.2.1 If visibile NO_2 fumes are created during heating of a tank, discontinue the heating operation and evaluate necessity of further heating of the solution.

8.7.2.2 When processing material is required to be air blown from the pipes going to tanks, flush lines into tank with clean water first to minimize pickup of contamination when blowing out lines.

8.7.2.3 When air blowing lines into tanks, limit air blow after the breakthrough to less than one minute for each occurrence.

8.7.3 Leaks and Spill Response

8.7.3.1 If an emergency situation endangers life, health, property, and/or the environment in the vicinity of Plant 2/3 or Plant 8, proceed in accordance with the Plant Emergency procedures (2-C-916 and 8-C-914). For non-emergency leaks or spills, follow the guidelines in this section of the PTA.

NOTE: Appropriate equipment is available and at easy access in preparation for leaks.

8.7.3.2 Operators must report all leaks to the Supervisor immediately.

8.7.3.3 The Supervisor must report all leaks to the AEDO for evaluation according to FMPC-503 and FMPC-704. The AEDO and Environmental Compliance will conduct an analysis of the leak and reporting requirements.

8.7.3.4 If the leak is of a dripping nature, action should first be taken to contain the material (can, pail, etc.)

8.7.3.5 If the leak is a steady stream or spray, the pump that is being used should be immediately shut off and valves should be closed to isolate the leak. A container should then be placed to contain the leak.

CAUTION: FOLLOW APPROPRIATE HEALTH AND SAFETY PLAN REQUIREMENTS WHEN WORKING AROUND LEAKS.

8.7.3.6 If a minor drip leak can be stopped by tightening bolts or nuts, this should be attempted first.

8.7.3.7 If a drip type leak does not respond to tightening, the Supervisor and Test Coordinator will consult with the AEDO to determine whether to stop pumping and repair the leak or to finish the pumping operation depending on the leak rate observed. In some cases, if the leak rate is low or the pumping is near a stopping point (e.g., final emptying of the tank, end of shift, hard to isolate for a repair) there would be less effect on personnel and/or the environment to continue operations and monitor the leak rate. In many cases, this can be determined by estimating the amount of material that would have to be drained from the affected area before repairs can proceed.

8.7.4 Spill Cleanup

8.7.4.1 Leak material collected in leak collection vessels shall be returned to the process after the leak has been repaired. The Test Coordinator determines at which stage of the process the material is to be returned.

8.7.4.2 After the leak is stopped and if the leak is in a diked area, the affected area will be hosed down with clean water. The cleanup water will be pumped from the sump to a holding tank.

8.7.4.3 After the planned batches are completed, the collected material in the holding tanks will be sampled for hazardous constituents (e.g., U, Cr, Ba, pH). If constituents are within acceptable limits and uranium concentrations are within limits, the collected water will be processed as standard sump water (through the Oliver Filter and then to the general sump).

8.7.4.4 If unacceptable levels of hazardous constituents or Uranium are found, the collected water from the holding tanks will be processed according to Standard Operating Procedures and this PTA.

8.7.4.5 If the leak is outside the secondary containment dike, the cleanup will be according to Site Procedure FMPC-503, "FMPC Spill Incident Reporting and Cleanup."

8.7.5 Characterization and Storage of Filter Cake

The filter cake resulting from this process will be characterized per MEF 1186 and the sampling plan prepared for the project. The sampling will be performed when the drums are filled and before the lids are installed. The filter cake will be packaged in double drums (48/55) and temporarily placed on the Plant 1 Pad until analysis and characterization is complete.

8.7.5.1 If the material is characterized as a RCRA Mixed Waste, the drums will be moved to an authorized RCRA storage facility. If no storage facility is available, a plan will be prepared within 60 days describing storage facility plans and the scheduled completion dates for construction.

8.7.5.2 If the material is non-hazardous, the drums will be moved to a non-RCRA storage area to await further disposition.

8.7.6 Filtrate Water

The filtrate water and effluent from the filtration cycles of the project will be analyzed. The filtrate water will be held in Plant 8 receiving Tank #25A until analysis is received and authorization is given to transfer to the General Sump. They will not be transferred to the General Sump until the hazardous constituents are at acceptable limits that can be processed in the existing wastewater treatment facilities to meet NPDES restrictions as specified in Section 8.5 of this procedure.

9.0 DATA REQUIRED

All drums of product will be sampled to satisfy the requirements of MC&A for uranium inventory. Waste water from all processes will be monitored and logged per existing SOPs prior to discharge to the General Sump.

All processing steps will be tracked by shift logs, sample logs, tank status sheets, etc. throughout the campaign as specified in applicable procedures.

The tanks of solution have been sampled for chromium and barium which by process knowledge, are the only constituents that may be present to cause the solutions to be classified as RCRA. The results of these analyses indicate substantial levels of each of these elements present. As the precipitation and filtration of the uranium proceeds, both solids and waste water streams will be monitored to assure retention of both elements within the collected solids.

10.0 ATTACHMENTS

A. Batch Information and Record Sheet

B. Valve alignment instruction sheets and piping diagrams

C. Preliminary blending recipes and UNH data

D. Sampling Plan

[redacted]

ATTACHMENT A

[redacted]

URANYL NITRATE STABILIZATION
BATCH INFORMATION AND RECORD SHEET

BATCH #

Section #1		TRANSFER INFORMATION		
Source Tanks	# of Gal	Outage - Start / Outage - End	Tank Heating Method	Valves to Open for Transfer to Receiving Tank
#1				
#2				
#3				
#4				
#5				
#6				
#7				
#8				

Receiving (Blend) Tank # ___ Supervisor ___ Date ___ Test Coordinator ___ Date ___

URANYL NITRATE STABILIZATION
BATCH INFORMATION AND RECORD SHEET

BATCH #

Section #2	TRANSFER					
Source Tanks	Outage - Start / Outage - End	No. of Gal.*	Heated & Mixed*	Material Transferred*	Tank Flushed*	Comments
#1						
#2						
#3						
#4						
#5						
#6						
#7						
#8						

SAMPLE #_____ ISOTOPIC VALUE _____ U CONTENT _____

* Supervisor to initial when complete.

_____
Test Coordinator

[redacted]

ATTACHMENT B

VALVE ALIGNMENT

[redacted]

VALVE ALIGNMENT INSTRUCTIONS

UNH TANKS TO BLEND TANKS

FROM	TO	PUMP #	VALVES TO OPEN
F2-605 NFS TANK	F1-26 BLEND TANK	G2-140-1	Open UNH-4, 21, 22, 28, 29, 8, 10, 55, 56
F2-605 NFS TANK	F1-26 BLEND TANK	G2-140-2	Open UNH-4, 21, 22, 28, 29, 5, 7, 55, 56
F2-605 NFS TANK	F1-25 BLEND TANK	G2-140-1	Open UNH-4, 21, 22, 28, 29, 8, 10, 57, 58
F2-605 NFS TANK	F1-25 BLEND TANK	G2-140-2	Open UNH-4, 21, 22, 28, 29, 5, 7, 57, 58
F2-606 NFS TANK	F1-26 BLEND TANK	G2-140-1	Open UNH-3, 21, 22, 28, 29, 8, 10, 55, 56
F2-606 NFS TANK	F1-26 BLEND TANK	G2-140-2	Open UNH-3, 21, 22, 28, 29, 5, 7, 55, 56
F2-606 NFS TANK	F1-25 BLEND TANK	G2-140-1	Open UNH-3, 21, 22, 28, 29, 8, 10, 57, 58
F2-606 NFS TANK	F1-25 BLEND TANK	G2-140-2	Open UNH-3, 21, 22, 28, 29, 5, 7, 57, 58
F2-607 NFS TANK	F1-26 BLEND TANK	G2-140-1	Open UNH-2, 21, 22, 28, 29, 8, 10, 55, 56
F2-607 NFS TANK	F1-26 BLEND TANK	G2-140-2	Open UNH-2, 21, 22, 28, 29, 5, 7, 55, 56
F2-607 NFS TANK	F1-25 BLEND TANK	G2-140-1	Open UNH-2, 21, 22, 28, 29, 8, 10, 57, 58
F2-607 NFS TANK	F1-25 BLEND TANK	G2-140-2	Open UNH-2, 21, 22, 28, 29, 5, 7, 57, 58
F2-608 NFS TANK	F1-26 BLEND TANK	G2-140-1	Open UNH-1, 21, 22, 28, 29, 8, 10, 55, 56
F2-608 NFS TANK	F1-26 BLEND TANK	G2-140-2	Open UNH-1, 21, 22, 28, 29, 5, 7, 55, 56
F2-608 NFS TANK	F1-25 BLEND TANK	G2-140-1	Open UNH-1, 21, 22, 28, 29, 8, 10, 57, 58
F2-608 NFS TANK	F1-25 BLEND TANK	G2-140-2	Open UNH-1, 21, 22, 28, 29, 5 7, 57, 58

[redacted]

UNH TANKS TO BLEND TANKS

FROM	TO	PUMP #	VALVES TO OPEN
F2E-5 SOUTHEAST TANK	F1-26 BLEND TANK	G2E-14	Open UNH-29, 30, 39, 36, 31, 41, 46, 51, 54, 55, 56
F2E-5 SOUTHEAST TANK	F1-25 BLEND TANK	G2E-14	Open UNH-29, 30, 39, 36, 31, 41, 46, 51, 54, 57, 58
F2E-6 NORTHEAST TANK	F1-26 BLEND TANK	G2E-14	Open UNH-29, 30, 39, 36, 31, 41, 46, 53, 55, 56
F2E-6 NORTHEAST TANK	F1-25 BLEND TANK	G2E-14	Open UNH-29, 30, 39, 36, 31, 41, 46, 53, 57, 58
F2E-8 SOUTHWEST TANK	F1-26 BLEND TANK	G2E-14	Open UNH-29, 30, 39, 36, 31, 40, 55, 56
F2E-8 SOUTHWEST TANK	F1-25 BLEND TANK	G2E-14	Open UNH-29, 30, 39, 36, 31, 40, 57, 58
D1-7	F1-26 BLEND TANK	G1-9	Open UNH-365, 362, 261, 366, 358, 74, 77
D1-7	F1-25 BLEND TANK	G1-9	Open UNH-365, 362, 261, 366, 358, 74, 351, 76
D1-10	F1-26 BLEND TANK	G2E-26	Open UNH-59, 62, 65, 67, 69, 72, 77
D1-10	F1-25 BLEND TANK	G2E-26	Open UNH-59, 62, 65, 67, 69, 72, 76, 351
D1-1 SOUTH DIGESTOR TANK	F1-26 BLEND TANK	G1-1	Open UNH-117, 163, 161, 158, 156, 112, 79
D1-1 SOUTH DIGESTOR TANK	F1-25 BLEND TANK	G1-1	Open UNH-117, 163, 161, 158, 156, 83

UNH TANKS TO BLEND TANKS

FROM	TO	PUMP #	VALVES TO OPEN
D1-2 SOUTH DIGESTOR TANK	F1-26 BLEND TANK	G1-2	Open UNH-117, 148, 145, 143, 141, 112, 79
D1-2 SOUTH DIGESTOR TANK	F1-25 BLEND TANK	G1-2	Open UNH-117, 148, 145, 143, 141, 83
D1-4 SOUTH DIGESTOR TANK	F1-26 BLEND TANK	G1-5	Open UNH-117, 132, 128, 126, 123, 120, 112, 79
D1-4 SOUTH DIGESTOR TANK	G1-25 BLEND TANK	G1-5	Open UNH-117, 132, 128, 126, 123, 120, 83
F1-1	F1-26 BLEND TANK	G1-14	Open UNH-95, 93, 90, 89, 87, 86, 113, 81
F1-1	F1-25 BLEND TANK	G1-14	Open UNH-95, 93, 90, 89, 87, 84
F3E-223	F1-26 BLEND TANK	G3E-222	Open UNH-171, 187, 189, 191, 197, 201, 206, 209, 220, 225, 114, 394, 79
F3E-223	F1-25 BLEND TANK	G3E-222	Open UNH-171, 187, 189, 191, 197, 201, 206, 209, 220, 225, 114, 394, 112, 83
F1-301 HOT RAFFINATE TANK	F1-26 BLEND TANK	G1-304	Open UNH-259, 249, 245, 326, 328, 26, 298, 114, 244, 241, 240, 237, 236, 229, 216, 225, 255, 251, 79
F1-301 HOT RAFFINATE TANK	F1-25 BLEND TANK	G1-304	Open UNH-259, 249, 245, 326, 328, 26, 298, 114, 244, 241, 240, 237, 236, 229, 216, 225 255, 251, 112, 83
F1-302 HOT RAFFINATE TANK	F1-26 BLEND TANK	G1-304	Open UNH-265, 268, 264, 245, 326, 328, 26, 298, 114, 244, 241, 240, 237, 236, 229, 216, 225, 255, 251, 79

[redacted]

UNH TANKS TO BLEND TANKS

FROM	TO	PUMP #	VALVES TO OPEN
F1-302 HOT RAFFINATE TANK	F1-26 BLEND TANK	G1-304	Open UNH-265, 268, 264, 245, 326, 328, 26, 298, 114, 244, 241, 240, 237, 236, 229, 216, 225, 255, 251, 79
F1-302 HOT RAFFINATE TANK	F1-25 BLEND TANK	G1-304	Open UNH-265, 268, 264, 245, 326, 328, 26, 298, 114, 244, 241, 240, 237, 236, 229, 216, 225, 255, 112, 83, 251
F1-303 HOT RAFFINATE TANK	F1-26 BLEND TANK	G1-304	Open UNH-270, 389, 268, 264, 249, 245, 326, 328, 26, 298, 114, 244, 241, 240, 237, 236, 229, 216, 225, 255, 251, 79
F1-303 HOT RAFFINATE TANK	F1-25 BLEND TANK	G1-304	Open UNH-270, 389, 268, 264, 245, 326, 328, 249, 26, 298, 114, 244, 241, 240, 237, 236, 229, 216, 225, 255, 251, 112, 83
F1-308 HOT RAFFINATE TANK	F1-26 BLEND TANK	G1-304	Open UNH-411, 509, 408, 655, 664, 238, 236, 326, 328, 26, 298, 229, 216, 225, 114, 79
F1-308 HOT RAFFINATE TANK	F1-25 BLEND TANK	G1-304	Open UNH-411, 509, 408, 655, 664, 238, 236, 326, 328, 26, 298, 229, 216, 225, 114, 112, 83

BLEND TANKS TO HOLD TANKS

FROM	TO	PUMP #	VALVES TO OPEN
F1-26 BLEND TANKS	F2E-601 HOLD TANK	G1-34	Open UNH-311, 319, 321, 324, 328, 329, 330, 332, 341, 291, 310, 294, 307, 301
F1-25 BLEND TANK	F2E-601 HOLD TANK	G1-32	Open UNH-274, 276, 277, 279, 281, 283, 284, 323, 324, 328, 329, 330, 332, 341
F1-26 BLEND TANK	F1-608 HOLD TANK	G1-34	Open UNH-311, 319, 321, 324, 328, 329, 330, 332, 340, 291, 310, 294, 307, 301
FI-25 BLEND TANK	F1-608 HOLD TANK	G1-32	Open UNH-274, 276, 277, 279, 281, 283, 284, 323, 324, 328, 329, 330, 332, 340

HOLD TANKS TO PRECIPITATION TANKS

FROM	TO	PUMP #	VALVES TO OPEN
F2E-601 HOLD TANK	F1-609 PRECIPITATION TANK	H002	Open UNH-577, 578, 580, 582, 588, 589, 590
F2E-601 HOLD TANK	F1-609 PRECIPITATION TANK	H001	Open UNH-577, 576, 571, 575, 588, 589, 590
F1-608 HOLD TANK	F1-609 PRECIPITATION TANK	H001	Open UNH-569, 571, 575, 588, 589, 590
FI-608 HOLD TANK	F1-609 PRECIPITATION TANK	H002	Open UNH-569, 576, 578, 580, 582, 588, 589, 590

PRECIPITATION TANK TO PLANT 8 HOLD TANK

FROM	TO	PUMP #	VALVES TO OPEN
F1-610 PRECIP. TANK	F1-203A PLT 8 HOLD TANK	G1-611	Open UNH-434, 445, 446, 426, 460, 452, 453, 454, 467, 472, 476, 480
F1-610 PRECIP. TANK	F1-203 PLT 8 HOLD TANK	H004A G1-611	Open UNH-434, 445, 446, 426, 460, 452, 453, 454, 467, 472, 476, 481, 483

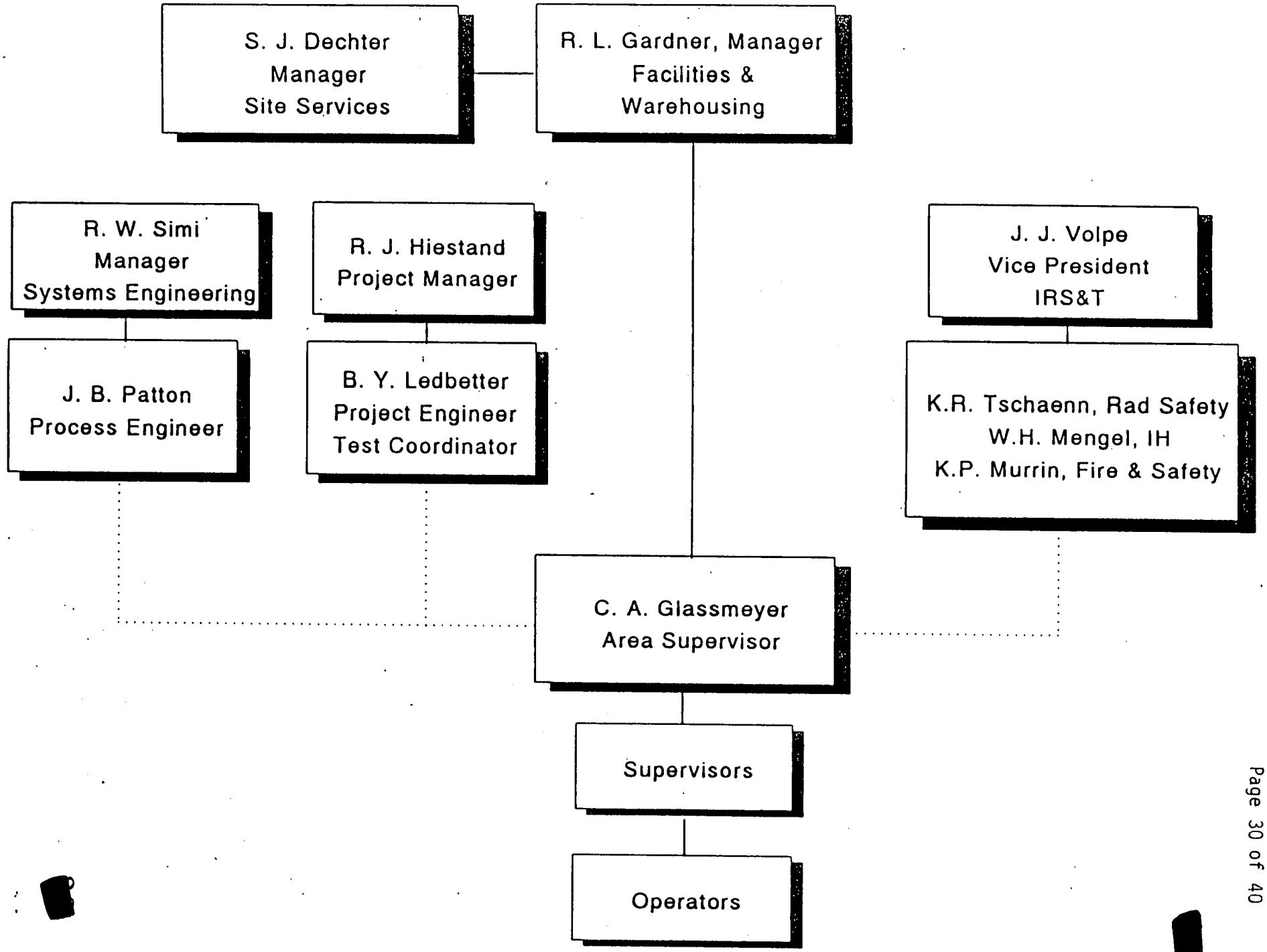
RECIRCULATE PRECIPITATION TANK

FROM	TO	PUMP #	VALVES TO OPEN
F1-610 PRECIPITATION TANK	F1-609 PRECIPITATION TANK	G1-610	Open UNH-434, 445, 437, 442, 440, 441, 427, 453, 455, 457

[redacted]

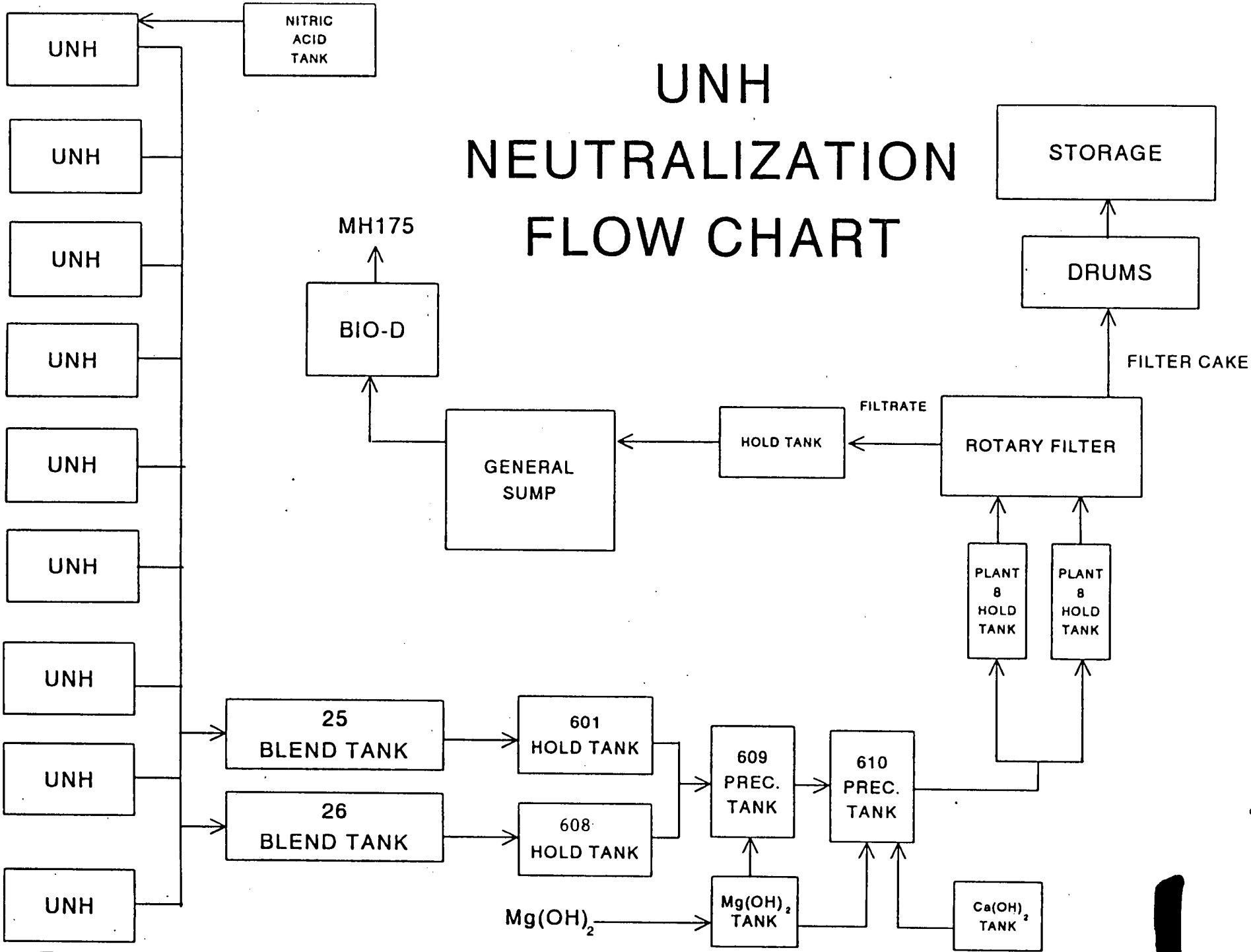
ATTACHMENT C

PROJECT INFORMATION



Responsibility Matrix for the UNH Project.

UNH NEUTRALIZATION FLOW CHART



21 TANKS

PROJECT MANAGEMENT PM3

REFINERY UNH STORAGE INVENTORY - RADIOLOGICAL

TANK NUMBER	VOLUME gallons	SAMPLE NUMBER	URANIUM (g/l)	ISOTOPIC (% U235)	PLUTONIUM d/m/g(ppb)	NEPTUNIUM d/m/g	TOTAL ALPHA
F1-301	2,301	C-16	58.7	0.990	NA	NA	NA
F3E223	12,180	D-1	313	0.989	690 (5.0)	370	1060
F1-302	1,538	C-17	38.8	0.990	NA	NA	NA
F1-303	1,764	C-18	22.2	0.990	NA	NA	NA
F1-25	18,564	C-6	146	1.000	930 (6.3)	620	1550
F1-26	16,114	C-7	128	0.991	1300 (9.3)	740	2040
NE	16,500	C-8	261	0.951	540 (4.0)	530	1070
SE	17,931	C-9	104	0.989	840 (6.2)	650	1490
SW	18,884	C-10	66	0.998	1100 (8.1)	590	1690
F1-308	2,299	C-19	28.3	0.99	NA	NA	NA
F2-605	24,280	*	64	1.00	2000 (14.7)	700	2700
F2-606	23,975	*	102	1.00	2000 (14.7)	700	2700
F2-607	25,590	*	62	1.00	2000 (14.7)	700	2700
F2-608	24,305	*	79	1.00	2000 (14.7)	700	2700
D1-1	3,150	C-1	134	0.956	640 (4.7)	540	1,180
D1-2	3,068	C-2	130	0.953	590 (4.4)	580	1,170
D1-4	2,832	C-3	138	0.955	580 (4.3)	580	1,160
D1-10	3,187	C-4	143	1.290	620 (4.5)	510	1,130
F1-1	2,227	C-5	173	0.951	970 (7.2)	1,400	2,370
D1-7	3,559	*	51	0.99	NA	NA	NA
TOTAL	224,248						
AVG.			110	0.99	1360 (10)	600	1,960

REFINERY UNH STORAGE INVENTORY - TOXIC METALS [redacted]

TANK NUMBER	VOLUME gallons	SAMPLE NUMBER	URANIUM (g/I)	ISOTOPIC (% U235)	CHROMIUM* mg/L(ppm)	BARIUM mg/L(ppm)
F1-25	2,301	C-1	58.7	0.990	29.32	53.64
F1-1	12,180	C-3	313	0.989	69.34	87.80
F1-26	1,538	C-2	38.8	0.990	98.10	138.80
F1-303	1,764	C-18	22.2	0.990	46.86	28.24
F1-308	18,564	C-19	146	1.000	71.28	62.24
F1-301	16,114	C-16	128	0.991	68.98	108.34
F1-302	16,500	C-17	261	0.951	42.36	47.18
F1-607	17,931	C-14	104	0.989	22.58	42.86
F1-608	18,884	C-15	66	0.998	118.42	81.46
F1-605	2,299	C-12	28.3	0.99	69.46	92.54
F1-606	24,280	C-13	64	1.00	59.90	92.76
SE	23,975	C-10	102	1.00	19.14	31.76
SW	25,590	C-11	62	1.00	64.08	216.60
D1-2	24,305	C-5	79	1.00	137.74	38.90
D1-1	3,150	C-4	134	0.956	82.40	126.18
D1-4	3,068	C-6	130	0.953	59.12	18.67
D1-10	2,832	C-8	138	0.955	404.00	74.72
D1-7	3,187	C-7	143	1.290	VOID	VOID
NE	2,227	C-9	173	0.951	90.00	72.28
F3E-223	12,180	D-1	313	0.989	NA	NA

* Sampled for total Chromium (ICP Analysis - Inorganic Metals)
RCRA Limit - 5 ppm (Hexovalent Chrome)
Barium Limit - 100 ppm (ICP Analysis - Inorganic Metals)

[redacted]

Refinery Blending Recipes

SOURCE	GALLONS	gm U/l	%.235U	MTU
F1-26	16,114	128	.991	
F1-25	3,000	146	1.000	
F2-607	3,000	62	1.000	
D1-2	1,000	30	.953	
TOTAL	23,114	122	.991	10.7
F1-25	15,564	146	1.000	
SW	6,000	66	.998	
D1-2	1,068	130	.953	
TOTAL	22,632	124	.997	10.6
SE	13,000	104	0.989	
D1-1	3,150	134	0.956	
D1-2	1,000	130	0.953	
D1-4	2,832	138	0.955	
D1-10	1,000	143	1.290	
NE	1.000	261	0.951	
TOTAL	21,982	123	0.989	10.2
SE	4,931	104	0.989	
SW	10,000	66	0.989	
NE	3,500	261	0.951	
F1-1	2,227	173	0.951	
D1-10	1,000	143	1.290	
TOTAL	21,658	121	0.989	9.9
SW	2,884	66	.998	
NE	4,000	261	.951	
F2-606	16,000	102	1.000	
TOTAL	22,884	125	.982	10.8
F2-606	7,975	102	1.000	
NE	4,000	261	.951	
F2-608	10,500	79	.990	
D1-10	587	143	1.290	
TOTAL	23,062	120	.987	10.5
F2-608	13,805	79	.990	
NE	4,000	261	.951	
F2-607	3,500	62	.990	
F3E-223	1,000	318	.990	
D1-10	600	143	1.290	
TOTAL	22,905	120	.985	10.4
F2-607	17,000	62	.990	
F3-223	5,000	318	.990	
TOTAL	22,000	120	.990	10.0

[redacted]

Refinery Blending Recipes

SOURCE	GALLONS	gm U/l	%.235U	MTU
F2-607	2,090	62	.990	
F2-605	15,000	64	.990	
F3E-223	5,000	318	.990	
TOTAL	22,090	121	.990	10.1
F2-605	9,280	64	.990	
F3E-223	1,180	318	.990	
F1-301	2,301	59	.990	
F1-302	1,538	39	.990	
F1-303	1,764	22	.990	
F1-308	2,299	28	.990	
D1-7	3,559	51	.990	
TOTAL	21,921	65	.990	4.8
TOTAL	224,248		.990	98.0

[redacted]

[redacted]

ATTACHMENT D

SAMPLING PLAN

[redacted]

RCRA Analysis and Sampling Request Form

Number: 0001
Date: 1-17-92
Page 1 of 4
Revision 1

Identifying Information

Project No.: UNH
Subproject No.: 0001
Material Description: Magnesium di-uranate Cake
Number of drums in waste stream: Approximately 2,500
Material Type: 091
Source Code: 815
Location of Drums: Plant 8
Process Knowledge: The material is magnesium di-uranate from the neutralization/precipitation of UNH solution.

Sampling Information

General: Samples taken will be contained in glass jars with teflon lined lids.
Preservation method: None
Sample to be split for duplicate analysis will be the fourth composite drum.
Holding Times: There is a holding time of six months for TCLP Metals (28 days for Hg). A fourteen day holding time for Total VOAs, TCLP Semi-VOAs, TCLP VOAs, and TCLP Pest/Herb.
Sample Technique: Scoop
Drum numbers to be sampled and analyzed: See page two of this form.

Will composite samples be taken? Yes, see pages 3 and 4.

Analysis Requested:	Sample Size
TCLP Metals (except Hg)	(1) quart
Total U (MC&A)	(1) 4 oz
U-235 (MC&A)	(1) 8 oz
Alpha-Beta	(1) 4 oz
% H_2O by weight	(1) 4 oz

Description of material (Color, appearance, consistency, etc.)

Eric C. Potter/2-13-92
Authorized Signature/Date

Michael F. Ramirez/2-18-92
Approved/Date

RCRA Analysis and Sampling Request Form

Number: 0001
Date: 1-17-92
Page 2 of 4
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Identifying Information

Material Type: 091
Source Code: 815

Sampling Information: Start with Sample Number U001-1 for the first drum sample, then number consecutively until sampling is completed. The drum that is to be sampled in duplicate will be the fourth composite drum. The duplicate samples will be given different sample numbers.

Sample Number	Lot Number	Drum Number	Laboratory Number	Date Submitted to Lab
U001-1				

Eric C. Patch/P/2-13-92
Authorized Signature/Date

Michael F. Ramirez/2-18-92
Approved/Date

Laboratory Approval/Date

RCRA Analysis and Sampling Request Form

Number: 0001
Date: 1-17-92
Page 3 of 4
Revision 1

1.0 Waste Stream Description:

The waste stream consists of approximately 2,500 drums, in one lot. The material type of "091" and the source code of "815" indicates that this material is sump cake from Plant 8 EIMCO filters which filtered the magnesium di-uranate slurry from neutralization/precipitation of UNH solution. This material should contain approximately 30 - 50% uranium.

2.0 Safety Concerns:

A Radiation Work Permit is required before sampling begins. Contact Industrial Hygiene before sampling begins. A half-face respirator with radionuclide magenta filter cartridges is required while the drum is open. Other Health and Safety requirements are neoprene gloves, face shield and an apron. See SOP 1-C-101, Sections 6.0 to 6.14 for Health & Safety requirements.

3.0 <u>Representative Sampling Procedure for RCRA Only:</u>

The large number of drums necessitates the determination of specific drums for sampling at Plant 8. Every tenth drum is chosen and sampled. Starting with the ninth drum (i.e. sample drum numbers 9, 19, 29, etc.). 25 drum samples make up each RCRA composite sample as follows:

a. Every tenth drum will be scoop sampled and the sample and placed directly into a 5-gallon pail with a lid. (Minimize the time that the container is open to prevent exposure to the environment.) There will be approximately 10 composite samples.

b. Stir the composite sample thoroughly in the pail before transfer to the required sample jars.

c. Record pertinent information in the Field Log Book for each drum samples as specified in SOP 1-C-101, Section 7.12.6.

Eric C. Ratliff 1/2-18-92
Authorized Signature/Date

Michael E. Ramirez 1/2-18-92
Approved/Date

RCRA Analysis and Sampling Request Form

Number: 0001
Date: 1-17-92
Priority: 2
Page 4 of 4
Revision 1

4.0 Representative Sampling for MC&A Only:

The large number of drums necessitates the need for composite sampling. Every drum will be sampled. 60 drum samples make up each composite sample as follows:

a. From each drum a scoop sample will be pulled and placed directly into a 5-gallon pail with a lid. (Minimize the time that the container is open to prevent exposure to the environment.) There will be approximately 41 composite samples.

b. Stir the composite sample thoroughly in the pail before transfer to the required sample jars.

c. Record pertinent information in the Field Log Book for each drum samples as specified in SOP 1-C-101, Section 7.12.6.

This form must be dated and signed by an authorized individual.

Eric C. Ratcliff 1/2-18-92
Authorized Signature/Date

Michael F. Ramirez 1/2-18-92
Approved/Date

ENCLOSURE 2

[redacted] 3082

[redacted]

TASK SPECIFIC HEALTH AND SAFETY PLAN FOR DISPOSITION OF REFINERY SOLUTIONS

FEBRUARY 1992*

* This document supersedes any previous Health and Safety Plan for Disposition of Refinery Solutions.

APPROVAL:

R. L. Gardner, Manager
Facilities and Warehousing
Westinghouse Environmental
Management Company of Ohio

for J. J. Volpe, Vice President
Industrial, Radiological Safety
and Training
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Management Company of Ohio

[redacted]

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HEALTH AND SAFETY PLAN FOR DISPOSITION OF REFINERY SOLUTIONS

INTRODUCTION

This Health and Safety Plan is written as a supplement to the FEMPC health and safety program and is specific to the "Disposition of Refinery Uranyl Nitrate Solutions" project, including the System Integrity Test and other necessary preparations.

1. HISTORY AND DESCRIPTION OF FACILITIES

Approximately twenty tanks in the Refinery area contain uranyl nitrate solutions in various concentrations. The total quantity amounts to approximately 200,000 gallons of solution which contains a nominal 100 metric tons of uranium (MTU). The extended storage of this previously designated work in process (WIP) material as a liquid is not a desirable arrangement due to the possibility of leakage from valves, flanges, and other fittings which would generate adverse publicity and create additional emergency operations. These tanks of solution were prepared as the initial step of purification, but the Refinery will not function again to process uranium as in the past. Therefore, it is desirable to convert the currently dissolved uranium into a solid form which would be much more amenable to extended storage, shipping, etc.

All of the tanks holding the uranyl nitrate solutions are stainless steel, as are also all of the pipes, pumps, valves and fittings through which the solutions will be moved. Most of the tanks are located outdoors, around the Refinery. Four of these outside tanks are large circular (~20 ft. dia. & ht.) and four are large horizontal (~10 ft. dia.) tanks which involve ladders and elevated walkways when working around them. The two remaining large tanks (blend) and the five smaller tanks are located indoors and, therefore, are less influenced by inclement weather. Part of the solutions have a free acid content (~1-2 N) as well as the dissolved uranium present, both of which would be of concern in the event of a spill or other loss.

The Refinery has not been in service since September, 1988. The equipment to be used will require a thorough startup checkout prior to use, although very little control or other precision equipment will be used. All piping involved will be pressure tested in a System Integrity Test prior to commencing any disposal activity.

2. WORK AREA ORGANIZATION AND ACCESS CONTROL

General:

The Refinery tankage holding the solutions are interconnected, by piping, and also connected to other equipment. Equipment not being used will be isolated by tagged/locked valves, blind flanges, pipe removal, etc. to prevent transfer of material outside the intended work area. WEMCO Radiological Safety procedure SP-P-35-025, "Radiological Posting" describes the requirements and guidelines for posting of radiologically controlled areas for access control

purposes. Chemical/Hazardous material and Radiation Work Permits, issued by WEMCO Radiological Safety and Industrial Hygiene Technicians, will be required when breaking open any pipeline, tank access, or the opening or breaching of any other system associated with the UNH processing. All associated permits will be posted at the affected control points, or the immediate work areas. A diagram of Exclusion/Regulated Area boundries is included as Attachment II.

NFS Tank Storage Area:

The NFS Tank Storage area is located outdoors within a radiologically controlled "Regulated Area" (refer to SP-P-35-025 and ORO Contamination Control Policy). A temporary control point will be established for access control based on the requirements for entry and exit.

Digestion and Extraction Areas:

The entire indoor Digestion area and the Extraction area above the ground floor is roped off and posted for radiological control with one central control point for personnel entry and exit. This control point is located in the Extraction area on the ground floor. "Emergency Exit Only" egress points from these areas have been identified and will be posted as such. These areas have also been identified as exclusion areas due to potential asbestos exposure resulting from deteriorating transite panels. Required personal protective equipment and clothing, and the control of these areas through the Extraction area central control point have been posted at all doors and steps. For asbestos, this area requires a minimum of shoe covers and full-face respirator equipped with magenta cartridges when UNH processing is not in progress.

Ambient radiological conditions in the Extraction and Digestion areas that are not associated with the actual UNH processing call for these areas to be posted as "Regulated Areas". Elevated levels of removable surface contamination, which are in excess of table values in DOE Order 5480.11, Attachment 2, are present (pertinent data presented in Section 8). There is also the potential to introduce contamination levels in excess of Attachment 2 during UNH processing, or from other physical disturbances.

A corrective action to isolate the asbestos problem prior to this processing work in the Refinery was previously proposed and investigated. It was concluded that the corrective action would involve many more work hours within the exclusion zone by the asbestos workers to prepare the area for the chemical operators than would be expended by the operators (also dressed out as the asbestos workers) in accomplishing the necessary blending and transferring operations of this project. The final elimination of asbestos remains a part of the Refinery D&D project.

CD Blend Tanks:

These tanks are located inside diked areas, outdoors on the north side of Digestion, and are within the established Digestion and Extraction Regulated Areas mentioned above. Access to these tanks will be controlled through the Extraction area central control point.

[redacted]

OK Liquor Storage Area:

The OK Liquor Storage is a diked area located outdoors within the radiologically controlled "Regulated Area", which adjoins a transition area from Extraction. A temporary control point will be established for access control at the immediate OK Liquor Area, based on the requirements for entry and exit. There is a "Contamination Area" posted within the OK Liquor Area, and is based on ambient levels of removable contamination in excess of 10 times Attachment 2 levels.

General Sump:

Also referred to as the Refinery Sump, this area is located outdoors within the radiologically controlled "Regulated Area", which adjoins a transition area from Extraction and the OK Liquor Storage Area to the north. A control point is located inside the General Sump Control Building for access control of personnel entering from the south side. The requirements for entry and exit of authorized personnel will be posted at this point. Tanks 601, 608, 609, 610, and 617 are designated for UNH processing operations. The tank manways shall remain closed unless access is required. These tanks shall be posted individually with the requirements for access. Thickener tank F2E-602 is an open top tank, approximately 20' in diameter, that may be used for slurry makeup. Uranium process residues will not be run through F2E-602.

Tank 612 will be used to make-up the lime water for addition to Tank 610 (precipitation tank). Bags of Hydrated Lime [Calcium Hydroxide - $Ca(OH)_2$] will be opened and dumped into the water in the tank. The tank does not have exhaust ventilation.

Utilities personnel will be performing routine tasks within this area which are outside the scope of the process. The minimum requirements for these individuals will be to participate in the bioassay program established for the project.

Raffinate Area:

The outside Combined Raffinate tank area and the Hot Raffinate Building will be controlled by two separate control points at each location. Each area is posted as a "Regulated Area" and the requirements for entry and exit of authorized personnel will be posted at the respective control points.

East Eimco Drumming Station:

The East Eimco drumming station is located within a "Regulated Area" inside Plant 8 and will be controlled by the placement of postings identifying the area as part of the process. These postings will convey specific operator requirements and instructions. Containment barriers will be placed on the west side, and the side adjacent a traffic lane, which is in close proximity to an enclosed office area. The exterior surfaces of the filled drums will be wiped down and surveyed by a Radiological Safety Technician prior to release from the drumming station area.

[redacted]

3. WORK PLAN / TASK ACTIVITIES

3.1 Work Plan

The manpower requirements for this operation totals 7 man-years, that is, 12 employees over a seven month period. This includes supervisory and maintenance support and incorporates the operations of both the Refinery and Plant 8.

It is estimated that three months will be required for facility readiness, maintenance of equipment, and training of all personnel for the processing steps of this operation. This activity will require a 2 man-year effort consisting of 4 engineers and 4 maintenance personnel.

Each piping route from a storage tank or group of tanks using a common header or transfer line will be individually pressure tested to a pressure 50% greater than the maximum line pressure delivered by any of the transfer pumps to be used in this process. Any leaks discovered by this test will be corrected before operations begin. Leaks which have begun from joints immediately adjacent to filled tanks and which cannot be stopped until the tank is empty, will be collected in buckets (or other containment mechanism). Industrial Hygiene and Radiological Safety Technicians are to be notified (as soon is practical) to assess degree of leaks and assure proper personal protective equipment is in use for the leak containment. The confined contents of the leak may be emptied into the blend tanks, as needed, without significant effect.

Blending of solutions will be done in blend tanks F1-25 & F1-26, located in the refinery digestion area. Transfers from the various storage tanks will be made in accordance with the blend recipes, included in section 8 of this plan, to achieve the desired isotopic and uranium concentration result. The operator will monitor each transfer to/from each tank by measurement of outage in accordance with the outage table of the specific tank. Outage tables for all tanks are available in the supervisors office.

Each storage tank, as it is emptied, will be rinsed/flushed to assure removal of all uranium-containing solution and bottom sediment. The contents of the blend tanks will be thoroughly mixed. Each blend batch will be transferred to tank F1-608 or F2E-601 in the refinery sump. Following the Refinery Sump SOP (SOP 2-C-601), the solution will be fed into the refinery sump where a continuous flow, two-stage precipitation process will be carried out by the addition of magnesium hydroxide slurry to the uranyl nitrate solution. The magnesium hydroxide slurry will be purchased in bulk tanker truck quantities. The magnesium hydroxide slurry will be stored in the General Sump tank 12 and transferred to the hold tank (F1-617) and the circulating loop, as needed. In addition, lime water from tank 612 may be added into the precipitation cycle. Each stage of the precipitation will be controlled by pH monitoring.

[redacted]

After precipitation, the slurry will be pumped to plant 8. It will be received into Tanks F1-203 & F1-203A from which it will be pumped to the east Eimco filter and filtered as described in SOP 8-C-116, "Filtering Refinery Thickener Underflow". The filtrate will be collected, sampled to assure satisfactory uranium removal, and transferred to the general sump. Some of the filtrate may be recycled to the precipitation operation for dilution if needed.

The wet filter cake will be collected into drums and sampled and stored to await the drying process when the Plant 8 kiln becomes operational.

No asbestos work is planned at this time. If maintenance work on asbestos is to be performed; e.g. fixing leaking asbestos insulated pipelines, then work shall be done under the control of an Asbestos Work Permit.

There shall be no need for any confined space entry in this project.

3.2 Task Activities

A. <u>Heat, agitate, and/or recirculate product in tanks</u>
turn on steam to heaters
turn on tank agitator
open valves to recirculate tanks and start pump
monitor tank temperature and level

B. <u>Heating tanks with steam lance</u>
connect steam hose to steam supply
open manhole cover on top of tank
insert lance into tank
turn on steam
manipulate lance to reach all parts of tank
monitor temperature and level
turn off steam
remove lance and rinse with process water as lance is removed from tank
close manhole cover
remove hose from steam supply

C. <u>Pump NFS tanks to Blend Tanks</u>
open valves: under tank, in pump house, on catwalk above CD blend pit, and at NFS tanks
take tank outage at each tank
start, run, and stop transfer pump at NFS pumphouse
connect air hose to fitting in pumphouse
air blow product to blend tank to empty lines
disconnect air hose
take tank outage at each tank
shut valves opened in 1st step

[redacted]

D. Pump 3 CD Blend Tanks to Blend Tanks
open valves: under tank, on catwalk above CD blend pit, at blend tank
tank outage at each tank
start, run, and stop transfer pump in CD blend pit
connect air hose to fitting in CD blend pit
air blow product to blend tank to empty lines
shut valves open in 1st step

E. Pump OK Liquor Tank to Blend Tank
open valves: under tank, 4th floor Denitration, 3rd floor Denitration, at blend tank
take tank outage at each tank
start, run, and stop transfer pump in OK liquor pit
connect air hose to fitting in OK liquor pit
air blow product to blend tank to empty lines
disconnect air hose
take tank outage at each tank
shut valves opened in 1st step

F. Pump 4 Hot Raffinate tanks to Blend Tank
open valves: under tank, on 1st and 2nd floor of Hot Raffinate Bldg, on high line from Hot Raffinate to Digestion, at blend tank
take tank outage at each tank
start, run, and stop transfer pump in Hot Raffinate Bldg.
connect air hose to fitting in Hot Raffinate Bldg.
air blow product to blend tank to empty lines
disconnect air hose
take tank outage at each tank
shut valves opened in 1st step

G. Pump Digestion Tanks to Blend Tanks
open valves: under tank, on 1st and 2nd floors of Digestion, at blend tank
take tank outage at each tank
start, run, and stop transfer pump at tank
connect air hose to fitting at tank
air blow product to blend tank to empty lines
disconnect air hose
take tank outage at each tank
shut valves opened in 1st step

H. Pump Blend Tanks to Refinery Sump Hold Tank
open valves: under blend tank, on 1st and 2nd floor of digestion, on high line from Digestion to Refinery Sump, at Refinery Sump
take tank outage at each tank
start, run, and stop transfer pump at tank
connect air hose to fitting at tank
air blow product to hold tank to empty lines
disconnect air hose
take tank outage at each tank
shut valves opened in 1st step

[redacted]

I. Make-up Lim Water at Refinery Sump Tank 612
open valve at tank 612 to add water
open bag of Calcium Hydroxide [$Ca(OH)_2$]
dump bag into water in tank 612
stire solution with paddle

J. Refinery Sump Hold Tanks to Precipitation Tanks to Plant 8 Hold Tanks
open valves: at sump hold tanks, at precipitation tanks, from magnesium hydroxide day tank in sump building, on high line to Plant 8 hold tanks
2-C-601-"Refinery Sump"
start, run, and stop transfer pump at tank (throughout SOP)
connect air hose to fitting at precipitation tank
air blow product to Plant 8 tank to empty lines
disconnect air hose
take tank outage at each tank
shut valves opened in 1st step

K. Plant 8 Hold Tanks to Eimco Filters and Eimco Filter Operation
8-C-104-"Makeup of Precoat Slurry and Precoating Rotary Vacuum Filters"
8-C-116-"Filtering Refinery Thickener Underflow"

L. Repair of Leaking Pipes before or after Precipitation Tank

4. HAZARD/RISK ASSESSMENTS

4.1 Chemical/Radionuclide Hazards: (Uranium is the radionuclide of concern)

Contaminant:	Mode:	Exposure Limit(1):	Action Level(2):
Uranium (UO_3, U_3O_8, UF_4, MgU_2O_7)	Inhalation	$2x10^{-11}$uCi/cc	$5x10^{-12}$uCi/cc
Asbestos(3)	Inhalation	0.2 fiber/cc	0.1 fiber/cc
Magnesium Hydroxide	Skin contact	None	None
Calcium Hydroxide	Inhalation/ skin contact	5 mg/m^3	2.5 mg/m^3 (8)
Uranium (UNH)	Inhalation/ skin contact	0.05 mgU/m^3 (4)	0.025 mgU/m^3
Barium, soluble	Inhalation	0.5 mgBa/m^3 (5)	0.025 mgBa/m^3
Chromium+6	Inhalation/	0.05 mgCr/m^3 (5)	skin contact
Dicalite	Inhalation	0.069 mg/m^3	0.03 mg/m^3 (6)

[redacted]

Nitric acid	Inhalation/ skin contact	2 ppm TWA 4 ppm STEL	2 ppm
Nitrogen dioxide	Inhalation	1 ppm (max.)	0.5 ppm (7)

Notes:

(1) Limit is based on a daily 8-hr time weighted average (TWA) (5 Rem Annual Effective Dose Equivalent @ 2000 hrs/yr).

(2) Full face air purifying respirator to be worn with magenta filter cartridges (or other respiratory protection as designated by IRS&T).

(3) No asbestos hazards are present outside the Exclusion Zone unless insulated lines or transite panels are damaged or disturbed.

(4) Limit is OSHA limit for soluble uranium which is more restrictive than radiological limit for class D material (Ref: letter, WEMCO:IRS&T(D):91-240).

(5) Barium and Chromium, by analysis, are present at a maximum of 217 and 404 ppm (0.02 and 0.04%), respectively. Uranium is present at 0.3 to 32%. Since chromium and uranium exposure limits are comparable, and uranium concentrations are greater by a factor of 10 or more, monitoring for soluble uranium will provide assurance that chromium and barium exposure limits are not exceeded.

(6) Dicalite Speed Plus is used as a pre-coat on the Einzinger polishing filters and the Eimco filters. A half-mask air-purifying respirator with magenta filter cartridges will be used for protection when dumping bags of dry Dicalite to make the pre-coat slurry.

(7) Hooded or full-face continuous flow airline respirator is required.

(8) Calcium Hydroxide (Hydrated Lime) is mixed with water to make lime water for addition to the precipitation cycle. A half-mask air purifying respirator with magenta filter cartridges will be used for protection when dumping bags of calcium hydroxide to make the lime wter.

4.2 Physical Hazards:

Inclement weather conditions may present hazards when working on or over the outside storage tanks.

Pipelines to be used in transferring UN solution will be pressurized to 90 psi during the System Integrity Test. The pressurizing water supply will be restricted to minimize the water flow and, therefore, the effect of any spray from leaks which may become evident.

[redacted]

Although the attached Material Safety Data Sheet for UNH lists this material as a shock hazard, this is only appropriate for dry UHN crystals, not the UNH solution which is being processed in this project.

4.3 ALARA Considerations:

General area dose rates from ambient sources of radiation, at contact to 1 meter, are less than 2.5 mrem/hour. The 2.5 mrem/hour maximum dose rate was measured in the Digestion Area, N. annex, of the Refinery. Other areas of the process have been measured to be less than 1 mrem/hour. A maximum dose rate of 1 mrem/hour has been measured, at contact to 1 meter, from external surfaces of UNH process pipes, tanks, pumps, and at tank openings.

Continuous collection of air sample data in the affected areas of the process indicates that airborne radioactivity averages less than 2% of the Derived Air Concentration (DAC) for uranium. Maximum concentrations have not exceeded 10% of the DAC for the data collected since November 1, 1991. These maximum concentrations were observed in the area of the East Eimco as a result of construction activities (demolition, etc.) and an incident which occurred in January, 1992.

An ALARA briefing to all management, supervisory, and operational personnel is required prior to processing the UNH.

4.4 Task Specific Hazard Analysis

See attached TASK ANALYSIS table for list of chemical airborne hazards according to task.

5. STANDARD OPERATING PROCEDURES (SOP) & MANUFACTURING SPECIFICATIONS (MS)

The following is a list of applicable procedures and specifications

FMPC-503	"FMPC Spill Incident Reporting and Cleanup"
FMPC-704	"Minor Event Reporting System"
OM-FMPC-0002	"FMPC Spill Prevention Control & Countermeasure Plan"
SOP 2-C-601	"Refinery Sump"
SOP 2-C-910	"Inspecting Refinery Control Floor Areas and Sumps and Operating Manual Sump pumps"
SOP 2-C-914	"Preventing Uranium Losses Through the Storm Sewer To Environment (Responding to pH Alarms)
SOP 2-C-916	"Refinery Emergencies"

[redacted]

[redacted]

SOP 2-C-918	"Inspection of Refinery Safety Shower/Eye Bubbler Stations and Recirculating Safety Shower/Eye Bubbler Systems
SOP 8-C-104	"Makeup of Precoat Slurry and Precoating Rotary Vacuum Filters"
SOP 8-C-116	"Filtering Refinery Thickener Underflow"
SP-P-35-025	"Radiological Posting"
SP-P-35-026	"Occupational Air Sampling for Radioactivity"
OSH-35-016	"Completion of a Radiation Work Permit"
SP-P-35-023	"Radiological Contamination Surveys"
SP-P-35 048	"Radiation Surveys"
SP-P-35-031	"Event Notification and Reporting of Radiological Safety Occurrences"
OSH-35-017	"Procedure for Personnel Decontamination"
CH-FMPC-203	"ALARA Committee"
INTERIM RM-0009I	"Radiological Controls Requirements Manual"

[redacted]

TASK ANALYSIS

CHEMICAL / RADIONUCLIDE HAZARDS OF CONCERN FOR UNH STABILIZATION

Task	Contaminant	DAC/PEL/TLV/IDLH	Source Concentration	Route of Exposure	Monitoring Device
Heat, agitate, and/or recirculate UNH in tanks	Asbestos	0.2 f/cc	< 0.01 f/cc *1	Inhalation	Filter sampling
	Soluble barium	0.5 mg/m³	< 0.002 mg/m³ *2	Inhalation	*2
	Chromium +6	0.05 mg/m³	< 0.002 mg/m³ *2	Skin, Inhalation	*2
	Soluble Uranium	0.05 mg/m³	0.018 mg/m³ *3	Skin, Inhalation	Filter sampling
	Nitric acid	2 ppm TWA, 4 ppm STEL	5 ppm *4	Skin, Inhalation	Draeger tubes
	Nitrogen dioxide	1 ppm	10 ppm *5	Inhalation	Draeger tubes
Heating tanks with steam lance	Asbestos	0.2 f/cc	< 0.01 f/cc	Inhalation	Filter sampling
	Soluble barium	0.5 mg/m³	< 0.002 mg/m³ *2	Inhalation	*2
	Chromium +6	0.05 mg/m³	< 0.002 mg/m³ *2	Skin, Inhalation	*2
	Soluble Uranium	0.05 mg/m³	0.018 mg/m³ *3	Skin, Inhalation	Filter sampling
	Nitric acid	2 ppm TWA, 4 ppm STEL	5 ppm *4	Skin, Inhalation	Draeger tubes
	Nitrogen dioxide	1 ppm	10 ppm *5	Inhalation	Draeger tubes
Pump 4 NFS tanks, 3 CD blend tanks, OK liquor tank, 4 hot raffinate tanks, and 6 digestion tanks to blend tanks	Asbestos	0.2 f/cc	< 0.01 f/cc	Inhalation	Filter sampling
	Soluble barium	0.5 mg/m³	< 0.002 mg/m³ *2	Inhalation	*2
	Chromium +6	0.05 mg/m³	< 0.002 mg/m³ *2	Skin, Inhalation	*2
	Soluble Uranium	0.05 mg/m³	0.018 mg/m³ *3	Skin, Inhalation	Filter sampling
	Nitric acid	2 ppm TWA, 4 ppm STEL	5 ppm *4	Skin, Inhalation	Draeger tubes
	Nitrogen dioxide	1 ppm	10 ppm *5	Inhalation	Draeger tubes

NOTES: See last page of table for notes

TASK ANALYSIS - contd.

CHEMICAL / RADIONUCLIDE HAZARDS OF CONCERN FOR UNH STABILIZATION

Task	Contaminant	DAC/PEL/TLV/IDLH	Source Concentration	Route of Exposure	Monitoring Device
Pump blend tanks to refinery sump hold tanks	Soluble barium	0.5 mg/m³	< 0.002 mg/m³ *2	Inhalation	*2
	Chromium +6	0.05 mg/m³	< 0.002 mg/m³ *2	Skin, Inhalation	*2
	Soluble Uranium	0.05 mg/m³	0.018 mg/m³ *3	Skin, Inhalation	Filter sampling
	Nitric acid	2 ppm TWA, 4 ppm STEL	5 ppm *4	Skin, Inhalation	Draeger tubes
	Nitrogen dioxide	1 ppm	10 ppm *5	Inhalation	Draeger tubes
Pump refinery sump hold tank to precipitation tanks to Plant 8 hold tanks and to Eimco filters	Chromium +3	0.1 mg/m3	< 0.002 mg/m³ *2	Inhalation	* 2
	Insoluble Uranium	$2x10^{-11}$ μCi/cc	< $2X10^{-13}$ μCi/cc *6	Inhalation	Filter counting
Making lime water in Refinery Sump	Calcium Hydroxide (Hydrated Lime)	5 mg/m³	-	Inhalation, Skin Contact	MIE MiniRam
Operate Eimco filters and sample drum cuttings	Chromium +3	0.1 mg/m3	0.002 mg/m³ *2	Inhalation	*2
	Dicalite	0.069 mg/m³	0.013 mg/m³ *8	Inhalation	MIE MiniRAM
	Insoluble Uranium	$2x10^{-11}$ μCi/cc	$5.2x10^{-12}$ μCi/cc *7	Inhalation	Filter counting
Repair of leaking pipes up to precipitation tanks	Asbestos	0.2 f/cc	< 0.1 f/cc *1	Inhalation	Filter sampling
	Soluble barium	0.5 mg/m³	< 0.002 mg/m³ *2	Inhalation	*2
	Chromium +6	0.05 mg/m³	< 0.002 mg/m³ *2	Skin, Inhalation	*2
	Soluble Uranium	0.05 mg/m³	0.018 mg/m³ *3	Skin, Inhalation	Filter sampling
	Nitric acid	2 ppm TWA, 4 ppm STEL	5 ppm *4	Skin, Inhalation	Draeger tubes
	Nitrogen dioxide	1 ppm	10 ppm *5	Inhalation	Draeger tubes

NOTES: See last page of table for notes.

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TASK ANALYSIS

CHEMICAL / RADIONUCLIDE HAZARDS OF CONCERN FOR UNH STABILIZATION (contd.)

Task	Contaminant	DAC/PEL/TLV/IDLH	Source Concentration	Route of Exposure	Monitoring Device
Repair of leaking pipes from precipitation tanks to and inside Plant 8	Asbestos	0.02 f/cc	< 0.1 f/cc *1	Inhalation	Filters sampling
	Chromium +3	0.1 mg/m3	0.002 mg/m^3 *2	Inhalation	*2
	Dicalite	0.069 mg/m^3	0.018 mg/m^3 *8	Inhalation	MIE MiniRAM
	Insoluble Uranium	2×10^{-11} μCi/cc	5.2×10^{-12} μCi/cc *7	Inhalation	Filter counting

notes:

1. Asbestos will only have a potential for tanks in the digestion and extraction areas of the Refinery and in the Hot Raffinate Building, where transite is deteriorating. This level is based on general area monitoring for background levels in these buildings when no activity was occurring. For repair of leaking asbestos insulated pipelines, in the past where glove bags have been used, the highest measured level on breathing zone samples was 0.1 f/cc on a 8-hour time weighted average basis.
2. Air samples for barium and chromium have not been collected in these areas historically. However, based on chemical analysis of the UNH tanks, barium comprises a maximum of 217 ppm (0.02%) and chromium comprises a maximum of 404 ppm (0.04%). Uranium is present at a level of 0.3 to 32%. Since soluble chromium (Cr^{+6}) and uranium exposure limits are comparable, and uranium concentrations are greater by a factor of 10 or more, monitoring for soluble uranium will provide assurance that chromium and barium exposure limits are not exceeded. The Source Concentration column concentration is set at 1/10th the measured uranium concentration.
3. This concentration is based on the geometric mean of 14 general area and breathing zone air samples for uranium which were collected in the Digestion and Extraction areas when the Refinery was in operation 1982-1985. The highest measured concentration was 0.191 mg/m^3, the geometric standard deviation was 3.995. Based on this 95% of all samples were less than 0.139 mg/m^3. Old air sample results recorded as αd/m/m^3 were converted to mg/m^3 by using 1.8 dpm/μgU assuming 1% U-235 content.
4. This concentration is based on the highest of 9 general area and breathing zone air samples for nitric acid which were collected in the Digestion and Extraction areas when the Refinery was in operation 1981-1990.
5. This concentration is based on the highest of 32 general area and breathing zone air samples for nitrogen dioxide which were collected in the Digestion and Extraction areas when the Refinery was in operation 1977-1990. Short-term levels as high as 25 ppm have been measured at the manholes of UNH tanks being steam sparged.
6. Mean concentration, based on continous GA sampling since 11-1-92: all Refinery areas and E. Eimco Filter/Drumming Stations.
7. This concentration is based on the geometric mean of 58 general area and breathing zone air samples collected at the Eimco filters when Plant 8 was in operation 1983-1986. The highest measured concentration was 2.1x10-10 μCi/cc, the geometric standard deviation was 5.511. Based on this 95% of all samples were less than 2.9x10-11 μCi/cc. Old air sample results recorded as αd/m/m^3 were converted to μCi/cc by multiplying by 4.5×10^{-13}.
8. This is based on one sample collected for crystalline silica at the Eimco filters when Plant 8 was in operation in 1988.

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6. EDUCATION AND TRAINING

All WEMCO personnel assigned to this work will, as a minimum, meet the training requirements specified in the Training Plan for this project. All training is to be documented, including documentation of understanding (tests, checklists, task demonstration, etc.) on such topics as:

Health and Safety plan for this work including site specific hazards and procedures

WEMCO radiation safety training

WEMCO annual respiratory training and fit test

40-hour OSHA training

8-hour annual refresher training (each year)

8-hour supervisory training (for supervisors)

24-hour supervised field experience

MSDS's for all chemicals involved (attached)

All pertinent SOP's & Site Procedures for this plan (see sec. 5.)

Specialized asbestos removal training for maintenance personnel disturbing asbestos

Asbestos hazard awareness training for everyone (part of RCRA 8-hour refresher)

A start-of-shift briefing, which must be documented, shall be conducted prior to the start of each day's work. The meetings will cover, over a period of time, the following applicable subjects:

task organization	personnel protective equipment
work operations	monitoring tests and results
decontamination	Material Safety Data Sheets
physical stress	hazard communications
communications	emergency procedures
general safety	all monitoring data
housekeeping	procedures (SOP's etc.)

[redacted]

7. MEDICAL SURVEILLANCE

In accordance with 29 CFR 1920.120 OSHA requirements, all WEMCO personnel and subcontractor personnel are required to participate in a medical monitoring program which includes:

- baseline medical examination
- annual medical examinations
- medical examination which may required after suspected exposures
- WEMCO respirator clearance for respirator users
- WEMCO medical approval for Emergency Response Team (ERT) members
- asbestos worker examination (for Maintenance workers doing asbestos work)

Prior to the start of work, personnel involved in this project shall be identified by name and badge to Medical Services. Each individual shall be subject to a medical surveillance approval by a physician. The approval shall certify that each individual is medically qualified to perform the work and is physically fit to wear the personal protective equipment.

8. MONITORING

Radiation Monitoring:

- Measurements of radioactive contamination and airborne radioactivity levels will be performed to assign the proper protective equipment. Pre-evaluation of the process activities and tasks involved, and the required levels of PPE for these activities is provided in the section on PPE. Dose-rates will be measured to assign RWP stay-times. Radiological coverage, and resulting measurements will be performed by Radiological Safety Technicians, with guidance provided by Radiological Engineering.

- Personal air sampling will be required for one Eimco Drumming Station operator per shift (insoluble Class Y). Daily personal air sampling will be required on at least one Digestion/Refinery operator (soluble Class D), and at least one individual performing a maintenance activity involving the opening of a process pipe or line in the Refinery Area (soluble Class D).

- General Area (GA) air samplers are in place at all indoor locations along the UNH process. These samplers (7 total) will be used to monitor ambient airborne concentrations, and determine level of area posting based on airborne activity. GA samplers are located in Digestion, Extraction, and Denitration Areas of the Refinery, Hot Raffinate, and Plant 8 at the East Eimco filter and drumming stations. Battery powered units will be used as required, based on the need to evaluate airborne activities for specific tasks in the outdoor areas.

- General Area air samplers, control point fixed radiation detection devices, and other similar types of devices (operating on 110 VAC service) shall have ground fault interrupter circuits installed.

[redacted]

- Radiation Work Permit issuance shall be initiated by project management or supervisory personnel for all operational and maintenance activities associated with the neutralization process. All areas or sections identified in Section 2 are within Regulated Area(s) and will be controlled and posted: "RWP Required for Entry", along with special requirements or instruction relative to the affected area. All areas shall be posted in accordance with DOE Order 5480.11 and applicable procedures prior to processing. The following is a brief summary of posting requirements:

REGULATED AREAS:

> 1,000 dpm/100 cm^2 (alpha, removable)

> 1,000 dpm/100 cm^2 (beta-gamma, removable)

CONTAMIANTION AREAS:

> 10,000 dpm/100 cm^2 (alpha, removable)

> 10,000 dpm/100 cm^2 (beta-gamma, removable)

AIRBORNE RADIOACTIVITY AREAS:

> 2 x 10-12 μCi/cc

> 0.025 mg/m^3

RESPIRATOR AREAS:

> 5 x 10-12 μCi/cc

> 0.025 mg/m^3

RADIATION AREAS: > 5 mrem/hour effective dose equivalent

Areas will be posted based on the levels present, or the potential to exceed these levels.

Bioassay Sampling:

UNH neutralization activities that take place at the NFS Tanks, Plant 2/3 Extraction and Digestion Areas, CD Blend Tanks, OK Liquor Storage, Raffinate areas, and General Sump involve the potential for direct contact with soluble (Class D) Uranyl Nitrate. Weekly urine sampling and analysis is required for internal dose assessment involving class D soluble uranium. All system operators, maintenance personnel, Technicians, and field project supervision performing work in these areas are to be identified for participation, per these requirements. Also, affected Utilities workers performing routine tasks in the General/Refinery Sump area are to be identified for participation.

Project personnel working exclusively in Plant 8 are not required to participate, but may do so voluntarily.

The following requirements are listed below:

- Urine samples will be required prior to the start of the project, weekly, and at the end of the project for all (excluding Plant 8) field personnel involved in the UNH processing. These samples are to be labelled as " 50 (Special) ".

- All participants will submit a final "completion of campaign" urine sample after the project is finished.

- Incident initial (end of shift) and post (start of next shift) urine samples will be required on occurrence of any incident.

  NOTE: Any circumstance which could have resulted in an intake of radioactive materials by inhalation, ingestion or absorption shall immediately be reported to a supervisor. The supervisor shall immediately report the circumstance of possible radioactive materials intake to Radiological Safety for evaluation. The involved employees shall report to Medical Services at the end of their shift or as directed to submit a urine sample and again report at the start of their next shift to submit another urine sample.

- If any confirmed positive results occur, a 24-hour follow-up sample will be initiated by Dosimetry for the affected individual.

Asbestos Monitoring:

- Asbestos breathing zone and general area monitoring will be conducted by Industrial Hygiene within the Exclusion Zone of the Refinery during the period of blending and solution transfer being done in this area for this project.

- Where process work is to be done in other areas having asbestos-containing siding panels, fixtures, etc.; where such materials are discovered to be damaged or broken in the work area, monitoring for airborne asbestos fibers will be conducted.

- Where maintenance work is done on transite or asbestos insulated pipelines, Industrial Hygiene will perform breathing zone asbestos sampling, which is part of issuing the Asbestos Work Permit.

Dicalite Monitoring:

- Dicalite will be monitored by Industrial Hygiene during bag dumping operations using a MIE MiniRAM forward light scattering dust photometer.

[redacted]

Calcium Hydroxide Monitoring:

- Calcium Hydroxide will be moniroted by Industrial Hygiene during bag dumping operations using a MIE Mini Ram forward light scattering dust photometer.

Nitric Acid Monitoring:

- Nitric acid will be monitored by Industrial Hygiene in indoor areas where nitric acid/UN solutions will be heated to 150-160 °F. Monitoring will be performed using short-term Draeger tubes. Additional 8-hour TWA samples may be collected using silica gel tubes.

Nitrogen Dioxide Monitoring:

- Nitrogen dioxide will be monitored by Industrial Hygiene in indoor areas where nitric acid/UN solutions will be heated to 150-160 °F. Monitoring will be performed using short-term Draeger tubes or Exotox instruments. Additional 8-hour TWA samples may be collected using silica gel tubes.

Soluble Uranium Monitoring:

- Soluble uranium will be monitored by Industrial Hygiene at specific tasks as noted in the Task Analysis table (Section 4.4). Breathing zone PVC filter samples will be analyzed by differential pulse stripping cathodic polarography.

9. PERSONAL PROTECTIVE EQUIPMENT REQUIREMENTS

PPE as specified in the following tables shall be used for each task.

[redacted]

[redacted]

PERSONAL PROTECTIVE EQUIPMENT BY TASK FOR UNH STABILIZATION

TASK: Heat, agitate, and/or recirculate UNH in tanks

Item	Need	Applicability
Air-supplying respirator	Yes	For protection against NO_2 and HNO_3 which have no approved cartridges. DuoFlo full-face airline with filter required in asbestos areas of Digestion, Extraction, an Hot Raffinate Bldg.
Hard hat / Bump cap	Yes	Only required in Digestion and NFS tank areas
Hearing protection	No (Yes)	Required if noise levels exceed 85 db_A
Inner gloves	Yes	To prevent skin contamination from UNH
Leather palm gloves	Yes	As needed for physical protection of the hands
Nitrile rubber gloves	Yes	To prevent skin contamination from UNH
PE coated Tyvek	Yes	To prevent skin contamination from UNH or may use 2 piece rain suit
2-piece rain suit	Yes	To prevent skin contamination from UNH or may use PE coated Tyvek
Process coveralls	Yes	Minimum requirement
Safety glasses	Yes	Minimum requirement if full-face respirator not being used
Safety goggles or face shield	No (Yes)	As needed to prevent contact with liquids i a full-face or hooded airline respirator is not used.
Safety shoes	Yes	Minimum requirement
Rubber shoe covers	Yes	Required for work in asbestos areas in Digestion, Extraction above ground floor, and Hot Raffinate Bldg, and if required on RWP.

[redacted]

[redacted]

PERSONAL PROTECTIVE EQUIPMENT BY TASK FOR UNH STABILIZATION (contd.)

TASK: Heating tanks with steam lance

Item	Need	Applicability
Air-supplying respirator	Yes	For protection against NO_2 and HNO_3 which have no approved cartridges and from solubl uranium. DuoFlo full-face airline required in asbestos areas of Digestion, Extraction, and Hot Raffinate Bldg.
Hard hat / Bump cap	Yes	Only required in Digestion and NFS tank areas
Hearing protection	No (Yes)	Required if noise levels exceed 85 db_A
Inner gloves	Yes	To prevent skin contamination from UNH
Leather palm gloves	Yes	As needed for physical protection of the hands
Nitrile rubber gloves	Yes	To prevent skin contamination from UNH
PE coated Tyvek	Yes	To prevent skin contamination from UNH or may use 2 piece rain suit
2-piece rain suit	Yes	To prevent skin contamination from UNH or may use PE coated Tyvek
Process coveralls	Yes	Minimum requirement
Safety glasses	Yes	Minimum requirement if full-face respirator not being used
Safety goggles or face shield	No (Yes)	As needed to prevent contact with liquids i a full-face or hooded airline respirator is not used.
Safety shoes	Yes	Minimum requirement
Rubber shoe covers	Yes	Required for work in asbestos areas in Digestion, Extraction above ground floor, and Hot Raffinate Bldg, and if required on RWP.

[redacted]

PERSONAL PROTECTIVE EQUIPMENT BY TASK FOR UNH STABILIZATION (contd.)

TASK: Pump 4 NFS tanks, 3 CD blend tanks, OK liquor tank, 4 Hot Raffinate tanks, and 6 digestion tanks to blend tanks

Item	Need	Applicability
Air-supplying respirator	Yes	For protection against NO_2 and HNO_3 which have no approvded cartridges and from soluble uranium when taking tank outages. DuoFlo full-face airline with filter required in Hot Raffinate Bldg. and in Digestion area.
Air-purifying respirator	Yes	For protection against soluble uranium when not exposed to NO_2 or HNO_3 at tops of tanks
Hard hat / Bump cap	No (Yes)	Only required in Digestion and NFS tank areas
Hearing protection	No (Yes)	Required if noise levels exceed 85 db_A
Inner gloves	Yes	To prevent skin contamination from UNH
Leather palm gloves	Yes	As needed for physical protection of the hands
Nitrile rubber gloves	Yes	To prevent skin contamination from UNH
PE coated Tyvek	Yes	To prevent skin contamination from UNH or may use 2 piece rain suit
2-piece rain suit	Yes	To prevent skin contamination from UNH or may use PE coated Tyvek
Process coveralls	Yes	Minimum requirement
Safety glasses	Yes	Minimum requirement if not wearing a full-face respirator.
Safety goggles or face shield	No (Yes)	As needed to prevent contact with liquids i a full-face or hooded airline respirator is not used.
Safety shoes	Yes	Minimum requirement
Rubber shoe covers	Yes	Required for work in asbestos areas in Digestion, Extraction above ground floor, and Hot Raffinate Bldg, and if required on RWP.

PERSONAL PROTECTIVE EQUIPMENT BY TASK FOR UNH STABILIZATION (contd.)

TASK: Pump blend tanks to refinery sump hold tanks

Item	Need	Applicability
Air-supplying respirator	Yes	For protection against NO_2 and HNO_3 which have no approved cartridges and from solubl uranium when taking tank outages. DuoFlo full-face airline with filter is required when working in Digestion area.
Full-face Air-purifying respirator	Yes	For protection against soluble uranium when not exposed to NO_2 or HNO_3 at tops of tanks
Hard hat / Bump cap	No (Yes)	Only required in Digestion and NFS tank areas
Hearing protection	No (Yes)	Required if noise levels exceed 85 db_A
Inner gloves	Yes	To prevent skin contamination from UNH
Leather palm gloves	Yes	As needed for physical protection of the hands
Nitrile rubber gloves	Yes	To prevent skin contamination from UNH
PE coated Tyvek	Yes	To prevent skin contamination from UNH or may use 2 piece rain suit
2-piece rain suit	Yes	To prevent skin contamination from UNH or may use PE coated Tyvek
Process coveralls	Yes	Minimum requirement
Safety glasses	Yes	Minimum requirement if not wearing a full-face respirator.
Safety goggles or face shield	No (Yes)	As needed to prevent contact with liquids i a full-face or hooded airline respirator is not used.
Safety shoes	Yes	Minimum requirement
Rubber shoe covers	Yes	Required for work in asbestos areas in Digestion, Extraction above ground floor, and Hot Raffinate Bldg, and if required on RWP.

PERSONAL PROTECTIVE EQUIPMENT BY TASK FOR UNH STABILIZATION (contd.)

TASK: Pump refinery sump hold tank to precipitation tanks to Plant 8 hold tanks and to Eimco filters

Item	Need	Applicability
Full-face Air-purifying respirator	Yes	For protection against insoluble uranium at tops of tanks when taking outages
Hard hat / Bump cap	No	Not required
Hearing protection	No (Yes)	Required if noise levels exceed 85 db_A
Inner gloves	Yes	To prevent skin contamination from insolubl uranium
Leather palm gloves	Yes	As needed for physical protection of the hands
Nitrile rubber gloves	Yes	To prevent skin contamination from neutralized UNH
PE coated Tyvek	Yes	To prevent skin contamination from neutralized UNH or may use 2 piece rain sui
2-piece rain suit	Yes	To prevent skin contamination from neutralized UNH or may use PE coated Tyvek
Process coveralls	Yes	Minimum requirement
Safety glasses	Yes	Minimum requirement if not wearing a full-face respirator.
Safety goggles or face shield	No (Yes)	As needed to prevent contact with liquids i a full-face or hooded airline respirator is not used.
Safety shoes	Yes	Minimum requirement
Rubber shoe covers	No (Yes)	Only if required on RWP.

PERSONAL PROTECTIVE EQUIPMENT BY TASK FOR UNH STABILIZATION (contd.) [redacted]

TASK: Operate Eimco filters and sample drum cuttings

Item	Need	Applicability
Full-face Air-purifying respirator	Yes	For protection against insoluble uranium at tops of tanks when taking outages
Hard hat / Bump cap	No	Not required
Hearing protection	No (Yes)	Required if noise levels exceed 85 db_A
Inner gloves	Yes	To prevent skin contamination from insolubl uranium
Leather palm gloves	Yes	As needed for physical protection of the hands
Nitrile rubber gloves	Yes	To prevent skin contamination from neutralized UNH
PE coated Tyvek	Yes	To prevent skin contamination from neutralized UNH or may use 2 piece rain sui
2-piece rain suit	Yes	To prevent skin contamination from neutralized UNH or may use PE coated Tyvek
Process coveralls	Yes	Minimum requirement
Safety glasses	Yes	Minimum requirement if not wearing a full-face respirator.
Safety goggles or face shield	No (Yes)	As needed to prevent contact with liquids i a full-face or hooded airline respirator is not used.
Safety shoes	Yes	Minimum requirement
Rubber shoe covers	No (Yes)	Only if required on RWP.

 [redacted]

PERSONAL PROTECTIVE EQUIPMENT BY TASK FOR UNH STABILIZATION (contd.)

TASK: Repair of leaking pipes up to precipitation tanks

Item	Need	Applicability
Full-face Air-purifying respirator	Yes	For protection against insoluble uranium an asbestos fibers if working on asbestos insulated pipes.
Hard hat / Bump cap	No	Not required
Hearing protection	No (Yes)	Required if noise levels exceed 85 db_A
Inner gloves	Yes	To prevent skin contamination from UNH
Leather palm gloves	Yes	As needed for physical protection of the hands
Nitrile rubber gloves	Yes	To prevent skin contamination from UNH
PE coated Tyvek	Yes	To prevent skin contamination from UNH and asbestos if asbestos pipe insulation. Or may use 2 piece rain suit.
2-piece rain suit	Yes	To prevent skin contamination from UNH or may use PE coated Tyvek
Process coveralls	Yes	Minimum requirement
Safety glasses	Yes	Minimum requirement if not wearing a full-face respirator.
Safety goggles or face shield	No (Yes)	As needed to prevent contact with liquids i a full-face or hooded airline respirator is not used.
Safety shoes	Yes	Minimum requirement
Rubber shoe covers	No (Yes)	Only if required on RWP.

PERSONAL PROTECTIVE EQUIPMENT BY TASK FOR UNH STABILIZATION (contd.)

TASK: Repair of leaking pipes from precipitation tanks to and inside Plant 8

Item	Need	Applicability
Full-face Air-purifying respirator	Yes	For protection against insoluble uranium an asbestos if working on asbestos insulated pipe.
Hard hat / Bump cap	No	Not required
Hearing protection	No (Yes)	Required if noise levels exceed 85 db_A
Inner gloves	Yes	To prevent skin contamination from insolubl uranium
Leather palm gloves	Yes	As needed for physical protection of the hands
Nitrile rubber gloves	Yes	To prevent skin contamination from neutralized UNH
PE coated Tyvek	Yes	To prevent skin contamination from neutralized UNH or may use 2 piece rain sui or asbestos if working on asbestos insulate pipe.
2-piece rain suit	Yes	To prevent skin contamination from neutralized UNH or may use PE coated Tyvek
Process coveralls	Yes	Minimum requirement
Safety glasses	Yes	Minimum requirement if not wearing a full-face respirator.
Safety goggles or face shield	No (Yes)	As needed to prevent contact with liquids i a full-face or hooded airline respirator is not used.
Safety shoes	Yes	Minimum requirement
Rubber shoe covers	No (Yes)	Only if required on RWP.

PERSONAL PROTECTIVE EQUIPMENT BY TASK FOR UNH STABILIZATION (contd.)

TASK: Make-up Lime Water at Refinery Sump Tank 612

Item	Need	Applicability
Half-face Air-purifying respirator with Magenta Cartridge	Yes	For protection against Calcium Hydroxide when dumping bags.
Hard hat / Bump cap	No	Not required
Hearing protection	No	Not required
Inner gloves	No	Not required
Leather palm gloves	Yes	As needed for physical protection of the hands
Nitrile rubber gloves	No	Not required
PE coated Tyvek	No	Not required
2-piece rain suit	No	Not required
Process coveralls	Yes	Minimum requirement
Safety glasses	Yes	Minimum requirement
Safety goggles or face shield	Yes	As needed to prevent contact with liquids
Safety shoes	Yes	Minimum requirement
Rubber shoe covers	No (Yes)	Only if required on RWP.

10. SAFETY EQUIPMENT LIST

Safety glasses and/or cover goggles

Vapor barrier type anti-C clothing (e.g., Saranex or 2-piece rainsuit)

Gloves, both leather palmed and acid resistant (nitrile) and inner disposable gloves

Hard hat or Bump cap

Shoe covers, rubber type

Safety Shower/Eye Bubbler Stations, properly functioning and tested weekly

DuoFlo Airline Respirator or full-face air-purifying respirator

11. DECONTAMINATION PROCEDURES

Incidents involving personnel skin contamination, "clean" company issued clothing, or personal clothing, shall be reported to the AEDO (Radio 202, F2) as soon as is practical. Personnel contaminated through direct contact with UNH, process residues, or other agents, which cannot be removed by the doffing of protective clothing, shall be decontaminated by Radiological Safety Technicians in accordance with IRS&T procedure OSH-P-35-017, "Procedure for Personnel Decontamination".

In case of body contact with an acid or caustic stream, nonpermeable (moisture resistant) PPE should be rinsed thoroughly with a clean water stream to prevent cross contamination of the skin when doffing PPE. Contaminated inner clothing shall be removed and the affected body area shall be washed thoroughly (15 minutes, minimum) in a safety shower or eye bubbler. Involved personnel shall report immediately to Medical Services or summon aid (phone 6511, fire alarm or radio 202/303 or control) as needed. Notification shall also be made to the appropriate supervisor as soon as possible.

To prevent body contact with asbestos, anti-C's and a respirator are required, as noted in Section 9. Anti-C's are disposed of as asbestos contaminated waste when they are doffed. However in case of skin contact, asbestos contaminated clothing is removed and placed in plastic bags labelled as asbestos contaminated. Respirators have their cartridges discarded with other labelled asbestos contaminated wastes. The respirator facepieces are bagged with asbestos labels so that the Laundry can identify them when washing them. For some asbestos jobs where potential for skin contact is high, a mandatory shower is specified at lunch and at the end-of-shift on the Asbestos Work Permit.

12. EMERGENCY PLANS

Personnel shall follow the emergency procedure for the facility in which the work is being performed. (SOP 2-C-916 "Refinery Emergencies")

All personnel shall be familiar with the locations of telephones (6511) and fire alarm pull boxes within the work area to summon emergency assistance and the use of two-way radios (303-F&S/202-AEDO).

A site map showing the preferred route to medical (Bldg 53) is attachment I.

Radiological Safety and Industrial Hygiene shall be notified for area monitoring, access control, and surveillance.

Listing of Key Personnel and Access Methods:

Organization	Individual	Access Methods
Health and Safety Officer	Bruce Ledbetter	Phone: 6946 Beeper: 844-7181
Radiological Safety Technician	Jim Canaday (lead)	Phone: 6289/6851/6889 Radio: 349/368/355, F2
Industrial Hygiene Technicians	Varies	Phone: 6207, Radio 357, F2
Safety and Fire Inspectors	Varies	Phone: 6235, Radio: 303, F2
Assistant Emergency Duty Officer (AEDO)	Varies	Phone: 6295 Radio: 202, F2
Communications Center	Varies	Phone: 6295, Radio: "Control"
FEMP Medical Services	JoAnn Kelley, Head Nurse	Phone: 6217
Emergency Phone Number	—	Phone: 6511

13. AMENDMENTS

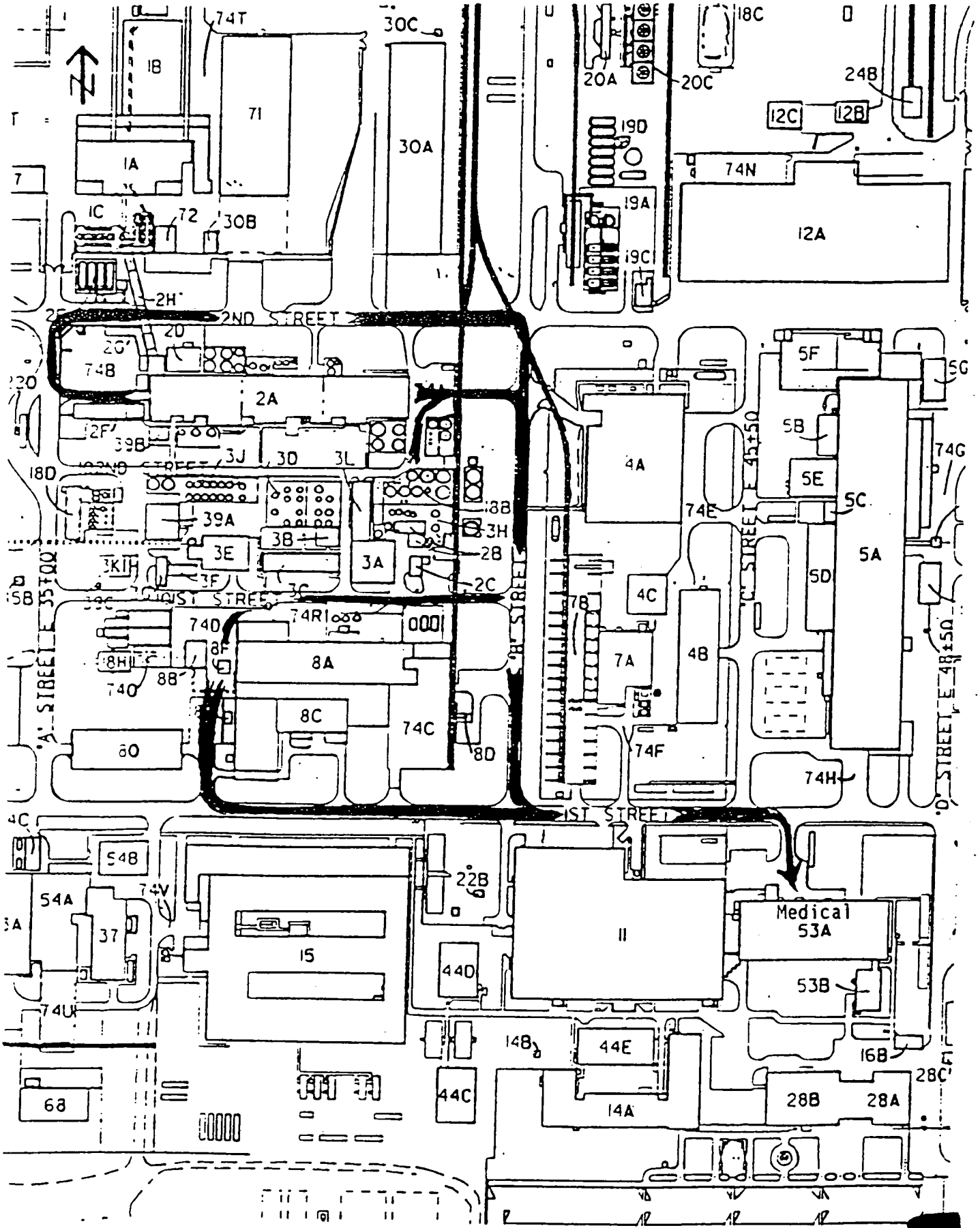
This Health and Safety Plan is based on information available at the time of preparation. Unexpected conditions may arise which require reassessment of safety procedures. Unplanned activities and/or changes in the hazard status shall require a review of and may require changes in this plan.

Changes in the anticipated hazard status or unplanned activities are to be submitted as an amendment to this plan. Amendments must be approved by the plan author and IRS&T prior to implementation of the amendment.

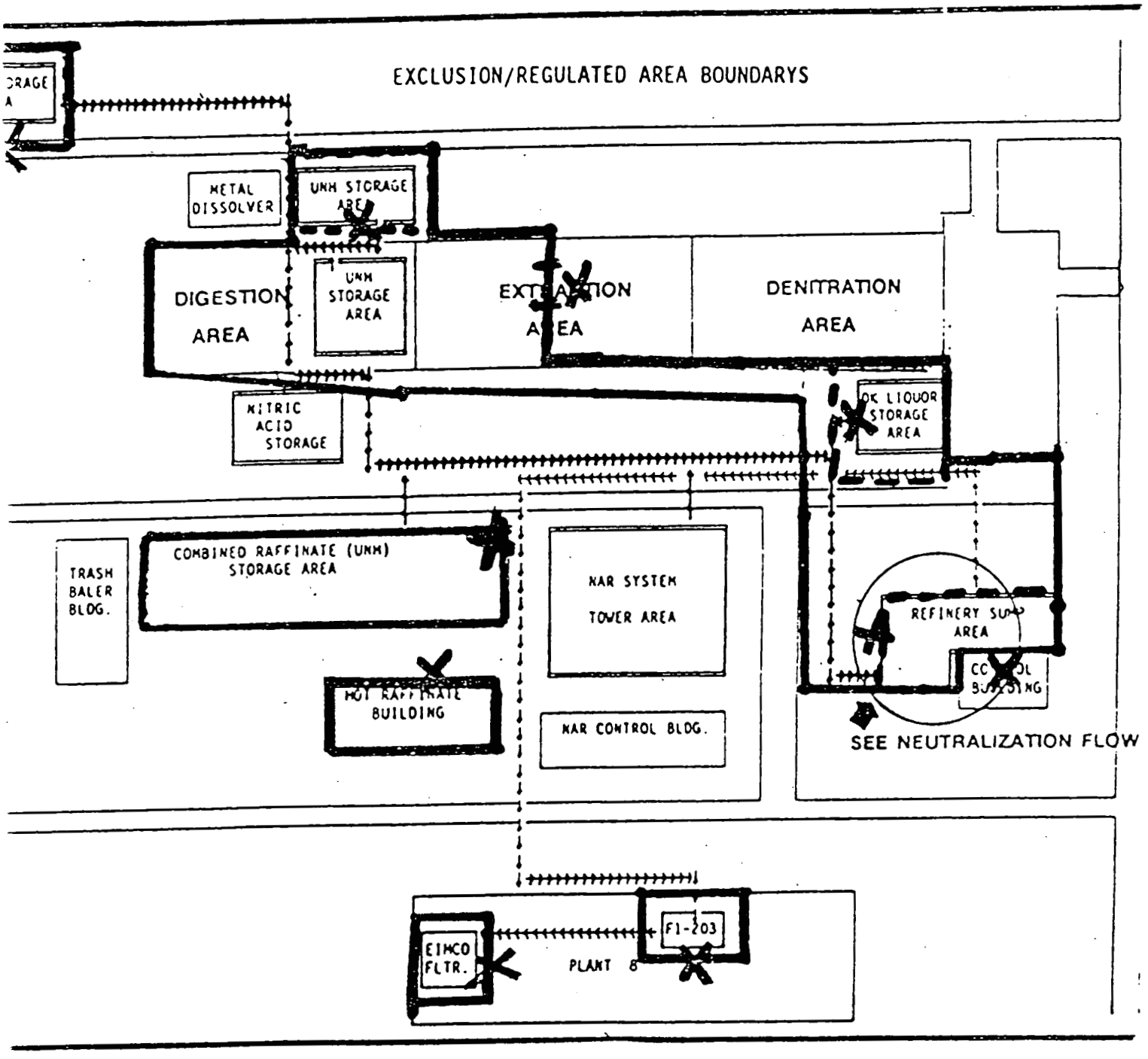
Attachment 1

Disposition of Refinery solutions Project
Travel Routes to FEMP Medical Facility

[redacted]



[redacted]



- Outlined areas are posted radiologically as "REGULATED AREAS". In most cases, the REGULATED AREA boundary will coincide with the "EXCLUSION AREA" boundary. The exceptions will be the NFS Storage Area, the outside CD Blend Tanks (N. side of Digestion), the OK Liquor Storage Area, Combined Raffinate, Hot Raffinate Building, Eimco filter and drumming stations, and the Refinery Sump Tanks 601, 608, 609, 610, and 617, where local access control will be required. A control point is established inside the Refinery Sump Control Building to limit access from the south.

X: On map indicates control points designated for access control. These may be temporary in some cases, depending on maintenance operational activities.

[redacted]

11252

CHEM REPORT
05/23/1986

CHEM ID	CHEM NAME
***	
* G034-86--0	URANIUM COMPOUNDS

ENTRY INFORMATION
05/23/1986

PREPARER	REVIEWER	ENTRY DATE	REVISED
***			
* D. AVERILL	J. BROWER	02/13/1985	05/16/1986

DOE CHEMICAL HAZARDS EMERGENCY MANAGEMENT SYSTEM
05/23/1986

HEALTH AND SAFETY INFORMATION AUTHORITY

CHEMICAL NAME OR SYNONYM
***
* URANIUM COMPOUNDS
* URANIUM INSOLUBLE COMPOUNDS
* URANIUM SOLUBLE COMPOUNDS
* G034-86-0

DISPOSAL

RECOVERY FOR REPROCESSING URANIUM IS THE PREFERRED METHOD FOR HANDLING WASTE URANIUM COMPOUNDS. SHIP TO LISCENCED RECOVERY FACILITY. UNRECOVERED MATERIAL SHOULD BE HANDLED AND PACKAGED AS RADIOACTIVE WASTE SHIPPED TO AN APPROVED SITE BY AN APRROVED DISPOSAL FIRM.

DECOMPOSITION PRODUCTS

TOXIC GASES AND VAPORS (SUCH AS HYDROGEN FLUORIDE, NITROGEN OXIDES, AND CARBON MONOXIDE) MAY BE RELEASED WHEN URANIUM COMPOUNDS DECOMPOSE. SEE SPECIFIC COMPOUND.

ENVIRONMENTAL EFFECTS

NO CRITERIA SET, BUT EPA SUGGEST A PERMISSIBLE CONCENTRATION IN WATER OF 3 UG/L BASED ON HEALTH EFFECTS.

EMERGENCY PROCEDURES

PERSONS NOT WEARING PROTECTIVE EQUIPMENT AND CLOTHING SHOULD BE RESTRICTED FROM AREAS OF SPILLS UNTIL CLEANUP HAS BEEN COMPLETED. IF URANIUM COMPOUNDS ARE SPILLED, 1. VENTILATE AREA OF SPILL. 2. COLLECT SPILLED MATERIAL IN THE MOST CONVENIENT AND SAFE MANNER AND DEPOSIT IN SEALED CONTAINERS FOR RECLAMATION. LIQUID CONTAINING URANIUM OR INSOLUBLE COMPOUNDS SHOULD BE ABSORBED IN VERMICULITE, DRY SAND, EARTH, OR A SIMILAR MATERIAL. SPILL AREAS MAY BE DECONTAMINATED USING A SOLUTION WITH A CHELATING AGENT SUCH AS EDTA.

FIRST AID

IF MATERIAL GET INTO THE EYES, WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER. GET MEDICAL AID. CONTACT LENSES SHOULD NOT BE WORN WHEN WORKING WITH THESE CHEMICALS.
SKIN EXPOSURE - IF COMPOUND GET ON THE SKIN, PROMPTLY WASH THE CONTAMINATED SKIN USING SOAP AND MILD DETERGENT AND WATER. IF THEY PENETRATE THROUGH THE CLOTHING, REMOVE THE CLOTHING IMMEDIATELY AND WASH THE SKIN USING SOAP OR MILD DETERGENT AND WATER. IF IRRITATION IS PRESENT AFTER WASHING, GET MEDICAL ATTENTION.
BREATHING - IF A PERSON BREATHES IN LARGE AMOUNTS OF URANIUM COMPOUND, MOVE THE EXPOSED PERSON TO FRESH AIR AT ONCE. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP THE AFFECTED PERSON WARM AND AT REST. GET MEDICAL ATTENTION AS SOON AS POSSIBLE.
SWALLOWING - WHEN SOLIDS OR LIQUIDS CONTAINING URANIUM OR INSOLUBLE COMPOUNDS HAVE BEEN SWALLOWED, GIVE THE PERSON LARGE QUANTITIES OF WATER IMMEDIATELY. AFTER THE WATER HAS BEEN SWALLOWED, TRY TO GET THE PERSON TO VOMIT BY TOUCHING THE BACK OF THE THROAT WITH A FINGER. [redacted] DO NOT MAKE AN UNCONSCIOUS PERSON VOMIT. GET MEDICAL ATTENTION IMMEDIATELY.

FIRE HAZARD

MANY URANIUM COMPOUNDS ARE FLAMMABLE. IF IN FIRE, URANIUM COMPOUNDS ARE NOT COMBUSTIBLE. IF IN FIRE, URANIUM COMPOUNDS MAY EMIT TOXIC PRODUCTS. SOME COMPOUNDS ARE WATER REACTIVE. SEE SPECIFIC COMPOUND.

HEALTH HAZARD

HIGHLY TOXIC AND RADIOACTIVE. URANIUM COMPOUNDS ARE TOXIC IF THEY ARE INHALED, SWALLOWED, OR IF THEY COME IN CONTACT WITH THE EYES OR SKIN. URANIUM INSOLUBLE COMPOUNDS ARE LESS TOXIC THAN THE SOLUBLE COMPOUNDS. THEY ARE WEAKLY RADIOACTIVE AND ARE PRINCIPALLY ALPHA PARTICLE EMITERS. THEY DO NOT CONSTITUTE A SIGNIFICANT EXTERNAL RADIATION AND CHEMICAL HAZARD. THEY MAY CAUSE AN INCREASE IN CANCER OF THE LYMPHATIC AND BLOOD-FORMING TISSUES IN MAN. PROLONGED CONTACT WITH THE SKIN MIGHT CAUSE RADIATION DAMAGE TO THE SKIN AND/OR SKIN RASH (DERMATITIS). PROLONGED INHALATION HAS CAUSED DAMAGE TO THE LUNGS OF ANIMALS. THEY ARE HIGHLY TOXIC TO THE KIDNEY AND LIVER.

CHEMICAL INCOMPATIBILITIES

VARIES WITH COMPOUND.

MEDICAL RECCOMMENDATIONS

SPECIAL ATTENTION SHOULD BE GIVEN TO THE BLOOD, LUNGS, KIDNEY, AND LIVER IN PREEMPLOYMENT MEDICAL EXAMS. PERIODIC MEDICAL EXAM SHOULD INCLUDE A CHEST X-RAY, URINALYSIS, COMPLETE BLOOD COUNT AND CHEMISTRY.

PHYSICAL DESCRIPTION

VARIES WITH COMPOUND.

PROTECTION MEASURES

GOOD ENGINEERING CONTROLS SHOULD BE USED TO REDUCE ENVIRONMENTAL CONCENTRATION TO THE PERMISSIBLE EXPOSURE LEVEL (PEL). ABOVE THE PEL RESPIRATORY PROTECTION MUST BE WORN. AT A U CONCENTRATION OF 2.5 MG/M3 OR LESS WEAR ANY FUME RESPIRATOR OR HIGH EFFECIENCY PARTICULATE RESPIRATOR APPROVED FOR RADIONUCLIDES, A SUPPLIED-AIR RESPIRATOR, OR A SCBA. EMPLOYEES SHOULD WEAR IMPERVIOUS CLOTHING, GLOVES, AND GOGGLES TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH SOLIDS OR LIQUIDS URANIUM OR INSOLUBLE COMPOUNDS. SKIN THAT BECOMES CONTAMINATED WITH URANIUM OR INSOLUBLE COMPOUNDS SHOULD BE PROMPTLY WASHED WITH SOAP OR MILD DETERGENT AND WATER. EATING AND SMOKING SHOULD NOT BE PERMITTED IN AREAS WHERE SOLIDS OR LIQUIDS CONTAINING URANIUM OR INSOLUBLE COMPOUNDS ARE HANDLED, PROCESSED, OR STORED. EMPLOYEES WHO HANDLE SOLIDS OR LIQUIDS CONTAINING URANIUM OR INSOLUBLE COMPOUNDS SHOULD WASH THEIR HANDS THOROUGHLY WITH SOAP OR MILD DETERGENT AND WATER BEFORE EATING, SMOKING, OR USING TOILET FACILITIES.

SAMPLING METHODS

NO STANDARD MEASUREMENT METHODS FOR URANIUM COMPOUNDS HAVE BEEN PUBLISHED BY NIOSH. MAY BE SAMPLED USING A CELLULOSE ESTER FILTER AND ANALYZED BY ATOMIC ABSORPTION.

SHIPPING INFORMATION

SHIP AS RADIOACTIVE MATERIAL. OTHER REQUIREMENTS VARY WITH COMPOUND, LEVEL OF RADIOACTIVY, PROPORTION OF FISSIBLE ISOTOPES AND AMOUNT SHIPPED.

CHEMICAL CATEGORIES
05/23/1986

CATEGORY	CLASS NAME	CLASS CODE
***		
* CHEMICAL	URANIUM COMPOUNDS	
* HAZARD CODE	HEALTH	3
* HEALTH HAZARD	KIDNEY	
* PHYSICAL HAZARD	RADIOACTIVE	
* TRANSPORTATION	RADIOACTIVE	

CHEM NAME* URANIUM COMPOUNDS

CHEMICAL ATTRIBUTES
05/23/1986

ATTRIBUTE	VALUE	UNITS	QUALITY	COMMENTS
***				
* HALF LIFE	4.500	10E9 YEARS		
* EXPOSURE LIMIT	0.050	MG/CU.M	PEL	SOLUBLE U
* EXPOSURE LIMIT	0.200	MG/CU.M	TLV	AS U
* EXPOSURE LIMIT	0.250	MG/CU.M	PEL	AS INSOLUBLE U

SELECTED MATERIALS THAT ARE RELATED TO OR CONTAIN THE SUBSTANCE
05/23/1986

CHEM NAME* URANIUM COMPOUNDS

***
* URANIUM
* URANIUM DICARBIDE
* URANIUM DIOXIDE
* URANIUM HEXAFLUORIDE
* URANIUM HYDRIDE
* URANIUM TETRAFLUORIDE
* URANYL NITRATE

Mallinckrodt
Material Safety Data

Emergency Phone Number: 314-982-5000

Mallinckrodt provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. Individuals receiving this information must exercise their independent judgment in determining its appropriateness for a particular purpose.

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Mallinckrodt, Inc., Science Products Division P.O. Box M Paris, KY 40361

Received Aug 1989

11958

NITRIC ACID, 70%

PRODUCT IDENTIFICATION:

Synonyms: Aqua Fortis; Azotic Acid; Nitric Acid 70%

Formula CAS No.: 7697-37-2

Molecular Weight: 63.00

Chemical Formula: HNO_3

Hazardous Ingredients: Not Applicable

PRECAUTIONARY MEASURES

DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED. INHALATION MAY CAUSE LUNG DAMAGE.

Do not get in eyes, on skin, or on clothing.
Avoid breathing mist.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep from contact with clothing and other combustible materials.
Do not store near combustible materials.
Store in a tightly closed container.
Remove and wash contaminated clothing promptly.
This substance is classified as a POISON under the Federal Caustic Poison Act.

EMERGENCY/FIRST AID

In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes. If swallowed, DO NOT INDUCE VOMITING! Give large quantities of water or milk if available. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In all cases call a physician.

CONTINUE SECTION 5.

DOT Hazard Class: Oxidizer

SECTION 1 Physical Data

Appearance: Clear, colorless to slightly yellow liquid.

Odor: Suffocating acrid.

Solubility: Infinite in water.

Boiling Point: 122°C (252°F)

Melting Point: -34°C (-29°F)

Specific Gravity: 1.41

Vapor Density (Air=1): 2-3 approximately

Vapor Pressure (mm Hg): 62 @ 20°C (68°F)

Evaporation Rate: No information found.

SECTION 2 Fire and Explosion Information

Fire:
Not combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition. Can react with metals to release flammable hydrogen gas.

Explosion:
Reacts explosively with combustible organic or readily oxidizable materials such as: alcohols, turpentine, charcoal, organic refuse, metal powder, hydrogen sulfide, etc.

Fire Extinguishing Media:
If involved in a fire, use water spray.

Special Information:
Increases the flammability of combustible, organic and readily oxidizable materials. In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

SECTION 3 Reactivity Data

Stability:
Stable under ordinary conditions of use and storage. Containers may burst when heated.

Hazardous Decomposition Products:
When heated to decomposition, emits toxic nitrogen oxides fumes and hydrogen nitrate. Will react with water or steam to produce heat and toxic and corrosive fumes.

Hazardous Polymerization:
Will not occur.

Incompatibilities:
A dangerously powerful oxidizing agent, concentrated nitric acid is incompatible with most substances, especially strong bases, metallic powders, carbides, hydrogen sulfide, turpentine, and combustible organics.

SECTION 4 Leak/Spill Disposal Information

Isolate or enclose the area of the leak or spill. Clean-up personnel should wear protective clothing and respiratory equipment suitable for toxic or corrosive fluids or vapors.
Small Spills: Flush with water and neutralize with alkaline material (soda ash, lime, etc.). Sewer with excess water.
Larger spills and lot sizes: Neutralize with alkaline material, pick up with absorbent material (sand, earth, vermiculite) and dispose in a RCRA-approved waste facility or sewer the neutralized slurry with excess water if local ordinances allow. Provide forced ventilation to dissipate fumes.

Reportable Quantity (RQ)(CWA/CERCLA): 1000 lbs.

Ensure compliance with local, state and federal regulations

NFPA Ratings: Health 3 Flammability 0 Reactivity [illegible]

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Mallinckrodt
Material Safety Data

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Mallinckrodt, Inc., Science Products Division, P.O. Box M, Paris, KY 40361

Addendum to Material Safety Data Sheet
REGULATORY STATUS

This Addendum Must Not Be Detached from the MSDS

Identifies SARA 313 substance(s)

Any copying or redistribution of the MSDS must include a copy of this addendum

(Chem.Key: NITRA)

Hazard Categories for SARA Section 311/312 Reporting

Acute	Chronic	Fire	Pressure	Reactive
X	X			X

Product or Components of Product:	SARA EHS Sect. 302 RQ (lbs.)	SARA EHS Sect. 302 TPQ (lbs.)	SARA Section 313 Chemicals Name List	SARA Section 313 Chemicals Chemical Category	CERCLA Sec.103 RQ (lbs.)	RCRA Sec. 261.33
NITRIC ACID, 70% (7697-37-2)	1000	1,000	Yes	No	1000	No

SARA Section 302 EHS RQ: Reportable Quantity of Extremely Hazardous Substance, listed at 40 CFR 355.
SARA Section 302 EHS TPQ: Threshold Planning Quantity of Extremely Hazardous Substance. An asterisk (*) following a Threshold Planning Quantity signifies that if the material is a solid and has a particle size equal to or larger than 100 micrometers, the Threshold Planning Quantity = 10,000 LBS.
SARA Section 313 Chemicals: Toxic Substances subject to annual release reporting requirements listed at 40 CFR 372.65.
CERCLA Sec. 103: Comprehensive Enviromental Response, Compensation and Liability Act (Superfund). Releases to air, land or water of these hazardous substances which exceed the Reportable Quantity (RQ) must be reported to the National Response Center, (800-424-8802); Listed at 40 CFR 302.4
RCRA: Resource Conservation and Reclamation Act. Commercial chemical product wastes designated as acute hazardous [illegible]

SECTION 5 Health Hazard Information

A. EXPOSURE / HEALTH EFFECTS

Inhalation:
Corrosive! Inhalation of vapors can cause breathing difficulties and lead to pneumonia and pulmonary edema, which may be fatal. Other symptoms may include coughing, choking, and irritation of the nose, throat, and respiratory tract.

Ingestion:
Corrosive! Swallowing nitric acid can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract.

Skin Contact:
Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and stain skin a yellow or yellow-brown color.

Eye Contact:
Corrosive! Vapors are irritating and may cause damage to the eyes. Splashes may cause severe burns and permanent eye damage.

Chronic Exposure:
Long-term exposure to concentrated vapors may cause erosion of teeth. Long term exposures seldom occur due to the corrosive properties of the acid.

Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye disease may be more susceptible to the effects of this substance.

B. FIRST AID

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion:
DO NOT INDUCE VOMITING! Give large quantities of water or milk if available. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Skin Exposure:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Eye Exposure:
Wash eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

C. TOXICITY DATA (RTECS, 1982)

Inhalation (Rat) LC50: 244 ppm (NO_2)/30M

SECTION 6 Occupational Control Measures

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
2 ppm (TWA)
-ACGIH Threshold Limit Value (TLV):
2 ppm (TWA); 4ppm (STEL)

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, "Industrial Ventilation, A Manual of Recommended Practices", most recent edition, for details.

Personal Respirators: (NIOSH Approved)
If the TLV is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or self-contained breathing apparatus. Nitric acid is an oxidizer and should not come in contact with cartridges and cannisters that contain oxidizable materials, such as activated charcoal.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Contact lenses should not be worn when working with this material. Maintain eye wash fountain and quick-drench facilities in work area.

SECTION 7 Storage and Special Information

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect from physical damage and direct sunlight. Isolate from incompatible substances. Protect from moisture.

MATERIAL SAFETY DATA SHEET

Dow Chemical U.S.A.* Midland, MI 48674 Emergency Phone: 517-636-4400

Product Code: 02397 Page: 1

PRODUCT NAME: MAGNESIUM HYDROXIDE TECHNICAL - 50 S

Effective Date: 04/12/88 Date Printed: 06/08/88 MSDS:000518

1. INGREDIENTS:

Magnesium hydroxide	CAS# 001309-42-8	55-59%
Calcium hydroxide	CAS# 001305-62-0	1-2%
Water	CAS# 007732-18-5	BAL.

This document is prepared pursuant to the OSHA Hazard Communication Standard (29 CFR 1910.1200). In addition, other substances not 'Hazardous' per this OSHA Standard may be listed. Where proprietary ingredient shows, the identity may be made available as provided in this standard.

2. PHYSICAL DATA:

BOILING POINT: 101C, 214F (Water)
VAP PRESS: Not applicable
VAP DENSITY: Not applicable
SOL. IN WATER: Dispersible
SP. GRAVITY: 1.461 - 1.525 (25C)
FREEZING POINT: 0C, 32F (Water)
APPEARANCE: White liquid (slurry).
ODOR: Odorless.

3. FIRE AND EXPLOSION HAZARD DATA:

FLASH POINT: Not applicable
METHOD USED: Not applicable

FLAMMABLE LIMITS
LFL: Not applicable
UFL: Not applicable

EXTINGUISHING MEDIA: Noncombustible.

FIRE & EXPLOSION HAZARDS: None - will not burn.

(Continued on Page 2)
(R) Indicates a Trademark of The Dow Chemical Company

* An Operating Unit of The Dow Chemical Company

3. FIRE AND EXPLOSION HAZARD DATA: (CONTINUED)

FIRE-FIGHTING EQUIPMENT: Wear positive pressure self-contained breathing apparatus.

4. REACTIVITY DATA:

STABILITY: (CONDITIONS TO AVOID) Solid component decomposes at approximately 350C.

INCOMPATIBILITY: (SPECIFIC MATERIALS TO AVOID) Reacts with acid.

HAZARDOUS DECOMPOSITION PRODUCTS: None.

HAZARDOUS POLYMERIZATION: Will not occur.

5. ENVIRONMENTAL AND DISPOSAL INFORMATION:

ACTION TO TAKE FOR SPILLS/LEAKS: Clean up floor areas - creates a slippery condition. Shovel or pump up.

DISPOSAL METHOD: Small amounts: Wash away with water. Large amounts: Use landfill when permitted. Comply with federal, state, and local regulations.

6. HEALTH HAZARD DATA:

EYE: May cause very slight transient (temporary) corneal injury. May cause moderate eye irritation.

SKIN CONTACT: Prolonged or repeated exposure not likely to cause significant skin irritation. May cause more severe response if confined to skin or skin is abraded (scratched or cut).

SKIN ABSORPTION: A single prolonged exposure is not likely to

(Continued on Page 3)

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6. HEALTH HAZARD DATA: (CONTINUED)

result in the material being absorbed through skin in harmful amounts. The dermal LD50 has not been determined.

INGESTION: Single dose oral toxicity is believed to be low.

INHALATION: Vapors are unlikely due to physical properties. Dusts or mists may cause irritation to upper repiratory tract.

SYSTEMIC & OTHER EFFECTS: No specific data available, however, repeated exposures are not anticipated to cause any significant adverse effects.

7. FIRST AID:

EYES: Irrigate with flowing water immediately and continuously for 15 minutes. Consult medical personnel.

SKIN: Wash off in flowing water or shower.

INGESTION: No adverse effects anticipated by this route of exposure.

INHALATION: Remove to fresh air if effects occur. Consult a physician.

NOTE TO PHYSICIAN: No specific antidote. Supportive care. Treatment based on judgment of the physician in response to reactions of the patient.

8. HANDLING PRECAUTIONS:

EXPOSURE GUIDELINE: Dow Industrial Hygiene Guide is 10 mg/m3 for magnesium hydroxide. ACGIH TLV is 5 mg/m3 for calcium hydroxide.

VENTILATION: Good general ventilation should be sufficient for

(Continued on Page 4)

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8. HANDLING PRECAUTIONS: (CONTINUED)

most conditions.

RESPIRATORY PROTECTION: For most conditions, no respiratory protection should be needed; however, in misty atmospheres, use an approved mist respirator.

SKIN PROTECTION: No precautions other than clean body-covering clothing should be needed. If hands are cut or scratched, use impervious gloves even for brief exposures.

EYE PROTECTION: Safety glasses should be sufficient for most operations; however, for dusty operations or when handling solutions of the material, wear chemical goggles.

9. ADDITIONAL INFORMATION:

REGULATORY REQUIREMENTS:

SARA HAZARD CATEGORY: This product has been reviewed according to the EPA 'Hazard Categories' promulgated under Sections 311 and 312 of the Superfund Amendment and Reauthorization Act of 1986 (SARA Title III) and is considered, under applicable definitions, to meet the following categories:

Not to have met any hazard category

SPECIAL PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: Practice reasonable care and caution when handling. Prolonged storage without agitation will lead to eventual settling of the solids from the slurry. Protect from freezing. Upon thawing, slurry will not retain original stability characteristics. These precautions are only a detriment to handling of the material - no hazard entailed.

MSDS STATUS: Revised Section 9.

(Continued on Page 5)

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MATERIAL SAFETY DATA SHEET

Dow Chemical U.S.A.* Midland, MI 48674 Emergency Phone: 517-636-4400

Product Code: 02397 Page: 5 [redacted]

PRODUCT NAME: MAGNESIUM HYDROXIDE TECHNICAL - 50 S

Effective Date: 04/12/88 Date Printed: 06/08/88 MSDS:000518

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The Information Herein Is Given In Good Faith, But No Warranty, Express Or Implied, Is Made. Consult The Dow Chemical Company For Further Information.

* An Operating Unit of The Dow Chemical Company

[redacted]

GREFCO, Inc. 3435 W. Lomita Boulevard Torrance, CA 90509

MATERIAL SAFETY DATA SHEET

No.0083 (2 pages)
Revised 09/23/88

I. PRODUCT IDENTIFICATION

Trade Name(s): Dicalite 341, 375, 2500, 4200, 4500, 5000, 6000, 7000, CP-100, Speedex, Speedplus, Swimming Pool Grade

Generic Name: Flux-Calcined Diatomaceous Earth (or Diatomaceous Silica) CAS #: 68855-54-9

Chemical Name: Silica Formula: Predominantly SiO_2

Manufacturer: GREFCO, INC.

Address: 3435 W. LOMITA BLVD. Telephone: (213)517-0700

City: TORRANCE State: CA Zip: 90509 (213)517-0773

II. PRODUCT INGREDIENTS

INGREDIENT NAME	CAS NUMBER	%	PERMISSIBLE EXPOSURE LIMIT
Flux Calcined Diatomaceous Earth	68855-54-9	100	0.069 mg/m^3 Respirable Mass
Contains Crystalline Silica			(PEL calculation based on up
(Quartz - up to 5%)	14808-60-7		to 75% crystalline silica
(Cristobalite - up to 70%)	14464-46-1		re: ACGIH-A.2 for TLV)

III. PHYSICAL DATA

OSHA PEL = 0.05 mg/m3

Appearance and Odor: White to off white powder; odorless.

Boiling Point: N/A

Vapor Pressure: N/A

Water Solubility (%): Slight

Vapor Density:(Air=1): N/A

Evaporation Rate (= 1): N/A

Specific Gravity (water = 1): 2.35

Melting Point: N/A

% Volatile by Volume: N/A

IV. FIRE AND EXPLOSION DATA

Flash Point(Method): Nonflammable

Flammable Limits: N/A

Extinguishing Media: N/A

Unusual Fire or Explosion Hazards: None

NFPA Flammable/Combustible Liquid Classification: N/A

Auto-Ignition Temperature: N/A

Special Fire-Fighting Procedures: None

V. HEALTH HAZARDS A. Summary/Risks

Summary: This product contains crystalline silica (see Section II). Long term inhalation of crystalline silica dusts may cause lung disease (silicosis). Crystalline silica has been classified as a probable human carcinogen (Group 2A) by IARC, a unit of the World Health Organization. This product has not been classified a carcinogen by NTP and/or OSHA. Grefco is currently in the process of evaluating the conclusions reached by IARC through studies sponsored by the International Diatomite Producers Association (IDPA) and conducted by The University of Washington School of Public Health.

Medical Conditions Which May Be Aggravated: Pre-existing upper respiratory and lung disease, (such as bronchitis, emphysema, asthma, or others).

Target Organ(s): Lungs Primary Entry Route(s): Inhalation

Acute Health Effect: Transitory upper respiratory irritant.

Chronic Health Effects: Long term inhalation of dust levels in excess of the PEL may cause lung disease (silicosis). IARC has classified crystalline silica as a probable human carcinogen.

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SICALITE 341, 375, 2500, 4200, 4500, 5000, 6000, 7000, CP-100, Speedex, Speedplus, Swimming Pool Grade

V. HEALTH HAZARDS B. Signs/Symptoms of Overexposure

Inhalation: Coughing, irritation of nose and throat; congestion may occur upon overexposure.
Skin Contact: N/A
Skin Absorption: N/A
Ingestion: Not hazardous.
Eyes: Temporary irritation and/or inflammation.

V. HEALTH HAZARDS C. First Aid/Emergency Procedures

Inhalation: Remove from dusty area; drink water to clear throat; blow nose to evacuate dust.
Skin Contact: N/A
Skin Absorption: N/A
Ingestion: N/A
Eyes: Do not rub eyes. Flush eyes with copious amounts of water to remove any dust particles. Consult a physician if irritation persists.

VI. REACTIVITY DATA

Stability: Material is stable. Hazardous polymerization will not occur.
Chemical Incompatibilities: Hydrofluoric acid
Conditions to Avoid: None in designed use. Avoid contact with hydrofluoric acid.
Hazardous Decomposition Products: Reacts with Hydrofluoric acid to form toxic silicon tetrafluoride gas.

VII. SPILL OR LEAK PROCEDURES

Procedures for Spill/Leak: Vacuum clean or wet sweep; avoid dusting; use a dust suppressant when sweeping.

Waste Management: Not considered as hazardous wastes by RCRA (40 CFR Part 261). Place waste and spillage in closed containers. Dispose of in approved landfill. RQ-N/A

VIII. SPECIAL PROTECTION INFORMATION

Goggles: Normally not required. May use safety eyewear to protect from dusts.
Gloves: Normally not required. May use gloves to protect overly-sensitive skin.
Respirator: Use NIOSH approved respirators to protect against silicosis producing dusts.
Ventilation: Use adequate exhaust ventilation and/or dust collection to keep dust levels below PEL.
Special Considerations for Repair/Maintenance of Contaminated Equipment: Insure proper respiratory protection.

IX. SPECIAL PRECAUTIONS

Storage Segregation Hazard Classes: N/A

*** ALWAYS SEGREGATE MATERIALS BY MAJOR HAZARD CLASS ***

Special Handling/Storage: Store in dry place. Repair all broken bags immediately. Avoid creating dust. Maintain good housekeeping practice.
Special Workplace Engineering Controls: Adequate ventilation and appropriate local exhaust where needed to keep dust levels below PEL.
Other: Comply with all Federal, State and local regulations.

Prepared/Revised by: V.B. Say Title: Analytical and Product-Health Chemist

As of the date of preparation of this document, the foregoing information is believed to be accurate and is provided in good faith to comply with applicable Federal and State law(s). However, no warranty or representation with respect to such information is intended or given.

UNITED STATES DEPARTMENT OF ENERGY
MATERIAL SAFETY DATA SHEET

Entry Date: 06/18/1980 Revised Date: 06/18/1980

SECTION I -- IDENTIFICATION

Chem. Name: NITROGEN DIOXIDE
Chem. Id: 010102-44-0 DOT Class/#: No Info.
Formula: No Info. Chem. Family: No Info.
Hazard Rating (Scale: 0-4): HEALTH-(3); FIRE-(0); REACTIVITY-(0)
Molecular Weight: 46.000

Synonyms: NITROGEN DIOXIDE
NITROGEN PEROXIDE
10102-44-0

SECTION II -- HAZARDOUS INGREDIENTS

Components	CAS #	PEL/TLV	Percentage
NO COMPONENT INFORMATION ENTERED FOR THIS MATERIAL.			

SECTION III -- PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point: (AT MMHG) 21.150 C
Vapor Pressure: (AT 20 C) 720.000 MM HG
Vapor Density: (AIR = 1.0) 2.800
Evaporation Rate: No Info.
Specific Gravity: 1.450
Melting Point: -9.300 C
Solubility: (REACTS IN WATER) No Info.
Volatiles by Vol.%: No Info.

Physical Description:

IT IS A YELLOW-BROWN, FUMING LIQUID (BELOW 21 C) OR A REDDISH-BROWN GAS WITH A PUNGENT ACRID ODOR AT ABOUT 10-20PPM. AT -12C THIS MATERIAL IS A COLORLESS SOLID (ESSENTIALLY ALL N204). THIS MATERIAL IS AN EQUILIBRIUM MIXTURE OF NO2 AND ITS DIMER N204. IT IS SUPPLIED COMMERICALLY AS A LIQUID UNDER ITS OWN VAPOR PRESSURE IN STEEL CYLINDERS.

SECTION IV -- FIRE AND EXPLOSION HAZARD INFORMATION

Flash Point	Auto Ignition Temp.	Flammable Limits
No Info.	No Info.	LEL: No Info. UEL: No Info.

Special Hazards:

THIS MATERIAL WILL NOT BURN, HOWEVER IT IS A VERY STRONG OXIDIZING AGENT WHICH IS ABLE TO CAUSE FIRE ON CONTACT WITH FLAMMABLE OR COMBUSTIBLE MATERIALS. FOR EXAMPLE, IT COULD CAUSE CLOTHING TO CATCH FIRE ON CONTACT. WATER SHOULD BE USED TO COOL FIRE-EXPOSED CYLINDERS (WHICH COULD EXPLODE FROM PRESSURE WHEN HEATED), AND A WATER SPRAY MAY BE USED TO DIRECT ESCAPING GAS AWAY FROM THOSE ATTEMPTING A SHUT OFF OF NO2 FLOW. FIREFIGHTERS REQUIRE FULL PROTECTIVE CLOTHING AND

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SELF-CONTAINED BREATHING APPARATUS.

SECTION V -- REACTIVITY INFORMATION

Conditions to Avoid:

THIS IS A STABLE MATERIAL AT ROOM TEMPERATURE IN A CLOSED CYLINDER. IT IS A VERY STRONG OXIDIZING AGENT. CONTACT WITH COMBUSTIBLES CAN CAUSE FIRE OR EXPLOSION. IF A MATERIAL BURNS IN AIR, IT WILL BURN IN NO2. BUT IT MIGHT ALSO EXPLODE. MIXTURES WITH AMMONIA, ACETIC ANHYDRIDE, ALCOHOLS, TOLUENE PROPYLENE, ETC HAVE PRODUCED VIOLENT EXPLOSIONS. EXPLOSIVES CAN BE PREPARED BY MIXING NO2 WITH CARBON DISULFIDE OR WITH NITROBENZENE. IT FORMS EXPLOSIVE MIXTURES WITH INCOMPLETELY HALOGENATED HYDROCARBONS. REACTIVE WITH REDUCING AGENTS AND STRONGER OXIDIZING AGENTS. IT MUST BE HANDLED WITH COMPATIBLE MATERIALS AND EQUIPMENT. IT IS NOT CORROSIVE TO MILD STEEL WHEN DRY, BUT WILL REQUIRE A NITRIC ACID RESISTANT STAINLESS STEEL WHEN WET. ALUMINUM, NICKEL, PYREX, TELFON, AND ASBESTOS ARE AMONG THE COMPATIBLE MATERIALS.

SECTION VI -- HEALTH HAZARD INFORMATION

Toxicity and Exposure Limits:

Inhal. Toxicity: 88.000 PPM
Comments: LC-50 RAT/4HRS
Dermal Toxicity: No Info.
Oral Toxicity: No Info.
Exp. Limit: 3.000 PPM
Comments: TLV
Eye Toxicity: No Info.
Exp. Limit Max.: 5.000 PPM
Comments: STEL

Health Effects and Symptoms:

INHALATION OF NO2 CAUSES LUNG DAMAGE WITH SEVERITY DEPENDENT ON THE TIME AND THE LEVEL OF EXPOSURE. SERIOUS RESULTS MAY NOT BE FELT UNTIL HOURS OR DAYS AFTER EXPOSURE, EVEN THOUGH HEAVY DAMAGE HAS OCCURRED. EXPOSURE AT 100PPM FOR EVEN A SHORT TIME IS DANGEROUS AND EXPOSURE TO OVER 200 PPM CAN BE FATAL EVEN WHEN TREATED. THE DISCOMFORT OR SLIGHT PAIN OCURRING AT EXPOSURE MAY GO UNNOTICED.
THE CYANOSIS AND PULMONARY EDEMA RESULTING FROM DAMAGED LUNG TISSUE BECOMES DISABLING AND CAN BE FATAL, ESPECIALLY IF NOT PROMPTLY TREATED AFTER EXPOSURE. CHRONIC EXPOSURE AT 5-50PPM CAN PRODUCE A SLOWLY EVOLVING PULMONARY EDEMA WITH RESPIRTORY TRACT IRRITATION, COUGH, HEADACHE, WEAKNESS, AND CORROSION OF THE TEETH. CONTACT WITH VAPORS IS IRRITATING TO THE EYES, NOSE, THROAT AND WET SKIN. CONTACT WITH LIQUID IS CORROSIVE. AN EIGHT HR TWA EXPOSURE LIMIT IS 3PPM WITH AN EXCURSION LIMIT OF 5PPM HAS BEEN RECOMMENDED BY ACGIH. THE CURRENT OSHA TLV IS 5PPM OR 9MG/M3. NIOSH (1976) RECOMMENDED A CEILING CEILING LEVEL OF 1PPM (15 MINUTE SAMPLE). PROVIDE PREPLACEMENT MEDICAL EXAMINATION OF EXPOSED PERSONNEL WITH SPECIAL ATTENTION TO PULMONARY FUNCTION TESTS AND DENTAL CARE. PRECLUDE INDIVIDUALS FROM EXPOSURE WITH CARDIAC OR PULMONARY DISEASE.

Emergency and First Aid Procedures:

IF EYE CONTACT OCCURS IMMEDIATELY FLUSH WITH PLENTY OF RUNNING WATER, INCLUDING UNDER EYELIDS, FOR AT LEAST 15 MINUTES. CONTACT PHYSICIAN OR OPHTALMOLOGIST IF POSSIBLE

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UNDER THE SAFETY SHOWER. WASH AFFECTED AREAS OF SKIN WITH RUNNING WATER AND SOAP AND WATER FOR 15 MINUTES. GET MEDICAL HELP. IF INHALED, REMOVE EXPOSED PERSON TO FRESH AIR AT ONCE. INSTRUCT TO BREATHE RAPIDLY AND DEEPLY FOR A FEW BREATHS TO FLUSH OUT LUNGS. KEEP WARM AND AT REST. HAVE QUALIFIED PERSON ADMINISTER OXYGEN. CONTACT PHYSICIAN IMMEDIATELY.

SECTION VII -- PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be taken in case material is released or spilled:

NOTIFY SAFETY PERSONNEL WHEN LEAKS ARE DETECTED OR SUSPECTED. PROVIDE MAXIMUM EXHAUST VENTILATION. DISCONTINUE OPERATIONS. EXCLUDE FROM SITE ALL EXCEPT THOSE INVOLVED IN CLEAN-UP WHO ARE PROPERLY PROTECTED (SEE SECT VIII). NO2 MEASURING DEVICES MOIST BLUE LITMUS PAPER OR STARCH-IODIDE PAPER CAN BE USED TO LOCATE SMALL LEAKS. THE RED-BROWN COLOR OF NO2 WILL MAKE LARGE LEAKS EVIDENT. STOP SOURCE OF NO2. ISLOATE AND REMOVE ANY LEAKING CYLINDER PLACE IN HOOD OR IN SAFE OUTDOOR AREA. WHEN SLOW RELEASE OF GAS TO THE AIR IS UNACCEPTABLE, ATTACH NEEDLE VALVE AND TUBE TO RUN NO2 INTO AN EXCESS OF 5-10% AQUEOUS SODIUM HYDROXIDE SOLUTION (CAUTION) AT A MODERATE RATE, THEN NEUTRALIZE FOR DISPOSAL. COVER LIQUID SPILL WITH AN EXCESS OF NAHCO3, MIX, SPRAY WITH WATER FROM ATOMIZER, THEN FLUSH TO HOLDING TANK FOR DISPOSAL.

Waste Disposal Method:

FOLLOW FEDERAL, STATE AND LOCAL REGULATIONS. DILUTE NEUTRAL, LOW NITRITE WASTE WITH MUCH WATER AND FLUSH TO DRAIN WITH LOTS OF WATER TO MEET DILUTION REQUIREMENTS FOR NANO3 DISCHARGE. (WASTE HIGH IN NITRITE REQUIRES OXIDATION TO NITRATE BEFORE DISCHARGE.

SECTION VIII -- CONTROL MEASURES

Protection Measures:

USE CLOSED PROCESSING TO PREVENT EXPOSURE WHENEVER FEASIBLE. CONSIDER USE OF CONTINUOUS NO2 MONITORING DEVICES. USE AN EXHAUST HOOD WITH MINIMUM 100 IFM FACE VELOCITY TO ENCLOSE. PROVIDE GENERAL VENTILATION AND LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS. FOR EMERGENCY AND NONROUTINE EXPOSURE PROVIDE AND APPROVED FULL FACEPIECE RESPITATOR ABOVE THE TLV. A CARTRIDGE OR CANISTER TYPE CAN BE USED BELOW 50PPM. A SELF-CONTAINED OR AIR-SUPPLIED RESPIRATOR IS REQUIRED ABOVE 50PPM OR FOR UNKNOWN LEVELS. PREVENT SKIN CONTACT WITH LIQUID OR VAPORS BY USE OF GLOVES AND PROTECTIVE CLOTHING. USE SAFETY SAFETY GOGGLES AND A FACE SHIELD FOR EYE PROTECTION. INSTANT ACTION EYEWASH STATION AND SAFETY SHOWERS ARE NEEDED IN CLOSE PROXIMITY TO USE AND HANDLING AREA. THOSE WORKING WITH NO2 MUST HAVE SPECIAL TRAINING IN HAZARDS AND HANDLING AND CLOSE SUPERVISION. OBSERVE BASIC PRECAUTIONS FOR HANDLING AND USE OF PRESSURIZED CYLINDERS. NOTE - NO2 CYLINDERS DO NOT HAVE SAFETY DEVICES FOR PRESSURE RELIEF. STORE AWAY FROM HEAT SOURCES IN LOW FIRE RISK AREAS. KEEP AWAY FROM SOLVENTS, FUELS, LUBRICANTS, COMBUSTILLES, REDUCING AGENTS. USE COMPATIBLE MATERIALS AND EQUIPMENT FOR HANDLING NO2. OBTAIN DETAILED INFORMATION FROM SUPPLIERS FOR HANDLING AND USE UNDER SPECIFIC CONDITIONS. O2 AND N2 CAN REACT IN AN ELECTRIC ARC OR OTHER HIGH TEMPERATURE SOURCE TO PRODUCE HAZARDOUS LEVELS OF NO2. COMBUSTION OF NITROGEN- CONTAINING MATERIALS WILL PRODUCE NO2.

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Reviewed Oct 1989 10035

DATE: 10/11/89
CUST#: 939768
PO#: 411441

MATERIAL SAFETY DATA SHEET

IDENTIFICATION

PRODUCT #: 23923-2 NAME: CALCIUM HYDROXIDE, 98+%, A.C.S. REAGENT
CAS #:1305-62-0
MF: H2CAO2

SYNONYMS
BELL LINE * CALCIUM HYDRATE * CALCIUM HYDROXIDE (ACGIH,OSHA) *
HYDRATED LIME * KEMIKAL * LIME WATER * SLAKED LIME *

TOXICITY HAZARDS

RTECS NO: EW2800000
CALCIUM HYDROXIDE
IRRITATION DATA
EYE-RAT 10 MG SEV TXAPA9 55,501,80
TOXICITY DATA
ORL-RAT LD50:7340 MG/KG ATHAAP 30,470,69
ORL-MUS LD50:7300 MG/KG YKYUA6 32,1477,81
REVIEWS, STANDARDS, AND REGULATIONS
ACGIH TLV-TWA 5 MG/M3 ASTMAR 5,91(88),86
EPA TSCA CHEMICAL INVENTORY, 1986
NIOSH ANALYTICAL METHODS: SEE CALCIUM, 7020; ELEMENTS, 7300

ONLY SELECTED REGISTRY OF TOXIC EFFECTS OF CHEMICAL SUBSTANCES (RTECS) DATA IS PRESENTED HERE. SEE ACTUAL ENTRY IN RTECS FOR COMPLETE INFORMATION.

HEALTH HAZARD DATA

ACUTE EFFECTS
HARMFUL IF SWALLOWED, INHALED, OR ABSORBED THROUGH SKIN.
MATERIAL IS EXTREMELY DESTRUCTIVE TO TISSUE OF THE MUCOUS MEMBRANES AND UPPER RESPIRATORY TRACT, EYES AND SKIN.
INHALATION MAY BE FATAL AS A RESULT OF SPASM, INFLAMMATION AND EDEMA OF THE LARYNX AND BRONCHI, CHEMICAL PNEUMONITIS AND PULMONARY EDEMA.
SYMPTOMS OF EXPOSURE MAY INCLUDE BURNING SENSATION, COUGHING, WHEEZING, LARYNGITIS, SHORTNESS OF BREATH, HEADACHE, NAUSEA AND VOMITING.
TO THE BEST OF OUR KNOWLEDGE, THE CHEMICAL, PHYSICAL, AND TOXICOLOGICAL PROPERTIES HAVE NOT BEEN THOROUGHLY INVESTIGATED.
FIRST AID
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES.
ENSURE ADEQUATE FLUSHING OF THE EYES BY SEPARATING THE EYELIDS WITH FINGERS.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
CALL A PHYSICIAN.
WASH CONTAMINATED CLOTHING BEFORE REUSE.
DISCARD CONTAMINATED SHOES.

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MATERIAL SAFETY DATA SHEET

CUST#: 939768
PO#: 411441

PRODUCT #: 23923-2 NAME : CALCIUM HYDROXIDE, 98+%, A.C.S. REAGENT
CAS #:1305-62-0
MF: H2CAO2

PHYSICAL DATA

PEARANCE AND ODOR
WHITE POWDER

FIRE AND EXPLOSION HAZARD DATA

TINGUISHING MEDIA
DRY CHEMICAL POWDER.
ECIAL FIREFIGHTING PROCEDURES
WEAR SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING TO PREVENT CONTACT WITH SKIN AND EYES.
USUAL FIRE AND EXPLOSIONS HAZARDS
EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

REACTIVITY DATA

COMPATIBILITIES
STRONG ACIDS
ABSORBS CO2 FROM AIR.

SPILL OR LEAK PROCEDURES

TEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED
EVACUATE AREA.
WEAR SELF-CONTAINED BREATHING APPARATUS, RUBBER BOOTS AND HEAVY RUBBER GLOVES.
ABSORB IN SAND OR VERMICULITE AND PLACE IN CLOSED CONTAINERS FOR DISPOSAL.
VENTILATE AREA AND WASH SPILL SITE AFTER MATERIAL PICKUP IS COMPLETE.
ASTE DISPOSAL METHOD
FOR SMALL QUANTITIES: CAUTIOUSLY ADD TO A LARGE STIRRED EXCESS OF WATER. ADJUST THE PH TO NEUTRAL, SEPARATE ANY INSOLUBLE SOLIDS OR LIQUIDS AND PACKAGE THEM FOR HAZARDOUS-WASTE DISPOSAL. FLUSH THE AQUEOUS SOLUTION DOWN THE DRAIN WITH PLENTY OF WATER. THE HYDROLYSIS AND NEUTRALIZATION REACTIONS MAY GENERATE HEAT AND FUMES WHICH CAN BE CONTROLLED BY THE RATE OF ADDITION.
OBSERVE ALL FEDERAL, STATE, AND LOCAL LAWS.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE

WEAR APPROPRIATE MSHA/NIOSH-APPROVED RESPIRATOR, CHEMICAL-RESISTANT GLOVES, SAFETY GOGGLES, OTHER PROTECTIVE CLOTHING.
USE ONLY IN A CHEMICAL FUME HOOD.
SAFETY SHOWER AND EYE BATH.
FACE-SHIELD (8-INCH MINIMUM).
AVOID CONTACT WITH EYES, ON SKIN, ON CLOTHING.
AVOID PROLONGED OR REPEATED EXPOSURE.
WASH THOROUGHLY AFTER HANDLING.

CONTINUED ON NEXT PAGE

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PRODUCT #: 23923-2 NAME : CALCIUM HYDROXIDE, 98+%, A.C.S. REAGENT
CAS #:1305-62-0
MF: H2CaO2

--- PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE ---

CORROSIVE.
KEEP TIGHTLY CLOSED.
STORE IN A COOL DRY PLACE.

--------- ADDITIONAL PRECAUTIONS AND COMMENTS ---------

DITIONAL INFORMATION
HEATING CALCIUM HYDROXIDE-POTASSIUM NITRATE MIXTURES WITH CHLORINATED PHENOLS MAY RESULT IN THE FORMATION OF CHLORINATED BENZODIOXINS.
VIOLENT REACTION WITH PHOSPHOROUS, MALEIC ANHYDRIDE, NITROPARAFFINS (SUCH AS NITROMETHANE, NITROETHANE, ETC.).

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ENCLOSURE 3

OUTLINE [redacted]

Uranyl Nitrate (UN) Stabilization

INDEX

I. **Background**
Release report, Threat, Subsequent information/updates.

II. **Regulatory Authority**
CERCLA Removal Action, Consent Agreement Section XIII, permits.

III. **Permits that Would Otherwise be Required or are in Place**
Identifies each permit required to treat UN.

IV. **Treatment Standards**
Explains how response action will meet these standards.

V. **Applicable or Relevant, and Appropriate Requirements (ARARs) Information**
Provides the applicable, relevant, and appropriate requirements data to USEPA and OEPA as planned for the removal/treatment of the UN using Ohio regulations for permit applications.

I. BACKGROUND

A. The result of observed leaks from valves and flanges associated with the Uranyl Nitrate (UN) Tanks at the FEMP on September 17, 1991 led to the report of a spill to the USEPA and OEPA on September 18. See Attachment 1 for general location of UN Tanks and Attachment 1A for specific locations. The leaks reported were minor and the liquid was contained in the secondary containment/sump system. Neither CERCLA nor any other reportable quantities were exceeded.

B. UN was a product created in the intermediate stage of uranium metals processing. It is a liquid with a low pH and high levels of uranium. UN resulted from the processing of high grade uranium ores using nitric acid and a filtering operation in preparation to extract the uranium in the form of a solid, uranium oxide, the end product of this particular process at FEMP. The UN still at FEMP is stored in 21 stainless steel tanks containing 226,284 gallons of UN at various concentrations and in various chemical/radiological configurations. A CERCLA removal action is planned to remove this potential threat.

C. UN on site was declared a hazardous waste because of the characteristic of corrosivity and the presence of chromium and barium above Toxicity Characteristic (TC) levels. The concept to be used in the removal is as follows:

1. The existing process system will be used to concentrate the solutions of UN into a stable filter cake. This existing system was used off and on since 1972 but has not been in use since the operational curtailment in mid 1989.

2. The solution will be blended into a uniform mixture, pH adjusted and precipitated using magnesium hydroxide or lime. The above will be filtered through a rotary vacuum filter press. The semi-solid material from this process will be drummed. See Attachment 2 for Process Flow Diagram. Recent testing has shown that all the metals of concern; uranium, barium and chromium will precipitate out of the mixture and be contained in the drums with the other solids used in this removal. The liquid will be sampled and, if acceptable, discharged through the FEMP water treatment system if the levels of contamination are below the NPDES permit criteria. Additional processing will be accomplished as required to meet NPDES criteria.

D. Both OEPA and USEPA have been informed of our progress on the Uranyl Nitrate removal action. The threat here is not the minor leaks which are symptoms, but a much greater issue; the deterioration of the FEMP UN storage system and resulting threat to human health safety and the environment.

II. REGULATORY AUTHORITY

A. The uranyl nitrate removal action will be implemented under 40 CFR Part 300.415, CERCLA Section 104(a)(2) and Section 105(a).

B. Because of the threat, the approach will be response/removal where the site will begin action using in-place procedures as a basis for a Plant Test Authorization (PTA) document specific to this removal. A plan for the removal, including safety and other OSHA concerns, will be available and in use prior to starting the removal.

C. Per 40 CFR 300.400(e) and the September 1991 Consent Agreement, Pages 56 and 57, permits for this removal will not be required, however; substantive requirements, standards, criteria, and limitations of each permit otherwise required will be provided. All applicable portions of the Consent Decree with OEPA, including the appropriate and relevant portions of closure/post closure, are considered herein.

III. PERMITS THAT WOULD OTHERWISE BE REQUIRED OR THAT ARE IN PLACE

A. RCRA treatment permit. (40 CFR 265 and OAC 3745-65)

B. PTI/PTO. Several air permits are in place from past operations. Renewals have been requested for primary tank emissions for the remaining permits.

C. NESHAPS is applicable and has been considered; however, no approval for the UN removal or treatment system is required.

D. A CATEX to satisfy NEPA has been approved by the USDOE.

E. NPDES permit is in place and the removal will meet the criteria prior to discharge.

IV. TREATMENT STANDARDS

A. The operations plan for the removal follows and details how the removal will meet the treatment standards listed below.

B. PTA Section 8.6 and PTA Attachment D discusses filter cake and waste water sampling for uranium content, isotopic level and TC constituents.

C. The removal treatment standards will be:

1. Below regulatory levels for TCLP constituents from 40 CFR 261.24 and OAC 3475-51-24.

2. A pH of 6.5-9.0 from 40 CFR 261.22 and FEMP NPDES permit.

3. Radiological limits per site documents for waste water going into Plant 8.

4. Limits as imposed by the current FEMP NPDES permit (see Attachment 3).

V. APPLICABLE RELEVANT AND APPROPRIATE PERMIT INFORMATION

The following were determined either applicable, relevant or appropriate portions of the permitting application information required by Ohio Hazardous Waste Management Law and Rules Annotated, March 1, 1990, ORC 3734.05 Licenses and Permits and OAC 3745-50-58 Conditions Applicable to All Permits. Both the requirements referencing ORC 3734.05, Page 18, and the information to satisfy these requirements are presented. All of OAC 3745-50-58(A) through (M), Pages 126, 127, and 128, are currently being compiled with and will apply to the removal action. The ARARs in Table 1 for Operable Unit 3 were also considered as part of this removal and will be complied with to the extent practicable.

A. ORC 3734.05(D)(6) - The board shall not approve an application for a hazardous waste facility installation and operation permit unless it finds and determines as follows:

(a) The nature and volume of the waste to be treated, stored, or disposed of at the facility. RESPONSE: The waste to be treated on a one time basis is Uranyl Nitrate that has the characteristic of corrosivity and contains elevated levels of chromium and barium above TC concentrations. It is anticipated that all metals will be removed during this process. Approximately 227,000 gallons of uranyl nitrate is contained in 21 tanks on site.

(b) That the facility complies with the director's hazardous waste standards adopted pursuant to Section 3734.12 of the Revised Code. RESPONSE: FEMP as part of the Proposed Amended Consent Decree (PACD), has submitted a Part A and Part B Permit Application to OEPA.

(c) That the facility represents the minimum adverse environmental impact, considering the state of available technology and the nature and economics of various alternatives, and other pertinent considerations. RESPONSE: Other alternatives were explored including shipment off site and no action. It was determined that no capacity was available for a mixed waste and that the risk could be reduced by treating the uranyl nitrate using the existing in-place treatment system. This will expedite removal and because of the technical and administrative controls in place, on site treatment is the alternative believed to be most protective of human health safety and the environment. Additionally, this will be a one time treatment event and thus the risk and threat is greatly diminished.

[redacted]

(d) That the facility represents the minimum risk of all of the following: RESPONSE: A minimum risk is present because the removal is a one time event using existing procedures and equipment. Additionally, both administrative and technical controls are in place, including secondary containment for the 21 UN tanks, welded piping where secondary containment is not available, 24-hour on site fire and spill response reporting and resolution through the Emergency Duty Officer, FEMP Contingency Plan, FEMP Spill Prevention Control and Countermeasure Plan, and Standard Operating Procedures (SOP) for activities associated with this removal. Part of the planning is to thoroughly leak test and repair the system as needed prior to starting treatment. This testing and repair is currently under way. Comprehensive training for OSHA health and safety concerns, handling hazardous materials and wastes and radiation safety are routinely provided to personnel involved in this removal.

(i) Contamination of ground and surface waters. RESPONSE: A Health and Safety Plan is in effect in addition to a Spill Prevention Control and Countermeasure Plan that is site specific. These plans will minimize the risks of spills or upset conditions. The UN tanks all have secondary containment, thus the risk of release is further minimized. NPDES parameters will be monitored prior to waste water discharge from the removal action. No surface or ground water discharge is planned.

(ii) Fires or explosions from treatment, storage or disposal methods. RESPONSE: In addition to the plans referenced in the response to (i), FEMP has an on site 24-hour fire and emergency response team. Using existing proven procedures further minimizes the threat of fire or explosion. No known significant fires or explosions have resulted from past operation of this treatment process.

(iii) Accident during transportation of hazardous waste to or from the facility. RESPONSE: The removal will require no hazardous waste to be transported to the site. The current plan for treatment of the UN does not involve any transport off site. At a later date the residues will be analyzed to make a waste determination. If a determination is made that the residues are a mixed waste, disposal will be addressed under remediation of Operable Unit 3. If an off site disposal site is required and one located prior to OU3 remediation, a separate disposal action may be taken. Any waste transported off site will represent a significant volume reduction and enhance this facility's waste minimization progress.

(iv) Impact on public health and safety. RESPONSE: The on site removal action is isolated from any population centers. The existing Wastewater Treatment System (See Attachment 5) will limit any impacts on public health and safety. By following the removal plan and site emergency/contingency plans no impact on public health and safety are anticipated.

(v) Air pollution. RESPONSE: Air permits are in place or being renewed for the existing process (See Attachment 4). Emissions specified in the terms and conditions of the applicable limits of these permits will not be exceeded during this removal. Additionally, radiological ambient air monitoring stations are in place around the facility.

(vi) Soil contamination. RESPONSE: The removal plan and site emergency/contingency plans address any spills, releases, or upset conditions. Secondary containment for all tanks will help eliminate a release from any upset condition. No soil contamination is expected as the result of this removal.

B. Although the volume of the uranyl nitrate is less than 250,000 gallons, the following data is provided to enhance the value of this document to provide significant relevant information. (See 3734.05(D)(6)(g)).

1. The facility is located more than two thousand feet from any residence, school, hospital, jail, or prison.

2. The removal site is not in a wetland.

3. The facility is not located within a flood plain nor is washout by a one hundred-year flood a concern.

[redacted]

TABLE 1

APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS

NESHAPS	
40 CFR 61 Subpart H Radionuclide Emissions (Except Airborne Radon-222)	Applicable
NPDES	
OAC 3745-1-07(C) Use Designations and Criteria Ohio Water Quality Standards	Applicable
OAC 3745-1-32 Radioactive Materials in Ohio River and in Receiving Waters Outside the Mixing Zone	Applicable
40 CFR 122.41 OAC 3745-33-05 Discharge of Treatment System Effluent	Applicable
40 CFR 122.44(a) Discharge of Treatment System Effluent	Applicable
40 CFR 122.44 OAC 3745-33-04 40 CFR 122.44(e) Water Quality Standards	Applicable
OAC 3745-31 Wastewater Treatment	Applicable
40 CFR 125.100 Discharge of Treatment System Effluent Best Management Practices	Relevant and Appropriate
ATOMIC ENERGY ACT	
10 CFR 20.101-.105 OAC 3701-38 Radiation Doses, Levels, and Concentrations in Restricted and Unrestricted Areas	Relevant and Appropriate

[redacted]

[redacted]

*CLEAN AIR

40 CFR 50.7 OAC 3745-17 National Ambient Air Quality Standard for Particulate Matter	Relevant and Appropriate

SAFE DRINKING WATER ACT

40 CFR 141.11 OAC 3745-81-11 Inorganic Chemicals in Drinking Water	Relevant and Appropriate
40 CFR 141.12 OAC 3745-81-12 Organic Chemicals in Drinking Water	Relevant and Appropriate
40 CFR 141.15 OAC 3745-81-15 Radionuclides in Drinking Water	Relevant and Appropriate
40 CFR 141.50 - 141.51 National Primary Drinking Water Standards	Relevant and Appropriate

EXPOSURE TO THE PUBLIC

DOE Order 5400.5, Chapter II, Section 1.a Radiation Dose Limit	Relevant and Appropriate
DOE Order 5400.5, Chapter II, Section 1.d Radiation Dose Limit (Drinking Water Pathway)	Relevant and Appropriate
US EPA Health Effects Assessment Guidance	Relevant and Appropriate

RCRA

40 CFR 260, Appendix I 40 CFR 261.4(b) 40 CFR 260.20 40 CFR 260.22 Hazardous Waste Determinations	Applicable
40 CFR 261 Empty Containers	Applicable
40 CFR 262.10 Generators Who Treat, Store, or Dispose of Hazardous Waste on Site	Applicable

40 CFR 262.20 40 CFR 262.30 Generators Who Transport Hazardous Waste for Off-Site Treatment, Storage or Disposal	Applicable
40 CFR 262.34 Waste Accumulation On Site by Generator	Applicable
40 CFR 262 Subpart D Generator Recordkeeping and Reporting	Applicable
40 CFR 264 Subpart B, General Standards Treatment, Storage, or Disposal Facility Standards	Applicable
40 CFR 264 Subpart C 40 CFR 264.32 40 CFR 264.33 40 CFR 264.34 40 CFR 264.35 40 CFR 264.37 Treatment, Storage, or Disposal	Applicable
40 CFR 264 Subpart D 40 CFR 264.52 40 CFR 264.55 Treatment, Storage, or Disposal Facility Contingency Plan and Emergency Procedures	Applicable
Facility Preparedness and Prevention	Applicable
40 CFR 264 Subpart E 40 CFR 264.73 - Operating Record Requirements Treatment, Storage, or Disposal Facility Operating Record	Applicable
40 CFR 264.75-.77 Treatment, Storage, or Disposal Facility Reporting	Applicable
40 CFR 264.111 OAC 3745-66-11 40 CFR 264.114 OAC 3745-66-14 Closure with No Post-Closure Care	Applicable

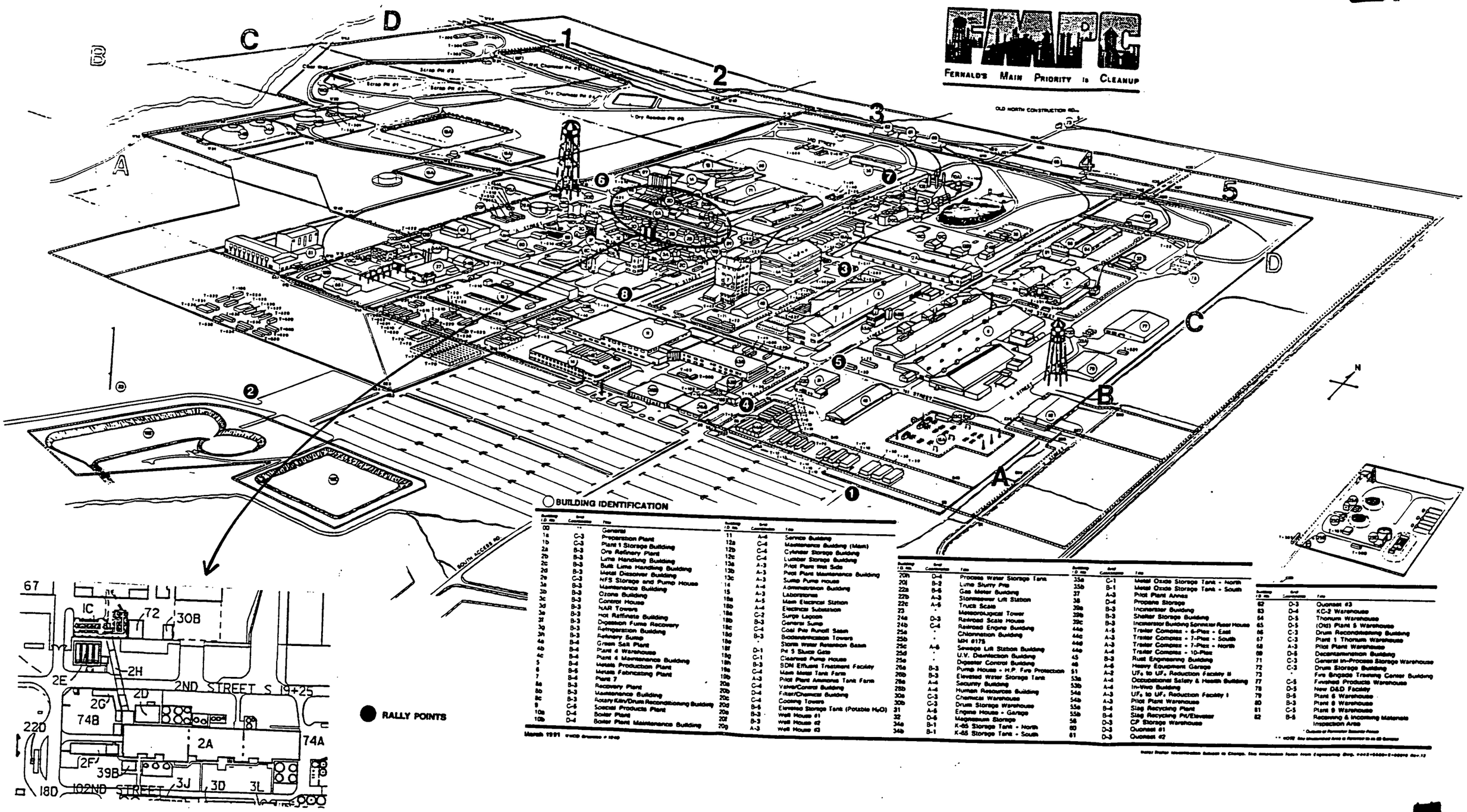
[redacted]

40 CFR 264.171 OAC 3745-55-70 through -78 40 CFR 264.172 40 CFR 264.173 40 CFR 264.174 40 CFR 264.175 40 CFR 264.177 40 CFR 264.178 Container Storage	Applicable
40 CFR 264 Subpart J (Tanks) Treatment in a Unit	Relevant and Appropriate
40 CFR 268 Land Disposal Restrictions	Applicable
DOE Orders	To be Considered

4

FMPC

FERNALD'S MAIN PRIORITY IS CLEANUP



BUILDING IDENTIFICATION

Building I.D. No.	Grid Coordinates	Title
00	--	General
1a	C-3	Preparation Plant
1b	C-3	Plant 1 Storage Building
2a	B-3	Ore Refinery Plant
2b	B-3	Lime Handling Building
2c	B-3	Bulk Lime Handling Building
2d	B-3	Metal Dissolver Building
2e	C-3	NFS Storage and Pump House
3a	B-3	Maintenance Building
3b	B-3	Ozone Building
3c	B-3	Control House
3d	B-3	NAR Towers
3e	B-3	Hot Raffinate Building
3f	B-3	Digestion Fume Recovery
3g	B-3	Refrigeration Building
3h	B-3	Refinery Sump
4a	B-4	Green Salt Plant
4b	B-4	Plant 4 Warehouse
4c	B-4	Plant 4 Maintenance Building
5	B-4	Metals Production Plant
6	B-5	Metals Fabricating Plant
7	B-4	Plant 7
8a	B-3	Recovery Plant
8b	B-3	Maintenance Building
8c	B-3	Rotary Kiln/Drum Reconditioning Building
9	C-5	Special Products Plant
10a	D-4	Boiler Plant
10b	D-4	Boiler Plant Maintenance Building
11	A-4	Service Building
12a	C-4	Maintenance Building (Main)
12b	C-4	Cylinder Storage Building
12c	C-4	Lumber Storage Building
13a	A-3	Pilot Plant Well Sub
13b	A-3	Pilot Plant Maintenance Building
13c	A-3	Sump Pump House
14	A-4	Administration Building
15	A-3	Laboratories
16a	A-4	Main Electrical Station
16b	A-4	Electrical Substation
18a	C-2	Surge Lagoon
18b	B-3	General Sump
18c	C-4	Coal Pile Runoff Basin
18d	B-3	Biodenitrification Towers
18e	-	Storm Water Retention Basin
18f	D-1	Pit 5 Sluice Gate
18g	C-1	Clearwell Pump House
18h	B-3	SDN Effluent Treatment Facility
19a	C-4	Main Metal Tank Farm
19b	A-3	Pilot Plant Ammonia Tank Farm
20a	C-4	Valve/Control Building
20b	C-4	Filter/Chemical Building
20c	C-4	Cooling Towers
20d	B-5	Elevated Storage Tank (Potable H_2O)
20e	B-3	Well House #1
20f	B-3	Well House #2
20g	A-3	Well House #3
20h	D-4	Process Water Storage Tank
20i	B-3	Lime Slurry Pre
22a	B-5	Gas Meter Building
22b	A-3	Stormsewer Lift Station
22c	A-5	Truck Scale
23	-	Meteorological Tower
24a	D-3	Railroad Scale House
24b	C-4	Railroad Engine Building
25a	-	Chlorination Building
25b	-	MH #175
25c	A-5	Sewage Lift Station Building
25d	-	U.V. Disinfection Building
25e	-	Digester Control Building
26a	B-3	Pump House - H.P. Fire Protection
26b	B-3	Elevated Water Storage Tank
28a	A-4	Security Building
28b	A-4	Human Resources Building
30a	C-3	Chemical Warehouse
30b	C-3	Drum Storage Warehouse
31	A-5	Engine House - Garage
32	D-5	Magnesium Storage
34a	B-1	K-65 Storage Tank - North
34b	B-1	K-65 Storage Tank - South
35a	C-1	Metal Oxide Storage Tank - North
35b	B-1	Metal Oxide Storage Tank - South
37	A-3	Pilot Plant Annex
38	D-4	Propane Storage
39a	B-3	Incinerator Building
39b	B-3	Shelter Storage Building
39c	B-3	Incinerator Building Sprinkler Pump House
44a	A-5	Trailer Complex - 6-Plex - East
44b	A-3	Trailer Complex - 7-Plex - South
44c	A-3	Trailer Complex - 7-Plex - North
44d	A-4	Trailer Complex - 10-Plex
44e	A-3	Trailer Complex - 10-Plex
45	B-3	Rust Engineering Building
46	A-5	Heavy Equipment Garage
51	A-2	UF_6 to UF_4 Reduction Facility III
53a	A-4	Occupational Safety & Health Building
53b	A-4	In-Vivo Building
54a	A-3	UF_6 to UF_4 Reduction Facility I
54b	A-3	Pilot Plant Warehouse
55a	B-4	Slag Recycling Plant
55b	B-4	Slag Recycling Pit/Elevator
58	D-3	CP Storage Warehouse
60	D-3	Quonset #1
61	D-3	Quonset #2
62	D-3	Quonset #3
63	D-4	KC-2 Warehouse
64	D-5	Thorium Warehouse
65	D-5	(Old) Plant 5 Warehouse
66	C-3	Drum Reconditioning Building
67	C-3	Plant 1 Thorium Warehouse
68	A-3	Pilot Plant Warehouse
69	D-5	Decontamination Building
71	C-3	General In-Process Storage Warehouse
72	C-3	Drum Storage Building
73	-	Fire Brigade Training Center Building
77	C-5	Finished Products Warehouse
78	D-5	New D&D Facility
79	B-5	Plant 6 Warehouse
80	B-3	Plant 8 Warehouse
81	C-5	Plant 9 Warehouse
82	B-5	Receiving & Incoming Materials Inspection Area

March 1991

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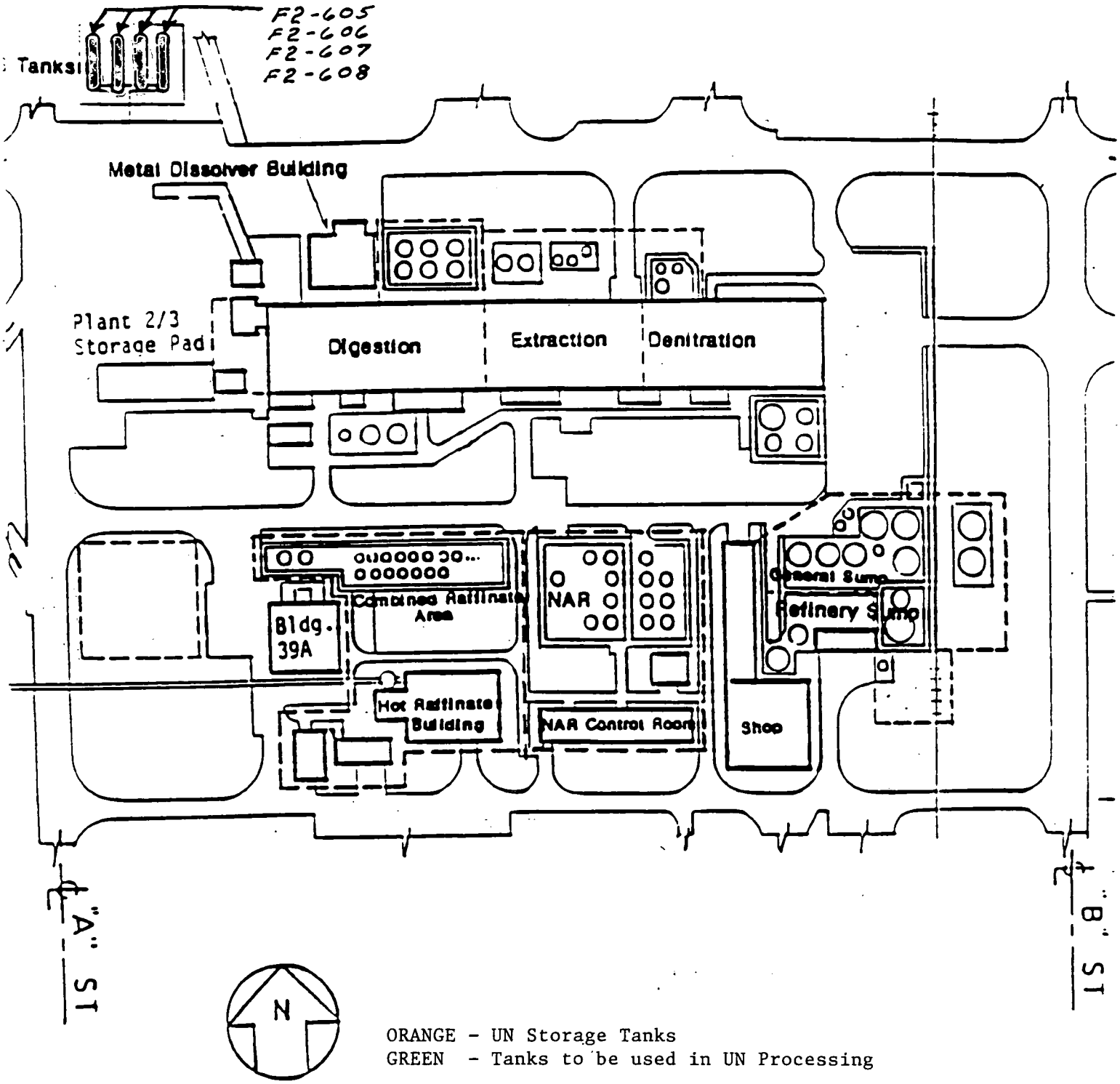
Attachment 1

[redacted]



ORANGE - UN Storage Tanks
GREEN - Tanks to be used in UN Processing

Figure 4-1. Plant 2/3 Area

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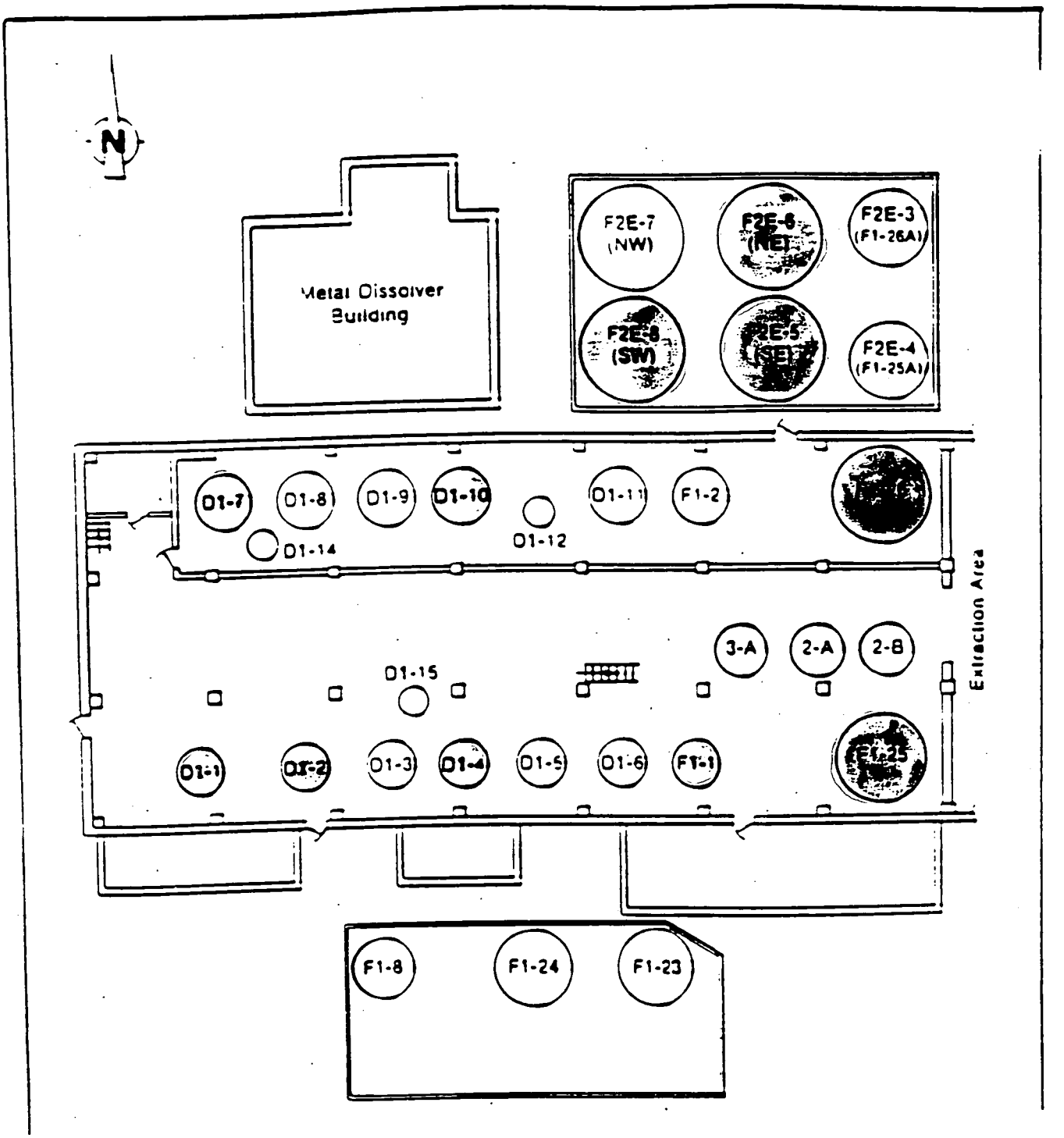


Figure 4-2. Digestion Area First Floor

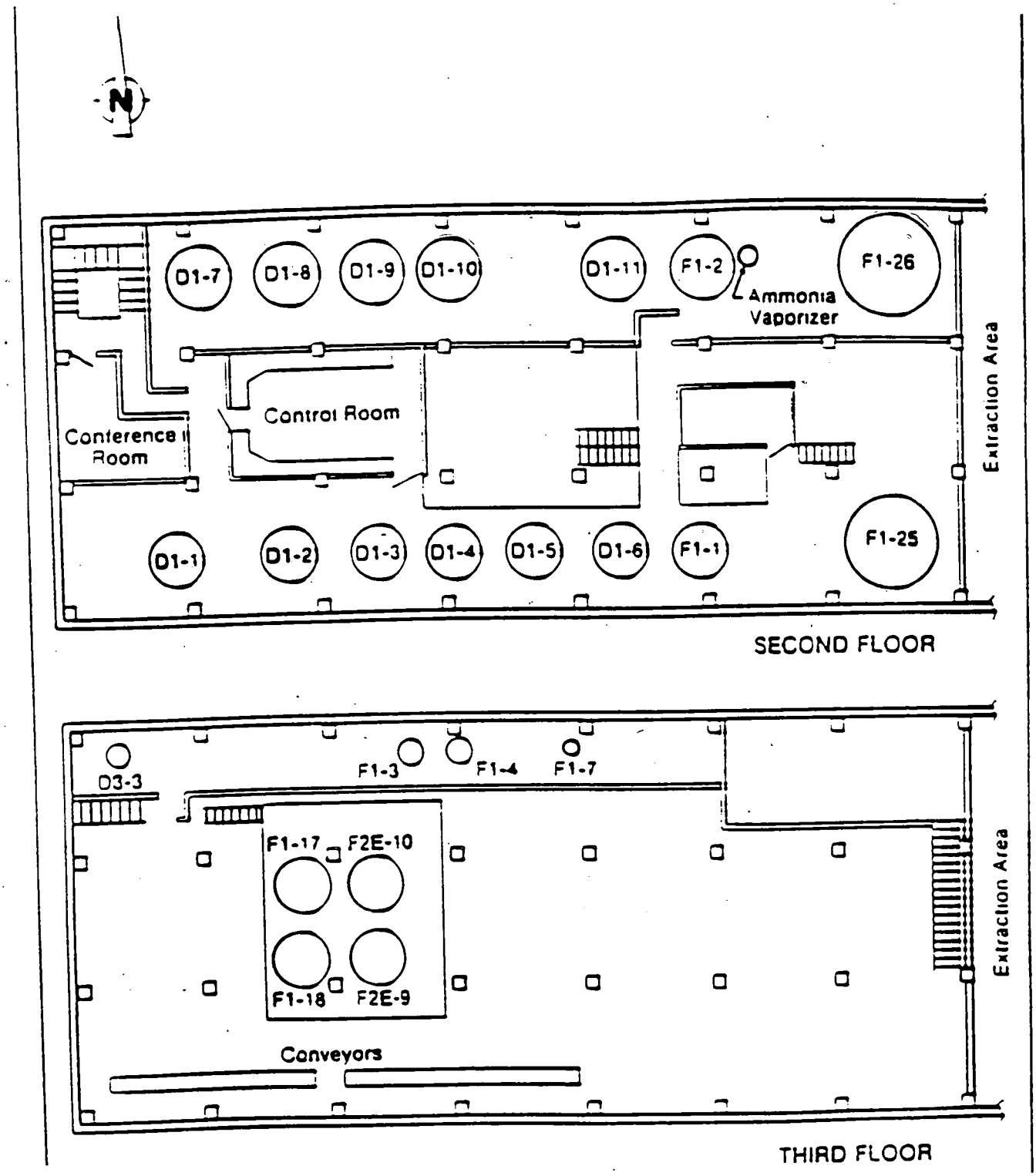


Figure 4-3. Digestion Area Second and Third Floors

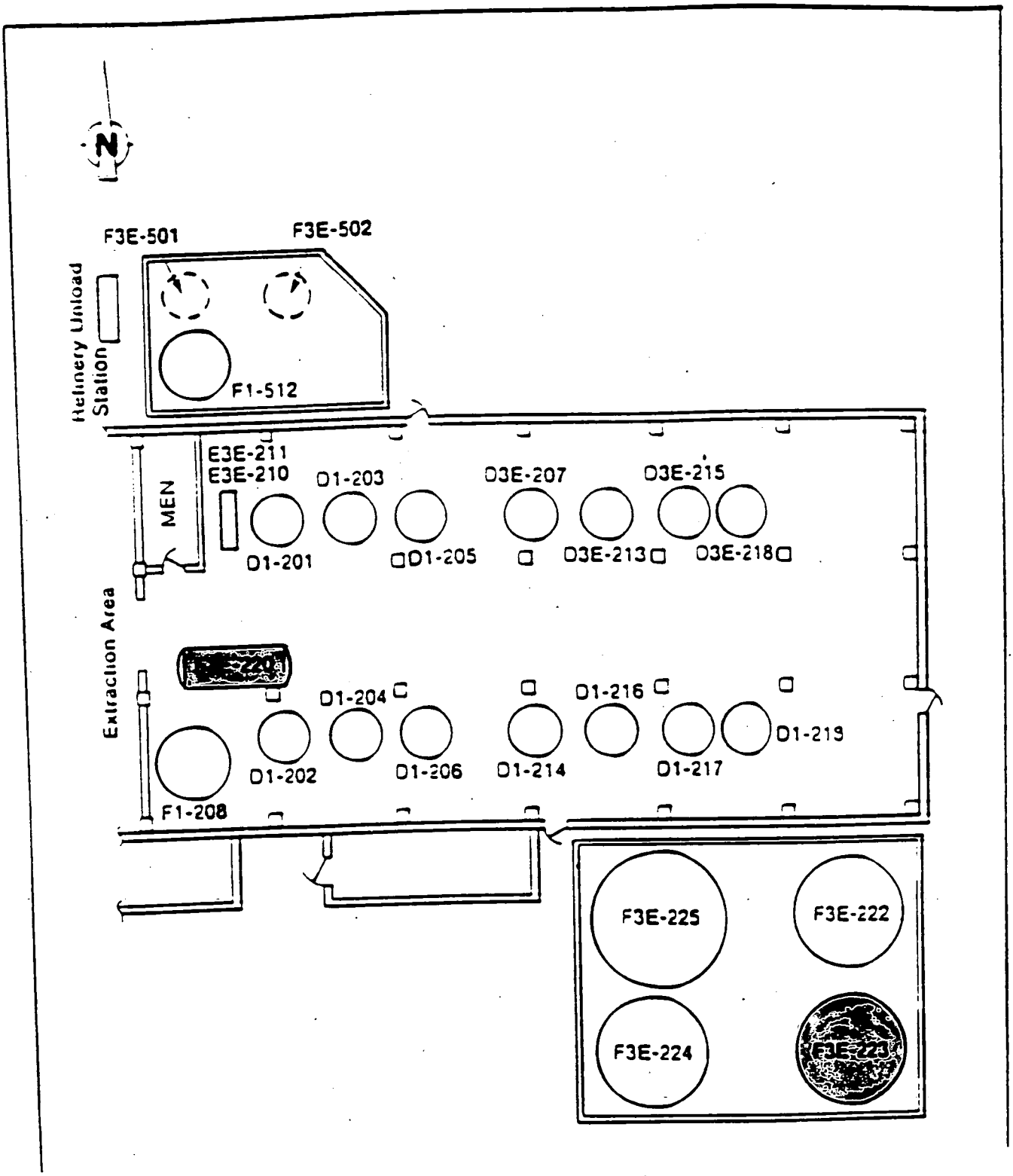


Figure 4-4. Denitration Area First Floor

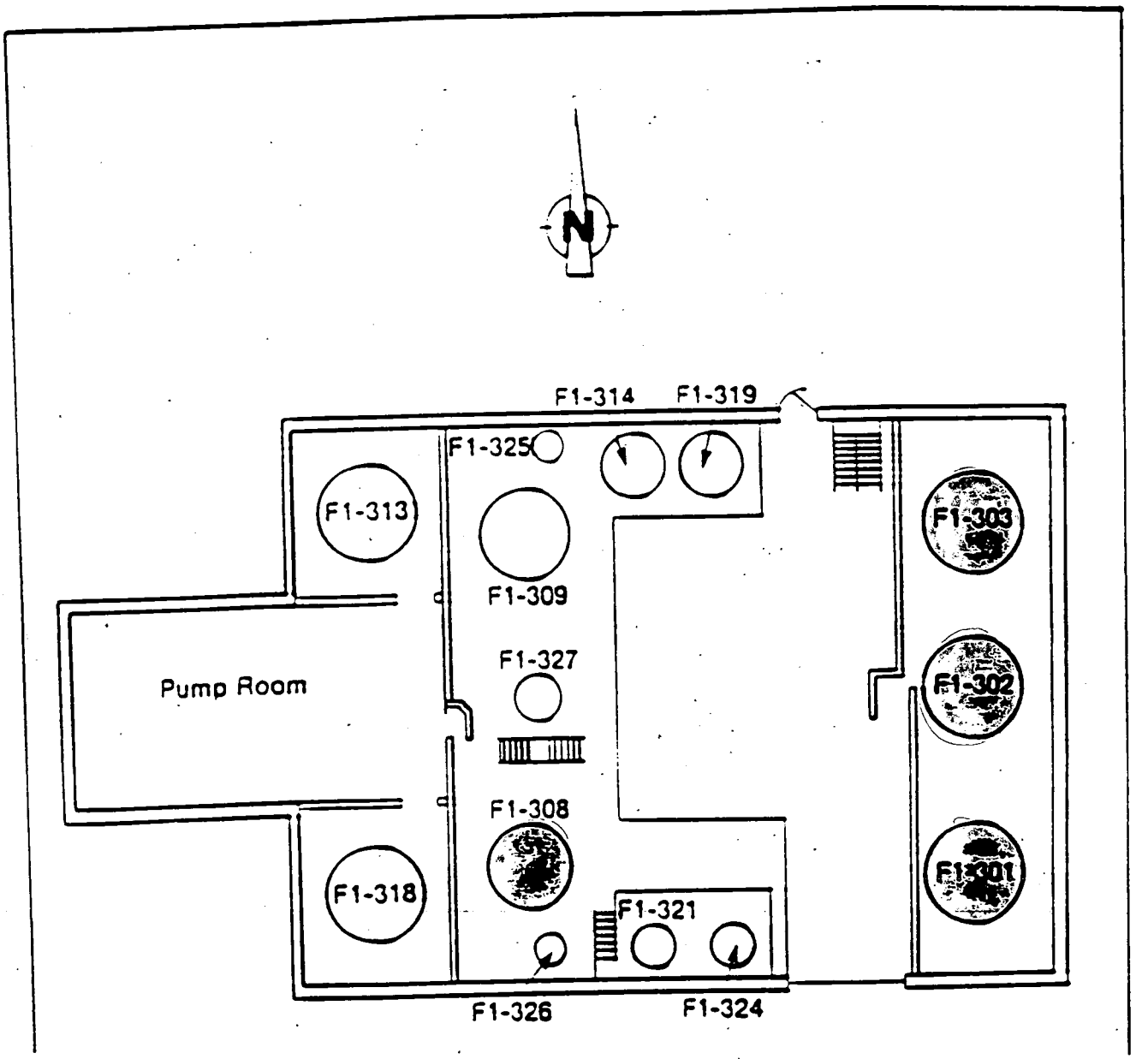
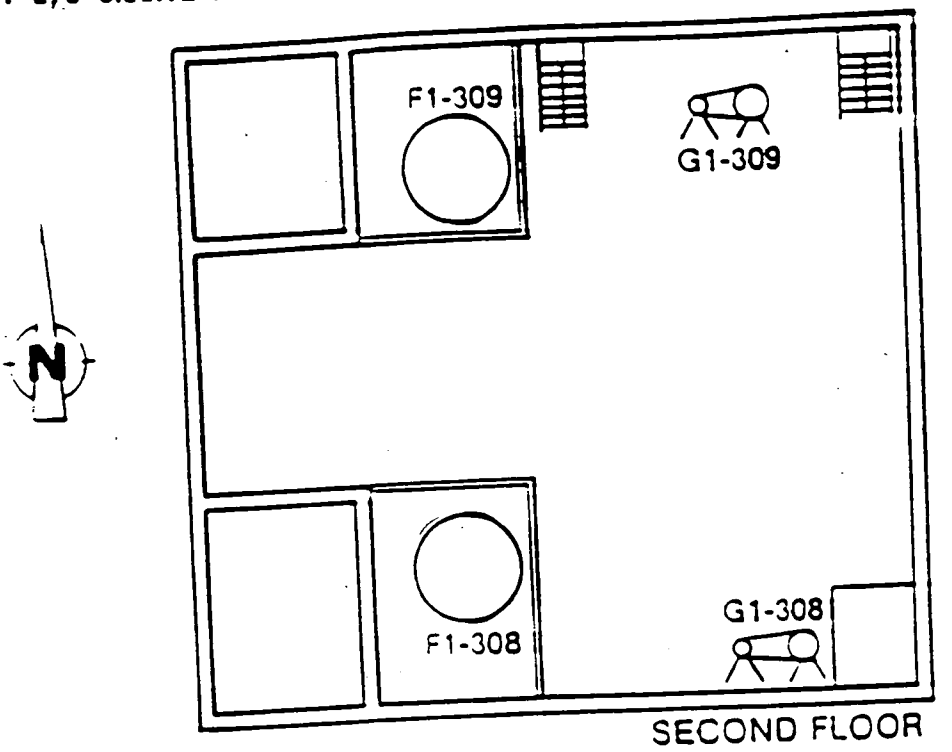


Figure 4-5. Hot Raffinate Building, First Floor



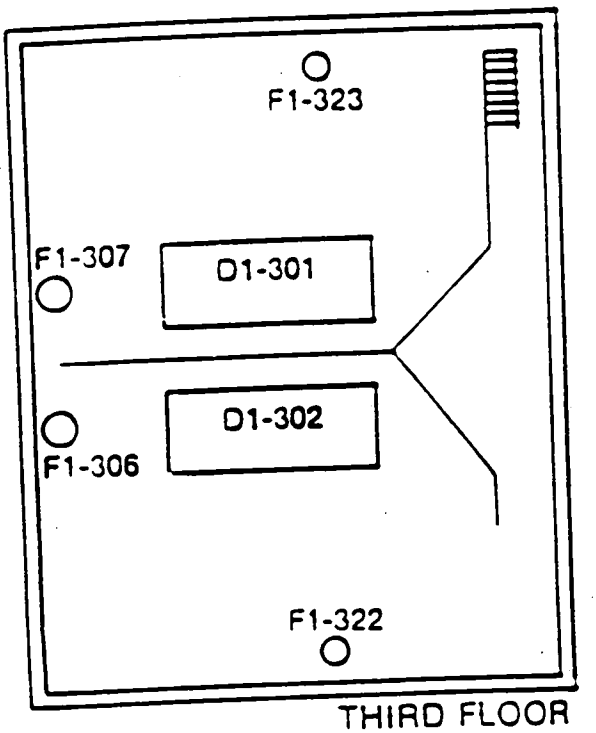


Figure 4-6. Hot Raffinate Building, Second and Third Floors

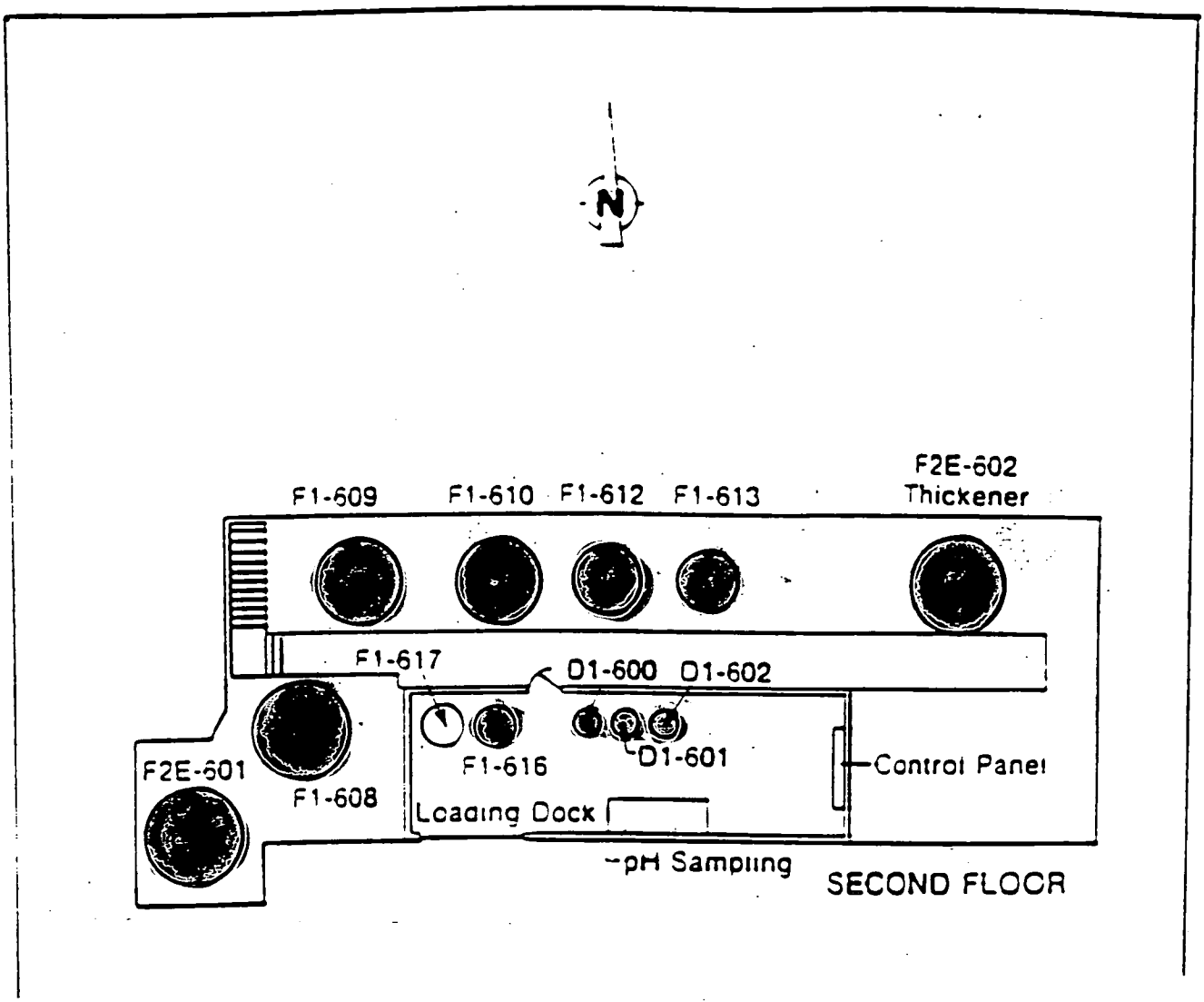


Figure 4-7. Refinery Sump Area

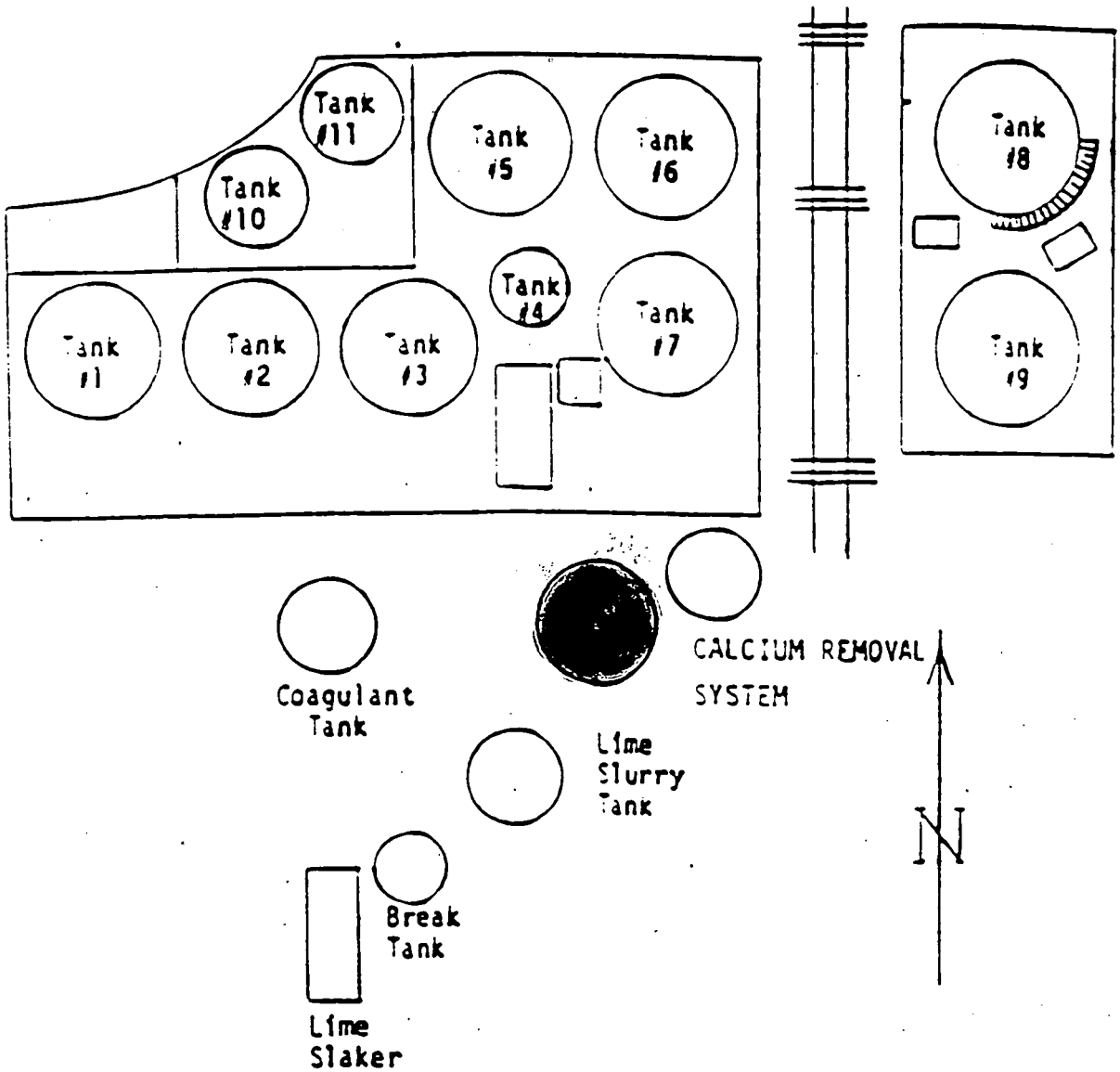


Figure 4-8. General Sump Tank Configuration

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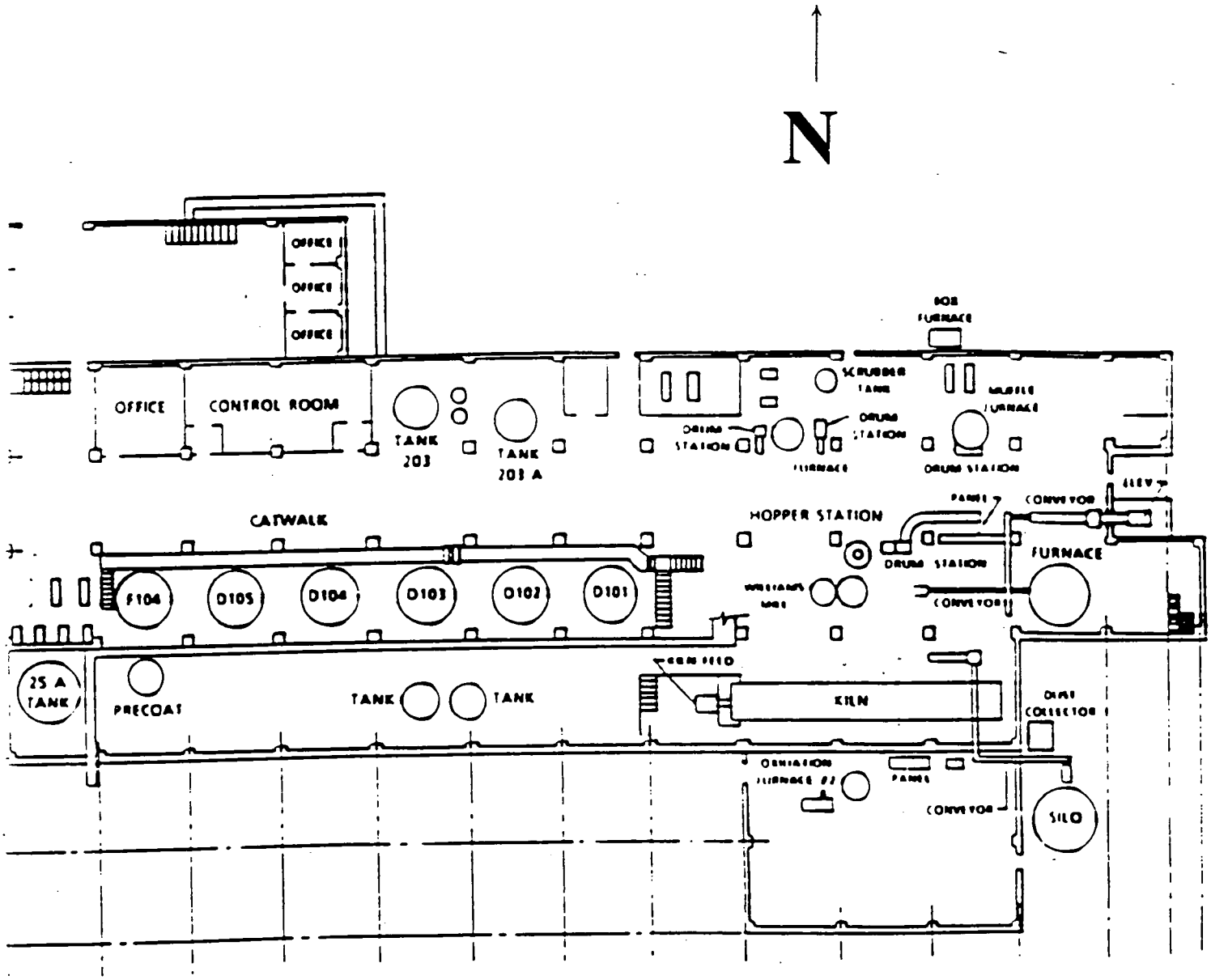


Figure 4-9. Floor Plan for Plant 8 first Floor

[redacted]

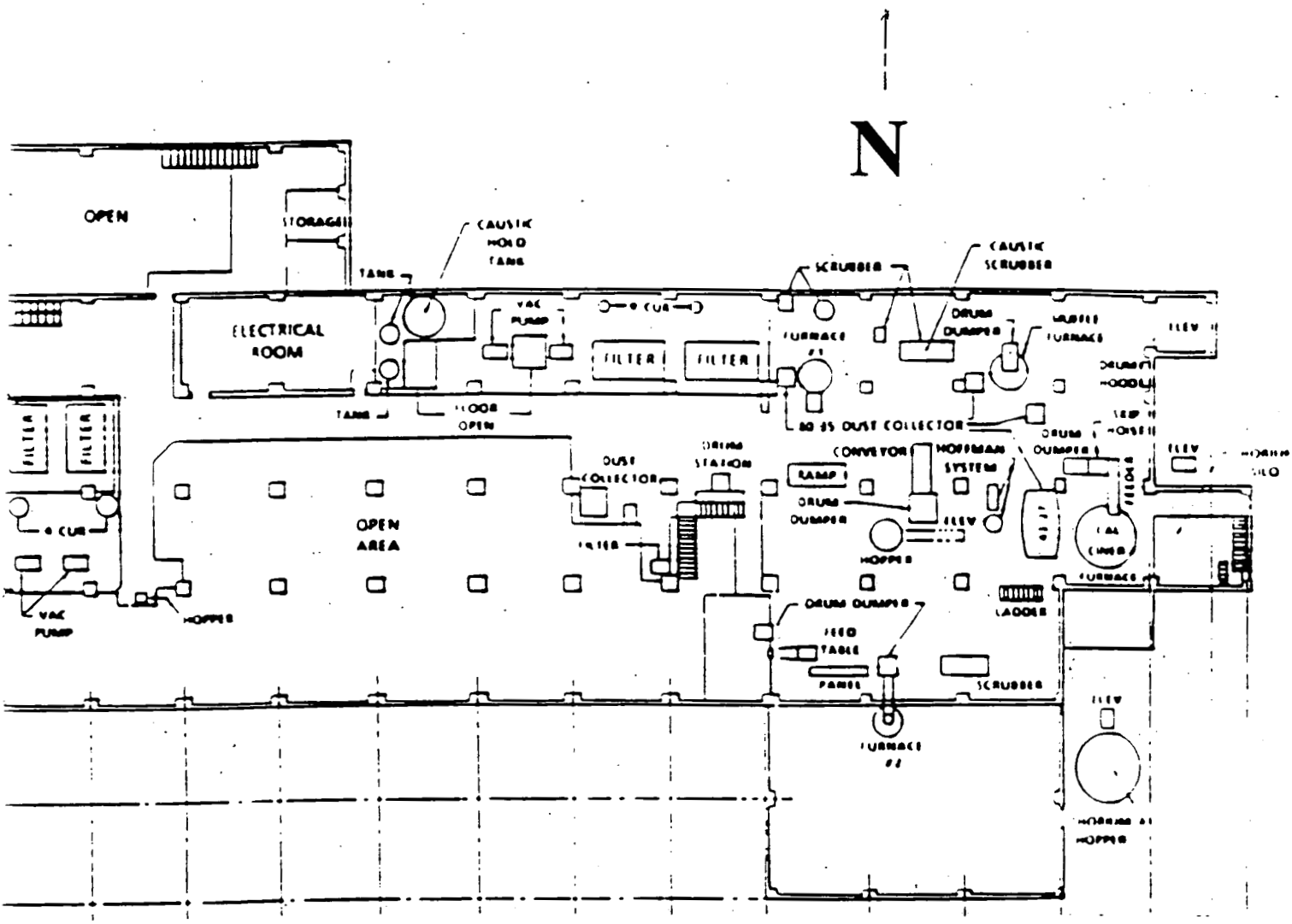
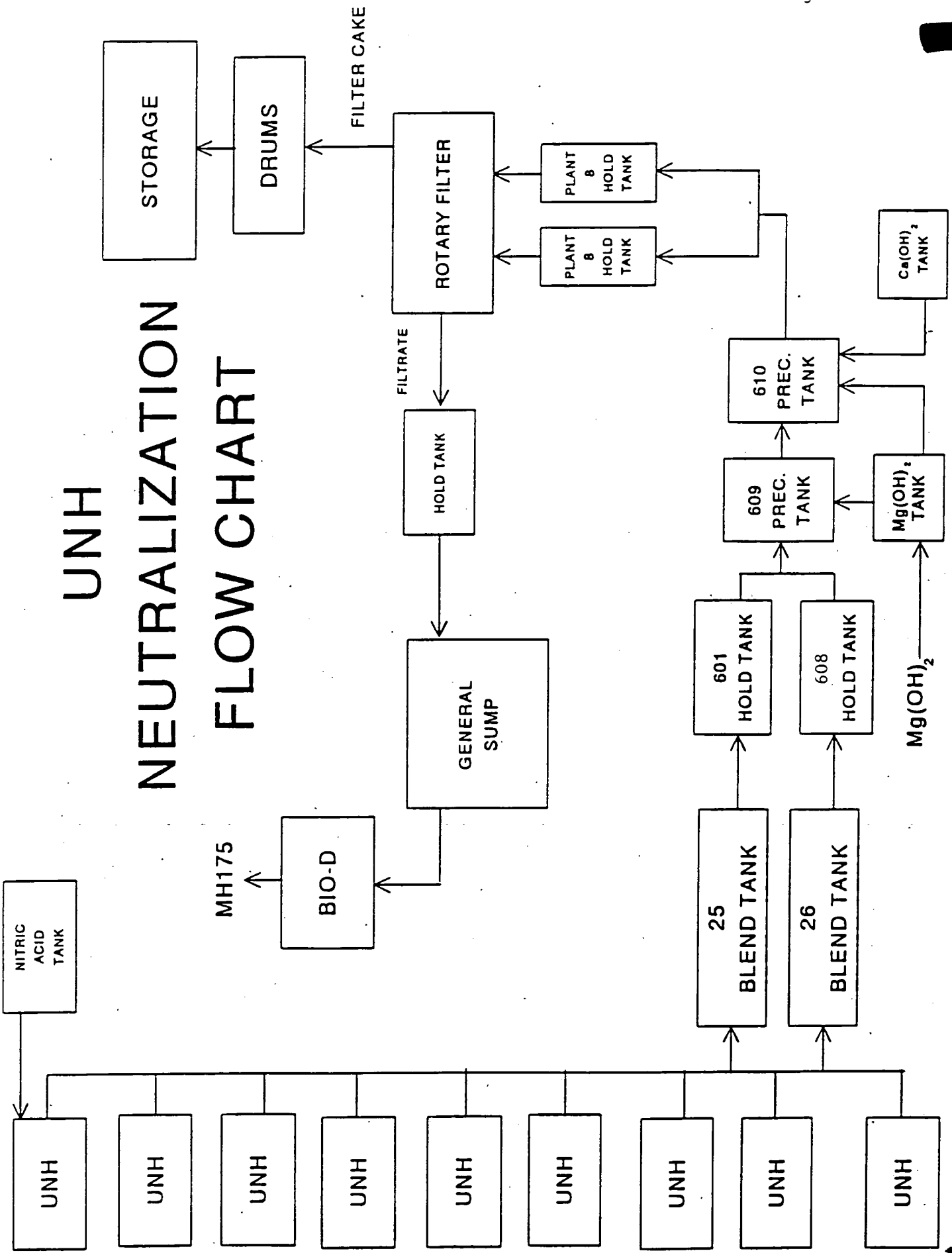


Figure 4-10. Floor Plan for Plant 8 Second Floor

[redacted]

UNH NEUTRALIZATION FLOW CHART



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PART I, A. - FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning on the effective date of this permit and lasting until the expiration date, the permittee is authorized to discharge in accordance with the following limitations and monitoring requirements from the following outfall: 1I000004605. SEE PART II, OTHER REQUIREMENTS, for location of effluent sampling.

BDN

EFFLUENT CHARACTERISTIC		DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS	
		Concentration Other Units (Specify)		Loading* kg/day			
REPORTING CODE/UNITS	PARAMETER	30 DAY	DAILY	30 DAY	DAILY	Measurement Frequency	Sample Type
00310 MG/L	Biochemical Oxygen Demand, 5 Day	30	45	26	38	1/Week	24 Hr. Comp.
00530 MG/L	Residue, Total Nonfilterable	30	45	26	38	1/Week	24 Hr. Comp.
00610 MG/L	Nitrogen, Ammonia (NH_3)	-	-	-	-	1/Week	24 Hr. Comp.
00620 MG/L	Nitrate-N	72.7	145	62	124	1/Week	24 Hr. Comp.
00951 MG/L	Fluoride, Total (F)	1.3	4.5	1.1187	3.8247	1/Week	24 Hr. Comp.
01034 UG/L	Chromium, Total (Cr)	12	27	0.0101	0.0226	1/Week	24 Hr. Comp.
01042 UG/L	Copper, Total (Cu)	45	90	0.0387	0.0770	1/Week	24 Hr. Comp.
01067 UG/L	Nickel, Total (Ni)	29	42	0.0251	0.0361	1/Week	24 Hr. Comp.
01220 UG/L	Chromium, Dissolved Hexavalent	-	-	-	-	1/Week	24 Hr. Comp.
50050 MGD	Flow Rate	-	-	-	-	Daily	24 Hr. Total

* Loadings are based on 0.2252 MGD

2. The pH (Reporting Codes 00402 (minimum) and 00401 (maximum)) shall be monitored continuously.

3. Samples taken in compliance with monitoring requirements specified above shall be taken at Sampling Stations described in Part II, OTHER REQUIREMENTS.

PART I, A. - FINAL EFFLUENT LIMITATIONS AND MONITORING REQUIREMENTS

1. During the period beginning on the effective date of this permit and lasting until the expiration date, the permittee is authorized to discharge in accordance with the following limitations and monitoring requirements from the following outfall: 1I000004001. SEE PART II, OTHER REQUIREMENTS, for location of effluent sampling.

MAN HOLE 175

EFFLUENT CHARACTERISTIC		DISCHARGE LIMITATIONS				MONITORING REQUIREMENTS	
		Concentration Other Units (Specify)		Loading* kg/day			
REPORTING CODE/UNITS	PARAMETER	30 DAY	DAILY	30 DAY	DAILY	Measurement Frequency	Sample Type
00300 MG/L	Dissolved Oxygen	-	(5.0 Min)	-	-	1/Week	Grab
00530 MG/L	Residue, Total Nonfilterable	30	45	99	149	1/Week	24 Hr. Comp.
00550 MG/L	Oil and Grease, Total	15	15	50	50	1/Week	Grab
00610 MG/L	Nitrogen, Ammonia (NH_3)	-	-	-	-	1/Week	24 Hr. Comp.
00620 MG/L	Nitrate-N	-	-	-	-	1/Week	24 Hr. Comp.
00720 MG/L	Cyanide, Total	0.036	0.076	0.120	0.251	1/Week	Grab
00951 MG/L	Fluoride, Total (F)	-	-	-	-	1/Week	24 Hr. Comp.
01034 UG/L	Chromium, Total (Cr)	-	-	-	-	1/Week	24 Hr. Comp.
01042 UG/L	Copper, Total (Cu)	23	94	0.077	0.310	1/Week	24 Hr. Comp.
01051 UG/L	Lead, Total (Pb)	60	776	0.199	2.562	1/Week	24 Hr. Comp.
01067 UG/L	Nickel, Total (Ni)	-	-	-	-	1/Week	24 Hr. Comp.
01077 UG/L	Silver, Total (Ag)	12	26	0.040	0.086	1/Week	24 Hr. Comp.
01220 UG/L	Chromium, Dissolved Hexavalent	-	-	-	-	1/Week	24 Hr. Comp.
50050 MGD	Flow Rate	-	-	-	-	Daily	24 Hr. Total
80082 MG/L	Biochemical Oxygen Demand, Carb.	20	30	66	99	1/Week	24 Hr. Comp.

* Loadings are based on 0.872 MGD

2. The pH (Reporting Codes 00402 (minimum) and 00401 (maximum)) shall not be less than 6.5 S.U. nor greater than 9.0 S.U. and shall be monitored continuously.

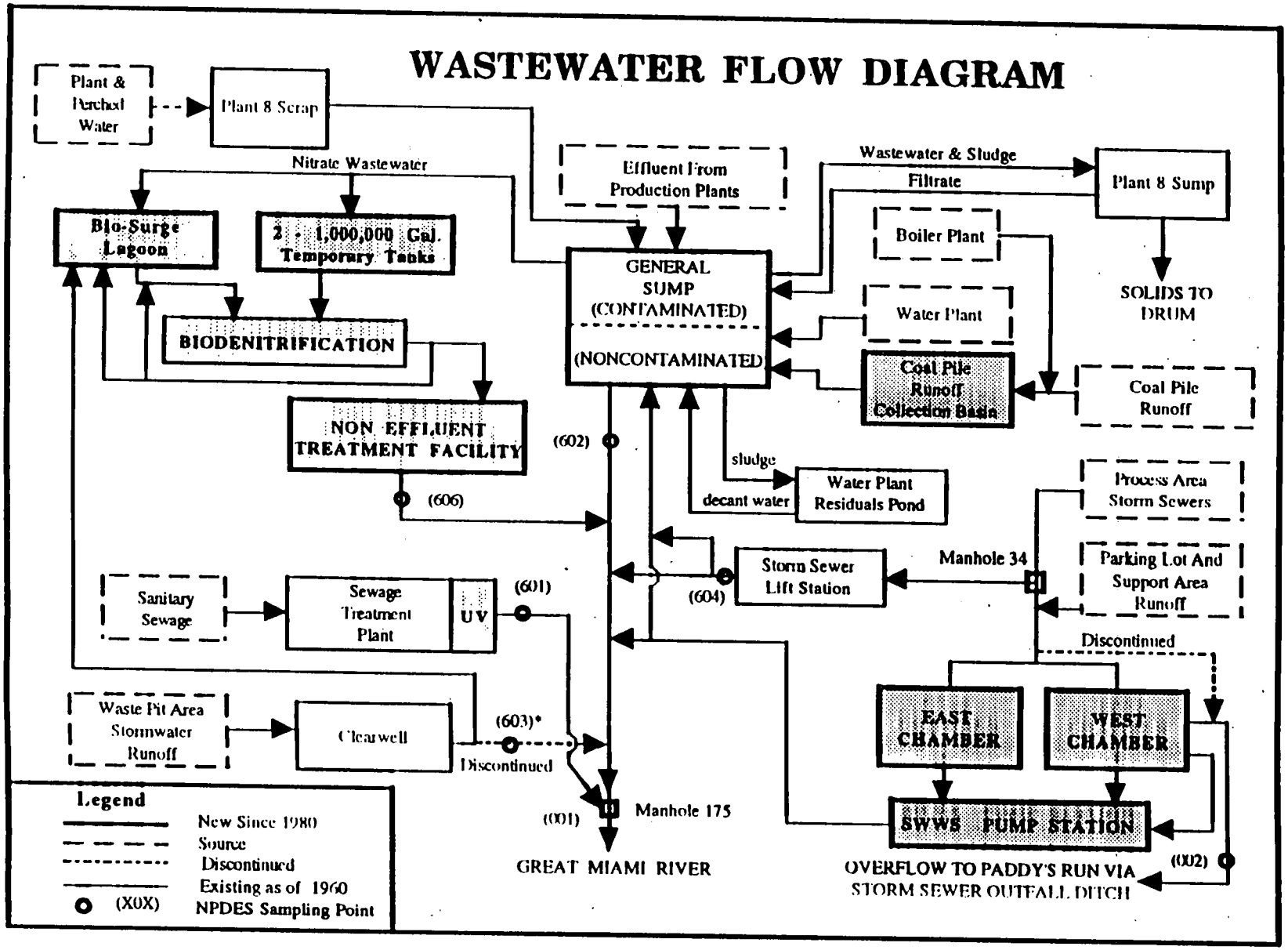
3. Samples taken in compliance with monitoring requirements specified above shall be taken at Sampling Stations described in Part II, OTHER REQUIREMENTS.

ATTACHMENT 4

PERMIT TO OPERATE (PTO) AIR, FOR SPECIFIC TANKS AND FILTERS TO BE USED IN THE URANYL NITRATE REMOVAL ACTION, ACTIVE WITH SOUTHWESTERN OHIO AIR POLLUTION CONTROL AGENCY (SWOAPCA).

TANK/FILTER	PTO	TANK/FILTER	PTO
F2-605	T042	F2-606	T041
F2-607	T040	F1-303	T049
F2-608	T039	F1-308	T073
F2E-5	T032	F2E-8	T031
F2E-6	T029	F1-26	T026
D1-7	P119	F1-25	T025
D1-10	T021	F2E-601	T046
D1-1	P113	F2E-602	P201
D1-2	P113	F1-24	T008
D1-4	P116	EIMCO-8-011(Plt8)	P248
F1-1	T023	F1-608	T045
F3E-223	T070	F1-612	T061
F1-301	T047	EIMCO-8-010(Plt8)	P240
F1-302	T048	F1-203A(Plt8)	T156
F1-23	T007		

PTOS FOR THE FOLLOWING SIX VESSELS ARE EITHER IN RENEWAL, ON REGISTRATION OR IN INITIAL PROCESSING WITH SWOAPCA.

TANK/FILTER
F1-609
F1-610
F1-203
F1-203A
West Eimco Filter (8-010)
East Eimco Filter (8-011)

WASTEWATER FLOW DIAGRAM