5758

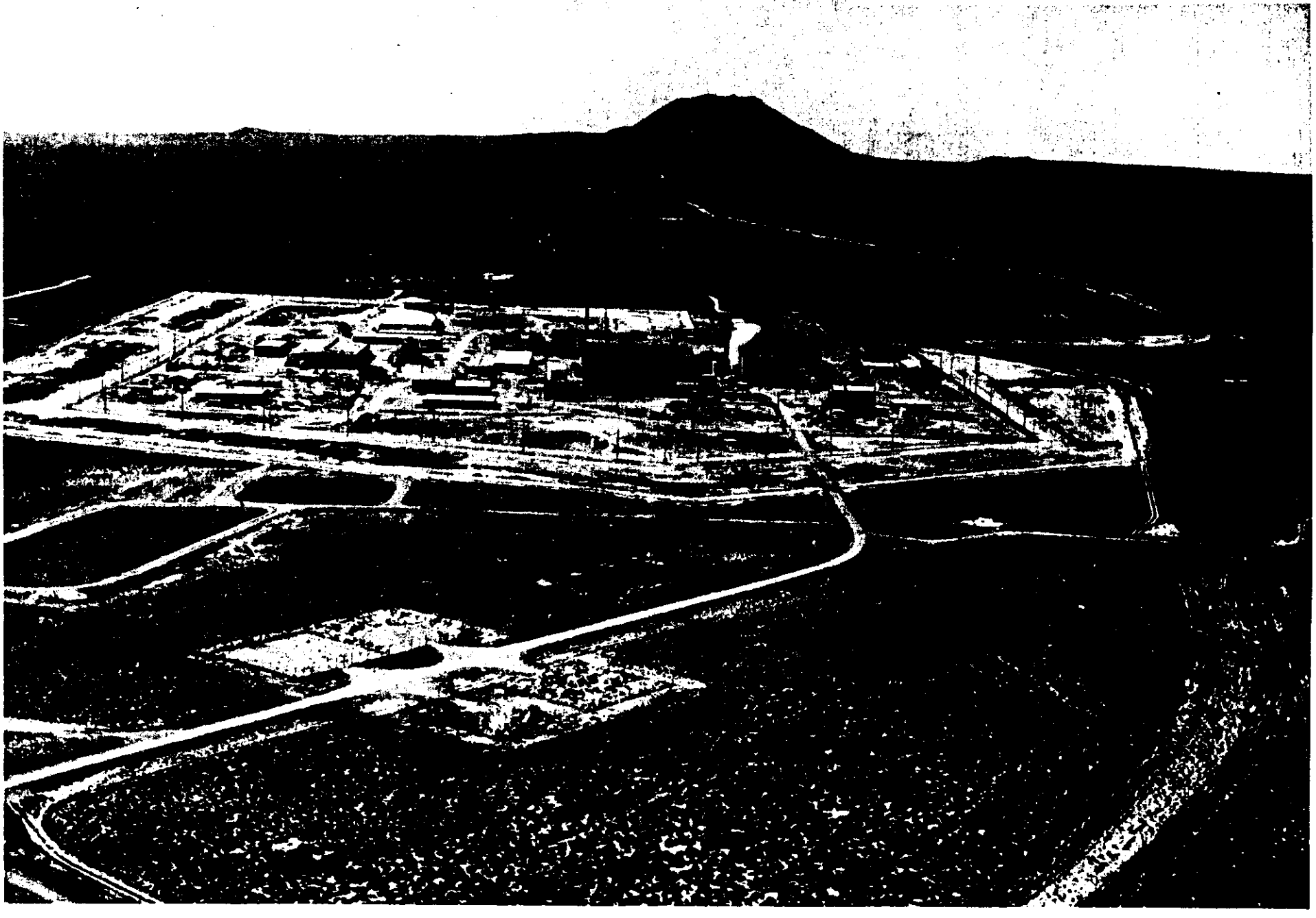
WAG 9

SITE CODE:
ANL-04

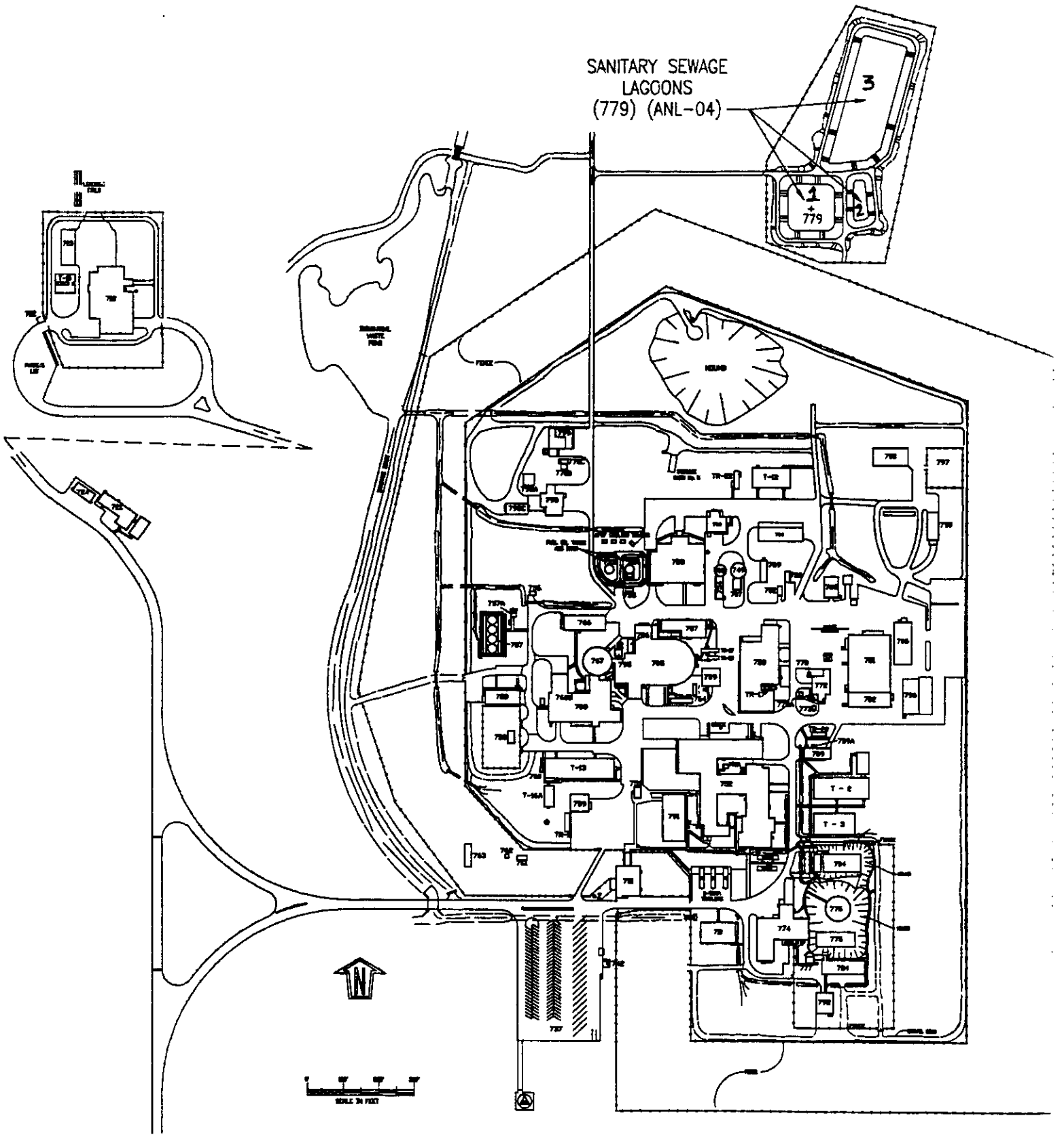
ANL Sewage Lagoons

Prepared by
Argonne National Laboratory-West

Photo 4: ANL Sewage Lagoon (Left Side)
Large One - Final
Small One - Overflow (From Raw)



ARGONNE NATIONAL LABORATORY–WEST SITE PLOT PLAN



FEBRUARY 1993/ESWM
SITE003E.DWG

DETERMINATION

The U.S. Department of Energy, the U.S. Environmental Protection Agency (EPA)-Region 10, and the State of Idaho have completed a review of the referenced information for ANL-04 hazardous waste site, as it pertains to the INEL Federal Facility Agreement of December 9, 1991. Based on this review, the Parties have determined that further scoping under a Track 2 or RI/FS is justified. This decision is subject to review at the time of issuance of the Record of Decision.

Brief summary of the basis:

sewage lagoons with past 1 million gallon leak

References: Track 1 OK's

DOE Project Manager	Lisa Green for J. Lyle	7/25/94 Date
EPA Project Manager	[signature]	6/8/94 Date
Idaho Project Manager	[signature]	6/8/94 Date

DECISION DOCUMENTATION PACKAGE
COVER SHEET

prepared in accordance with

TRACK 1 SITES:
GUIDANCE FOR ASSESSING
LOW PROBABILITY HAZARD SITES
AT INEL

Site description: **The ANL Sewage Lagoons, are located at the Sanitary Sewage Treatment Facility (#779), northeast of EBR-II.**

Site ID: ANL-04 **Operable Unit: 9-01**

Waste Area Group: 9

I. SUMMARY - Physical description of the site:

The sanitary sewage lagoons are located at the Sanitary Sewage Treatment Facility, northeast of EBR-II. Two lagoons were constructed in 1965 along with a third built later in 1974.

According to engineering drawings, the three sanitary sewage lagoons cover approximately two acres of ground. With reference to ANL-W Plot Plan located at the beginning of this document, the lagoons' approximate dimensions are: (#1) - 150 ft x 150 ft x 7 ft, (#2) - 50 ft x 100 ft x 7 ft, and (#3) - 125 ft x 400 ft x 7 ft. The lagoons receive all sanitary wastes originating at ANL-W, with the exception of the Transient Reactor Test Facility and the Sodium Components Maintenance Shop. This includes sanitary wastes from rest rooms, change facilities, drinking fountains and the Cafeteria. The three lagoons are sealed with a 1/8" - 1/4" bottom bentonite liner and are located approximately 600 feet above the underground water table.

A large leak in the northeast corner of the third lagoon was detected after its construction in 1974. This leak resulted in the loss of over a million gallons of waste water through fissures that had not been sealed completely by the bentonite. This was rectified by using a hypalon liner (approximately 30 ml thick) over the northeast corner and sealing the seams. A recent study (conducted in August and September 1992) confirmed that the Sanitary Lagoons are functioning as evaporative ponds and not as percolating ponds, suggesting that the bentonite layer seal has remained intact.

Between 1975 and 1981, photoprocessing solutions were discharged from the Fuel Assembly and Storage Building (FASB) to the Sanitary Waste Lift Station, which discharges to the lagoons. Elon Wood Jr., manager of FASB during that period, estimates that approximately 1.32 Troy ounces of silver were discharged to the Sanitary Waste Lift Station. It has not been confirmed whether the silver was released to the sanitary lagoons or if it remained in the lift station. However, risk based calculations show that the estimated silver concentration for the given amount (1.32 Troy oz.) is well below that required to exceed a risk greater than 1×10^{-6} (see reference 19 and 20). Furthermore, photoprocessing was discontinued at FASB in 1981 and subsequently, there has been no further releases to the lift station.

With the exception of an occasional point source of low level medical radionuclides, there has been no known radioactive hazardous substances released into the Sanitary Lagoons. Periodic sampling of the lagoon and a radionuclide detector placed in the lift station supplying the lagoon (Sanitary Waste Lift Station-778) support these conclusions.

II. SUMMARY - Qualitative Assessment of Risk:

Although the spill of 1 million gallons of waste water through the liner of lagoon 3 raises the level of uncertainty regarding qualitative assessment of risk, the level of uncertainty in the obtained information is low due to the absence of any conflicting information, and the qualitative risk level is also low. Therefore, according to the Qualitative Risk and Uncertainty Evaluation Table, no action is required for this particular site.

III. SUMMARY - Consequences of Error:

(False Negative Error)-If no action is taken and the initial assessment is incorrect, there may be the potential for hazardous substances to be present in the sanitary wastes, which may potentially migrate into the groundwater, thus exposing the population to risks higher than expected.

(False Positive Error)-If remedial actions occur and site is clean, there may be an economical loss due to the high cost of clean up compared to the low environmental benefits which may occur.

IV. SUMMARY - Other Decision Drivers:

No other decision drivers are apparent for this site.

Recommended action:

The Sanitary Sewage Lagoons should be removed from the list of Solid Waste Management Units. This recommendation was reached when it was determined that the possibility of hazardous substances being present within the sanitary wastes was low. Additionally, it is also unlikely that migration of the sanitary wastes will occur.

Signatures	**# PAGES:**	**DATE:**
Prepared By:	DOE WAG Manager:	
Approved By:	Independent Review:	

DECISION STATEMENT
(by DOE RPM)

Date recd: 7/24/94 — AAL-04

Disposition:

Additional scoping and evaluation of data is necessary — assessment of radiological data missing.

DATE: 7/25/94	**# PAGES (decision statement):** 1
NAME: Lisa Green for J Lyle	**SIGNATURE:** Lisa Green for J Lyle

DECISION STATEMENT
(by EPA RPM)

Date recd: 6/7/94 ANL-04

Disposition:

3 Sewage lagoons operating since the mid-1960's. A leak in '74 resulted in a loss of 1 million gallons of wastewater. Based on potential for photoprocessing waste discharge, the evaluatio concentrated on Ag discharge. However, the heavy metal contamination levels in the sludge are not provided nor are radiological survey data. Additional scoping and evaluation of available data is necessary.

DATE: 6/8/94	**# PAGES (decision statement):** 1
NAME: Wayne Pierre	**SIGNATURE:** Wayne Pierre

DECISION STATEMENT
(by STATE RPM)

Date recd: 6/7/94 ANL-04

Disposition:

Although the documentation indicates that that no radioactive discharges of waste water occured, sampling data is not provided to document this claim. This aspect should be further evaluated in a track 2 scoping OU in the workplan for the comprehensive WAG-wide RI. Furthermore, further analysis for hazardous substances should be provided.

DATE: 6/7/94	**# PAGES (decision statement):**
NAME: Dean V. Nygard	**SIGNATURE:** Dean V. Nygard

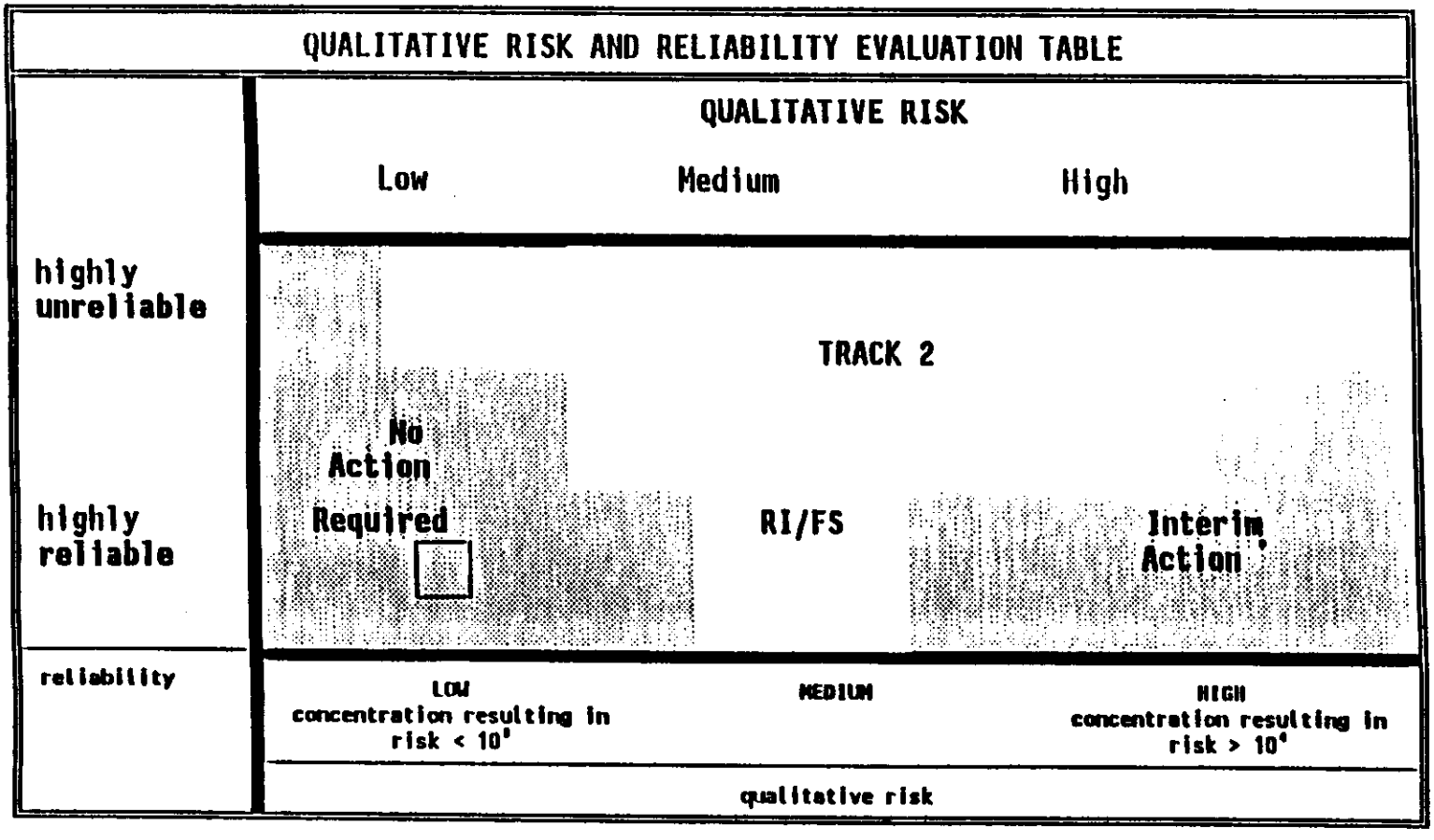
PROCESS/WASTE WORKSHEET
SITE ID ANL-04, ANL SEWAGE LAGOONS

Col 1 Processes Associated with this Site	Col 2 Waste Description & Handling Procedures	Col 3 Description & Location of any Artifacts/Structures/Disposal Areas Associated with this Waste or Process
Process Sanitary Sewage Lagoons	Holding areas where sanitary sewage will biodegrade and eventually evaporate.	Artifact (#1) Sanitary Sewage Lagoon Location Sanitary Sewage Treatment Facility, northeast of EBR-II. Description Lined with bentonite, 150 ft x 150 ft x 7 ft.
		Artifact (#2) Sanitary Sewage Lagoon Location Sanitary Sewage Treatment Facility, northeast of EBR-II. Description Lined with bentonite, 50 ft x 100 ft x 7 ft.
		Artifact (#3) Sanitary Sewage Lagoon Location Sanitary Sewage Treatment Facility, northeast of EBR-II. Description Lined with bentonite, 125 ft x 400 ft x 7 ft.
Process		Artifact Location Description
		Artifact Location Description
		Artifact Location Description
Process		Artifact Location Description
		Artifact Location Description
		Artifact Location Description

CONTAMINANT WORKSHEET
SITE ID ANL-04, ANL SEWAGE LAGOONS
PROCESS (Col 1) Sanitary sewage lagoons **WASTE (Col 2)** Sanitary sewage

Col 4 What known/potential hazardous substances/constituents are associated with this waste or process?	Col 5 Potential sources associated with this hazardous material	Col 6 Known/estimated concentration of hazardous substances/ constituents[a]	Col 7 Risk based concentration mg/kg	Col 8 Qualitative risk assessment (Hi/Med/Lo)	Col 9 Overall reliability (Hi/Med/Lo)
Silver	Sludge (discontinued process)	68 ppm (see ref. 19)	1350 ppm (see ref. 20)	Low	High
Low Level Medical Radionuclides	Employees who have been prescribed medication containing low level radionuclides.	ND	NA	Low	High

a. ND = not detected
DL = detection limit in ppm



* If sufficient data exist to identify an appropriate remedy.

PROCESS Evaporative Ponds

Question 1. **What are the waste generation process locations and dates of operation associated with this site?**

Block 1 Answer:

Construction of the sanitary sewage lagoons began in 1965 when the current sewage treatment facility, an Imhoff tank-leaching pit, was abandoned because of obnoxious odors. As the site grew, two additional sanitary lagoons were built, one later in 1965 and the third lagoon in November 1974. Two of the three sewage lagoons (the southwestern and northern ponds) continue to be utilized by ANL-W. The other lagoon is used as an emergency overflow basin and has not been in operation since 1965. They are located at the Sanitary Sewage Treatment Facility (#779), northeast of EBR-II.

Block 2 How reliable is/are the information source/s? X High _ Med _ Low (check one)
Explain the reasoning behind this evaluation.

Information is obtained from a preliminary proposal for ANL-W Sanitary Sewage Treatment Expansion.

Block 3 Has this INFORMATION been confirmed? X Yes _No (check one)
If so, describe the confirmation.

Historical process data and engineering drawings confirm this information.

Block 4 Sources of Information (check appropriate box/es & source number from reference list)

No available information	[ ]	Analytical data	[ ]
Anecdotal	[ ]	Documentation about data	[ ]
Historical process data	[X] 3,4,5	Disposal data	[ ]
Current process data	[ ]	Q.A. data	[ ]
Areal photographs	[ ]	Safety analysis report	[ ]
Engineering/site drawings	[X] 21	D&D report	[ ]
Unusual Occurrence Report	[ ]	Initial assessment	[ ]
Summary documents	[ ]	Well data	[ ]
Facility SOPs	[ ]	Construction data	[ ]
OTHER	[ ]		

PROCESS_Evaporative Ponds

Question 2. What are the disposal process locations and dates of operation associated with this site?

Block 1 Answer:

The first two sanitary lagoons were built in 1965 with the construction of the third one beginning in 1974. Two of the three sewage lagoons (the southwest and northern ponds) continue to be utilized by ANL-W today. The lagoons receive sanitary wastes from rest rooms, change facilities, drinking fountains and the Cafeteria. All sanitary sewage collects in the Sanitary Waste Lift Station (#778), where it is pumped via a sewage pump/air lift to the primary lagoon (southwest pond) by means of a submerged standpipe. As the primary lagoon fills it cascades over a divider into the secondary lagoon (northern pond), where it will biodegrade and eventually evaporate. The other lagoon is utilized as an emergency overflow basin and has not been used since 1965.

Block 2 How reliable is/are the information source/s? X High _Med _Low (check one)
Explain the reasoning behind this evaluation.

Information is obtained from an Initial Assessment.

Block 3 Has this INFORMATION been confirmed? X Yes _No (check one)
If so, describe the confirmation.

Historical data and engineering drawings confirm this information.

Block 4 Sources of Information (check appropriate box/es & source number from reference list)

No available information	[ ]	Analytical data	[ ]
Anecdotal	[ ]	Documentation about data	[ ]
Historical process data	[X] 3,4,5,6	Disposal data	[ ]
Current process data	[ ]	Q.A. data	[ ]
Areal photographs	[ ]	Safety analysis report	[ ]
Engineering/site drawings	[X] 21	D&D report	[ ]
Unusual Occurrence Report	[ ]	Initial assessment	[X] 1
Summary documents	[ ]	Well data	[ ]
Facility SOPs	[ ]	Construction data	[ ]
OTHER	[ ]		

Question 3. Is there empirical, circumstantial, or other evidence of migration? If so, what is it?

Block 1 Answer:

A large leak in the northeast corner of the third lagoon was detected after its construction in 1974. This leak resulted in the loss of over a million gallons of waste water through fissures that had not been sealed properly by the bentonite. This was rectified by using a hypalon liner over the northeast corner. In August and September of 1992 a test was conducted which verified that the lagoons are evaporative ponds and not percolation ponds. The seepage rates were found to be 0.2" - 0.02", while evaporative rates varied from .1" - 2.3". This test confirmed that the bentonite seal has remained intact and that no migration has occurred into the surrounding soil or groundwater.

Block 2 How reliable is/are the information source/s? X High _Med _Low (check one)
Explain the reasoning behind this evaluation.

Information obtained from a preliminary proposal and from a memo reporting the leak.

Block 3 Has this INFORMATION been confirmed? X Yes _No (check one)
If so, describe the confirmation.

Information is confirmed by historical process data and a Pond Seepage Test.

Block 4 Sources of Information (check appropriate box/es & source number from reference list)

No available information	[ ]	Analytical data	[ ]
Anecdotal	[X] 7	Documentation about data	[ ]
Historical process data	[X] 4,5	Disposal data	[ ]
Current process data	[ ]	Q.A. data	[ ]
Areal photographs	[ ]	Safety analysis report	[ ]
Engineering/site drawings	[ ]	D&D report	[ ]
Unusual Occurrence Report	[ ]	Initial assessment	[ ]
Summary documents	[ ]	Well data	[ ]
Facility SOPs	[ ]	Construction data	[ ]
OTHER	[X] 15		

Question 4. **Is there evidence that a source exists at this site? If so, list the sources and describe the evidence.**

Block 1 Answer:

Between 1975 and 1981, photoprocessing solutions were discharged from the Fuel Assembly and Storage Building (FASB) to the Sanitary Waste Lift Station, which discharges to the lagoons. Elon Wood Jr., manager of FASB during that period, estimates that approximately 1.32 Troy ounces of silver was discharged to the Sanitary Waste Lift Station. It has not been confirmed whether the silver was released to the sanitary lagoons or if it remained in the lift station. However, risk based calculations show that the estimated silver concentration (68 ppm) for the given amount (1.32 Troy oz.) is well below that required to exceed a risk greater than 1 x 10^{-6} (see reference 19 and 20). Furthermore, photoprocessing was discontinued at FASB in 1981 and subsequently, there have been no further releases to the lift station.

With the exception of an occasional point source of low level medical radionuclides, there has been no known radioactive hazardous substances released into the Sanitary Lagoons. Periodic sampling of the lagoon and a radionuclide detector placed in the lift station supplying the lagoon (Sanitary Waste Lift Station) support these conclusions.

Block 2 How reliable is/are the information source/s? X High _Med _Low (check one)
Explain the reasoning behind this evaluation.

Information is based upon analytical data obtained from sampling and silver concentration calculations.

Block 3 Has this INFORMATION been confirmed? X Yes _No (check one)
If so, describe the confirmation.

This information is confirmed by ANL-W Analytical Lab, CFA and Elon Wood Jr., former manager of FASB.

Block 4 Sources of Information (check appropriate box/es & source number from reference list)

No available information	[ ]	Analytical data	[X] 10
Anecdotal	[X] 14,18	Documentation about data	[X] 11
Historical process data	[ ]	Disposal data	[X] 12
Current process data	[ ]	Q.A. data	[ ]
Areal photographs	[ ]	Safety analysis report	[ ]
Engineering/site drawings	[ ]	D&D report	[ ]
Unusual Occurrence Report	[ ]	Initial assessment	[ ]
Summary documents	[ ]	Well data	[ ]
Facility SOPs	[ ]	Construction data	[ ]
OTHER	[X] 19,20		

Question 5. **Does site operating or disposal historical information allow estimation of the pattern of potential contamination? If the pattern is expected to be a scattering of hot spots, what is the expected minimum size of a significant hot spot?**

Block 1 Answer:

There is no evidence of a pattern of potential contamination, which, if there had been one, would be confined to the known areas of the lagoons. Although it was confirmed that approximately 1.32 Troy ounces of silver was released from the Fuel Assembly and Storage Building (FASB) to the Sanitary Waste Lift Station, which discharges to the lagoons, it has not been verified whether the silver was discharged to the sanitary lagoons or if it remained in the lift station and is therefore assumed to be contained in the sludge at the lift station. However, risk based calculations show that the estimated silver concentration for the given amount (1.32 Troy oz.) is well below that required to exceed a risk greater than 1×10^{-6}. Furthermore, photoprocessing was discontinued at FASB in 1981 and subsequently, there has been no further releases to the lift station.

With the exception of an occasional point source of low level medical radionuclides, there has been no known radioactive hazardous substances released into the Sanitary Lagoons. Periodic sampling of the lagoon and a radionuclide detector placed in the lift station supplying the lagoon (Sanitary Waste Lift Station) support these conclusions.

Additionally, a recent study (August and September 1992) confirmed that the bentonite seal remains intact and that seepage to the ground is non-existent.

Block 2 How reliable is/are the information source/s? X High _Med _Low (check one)
Explain the reasoning behind this evaluation.

The non-existent contamination pattern is supported by sampling data and a Pond Seepage Test.

Block 3 Has this INFORMATION been confirmed? X Yes _No (check one)
If so, describe the confirmation.

This information is confirmed by ANL-W Analytical Lab, CFA and Elon Wood Jr., former manager of FASB.

Block 4 Sources of Information (check appropriate box/es & source number from reference list)

No available information	[ ]	Analytical data	[X] 10
Anecdotal	[X] 18	Documentation about data	[ ]
Historical process data	[ ]	Disposal data	[X] 12
Current process data	[ ]	Q.A. data	[ ]
Areal photographs	[ ]	Safety analysis report	[ ]
Engineering/site drawings	[ ]	D&D report	[ ]
Unusual Occurrence Report	[ ]	Initial assessment	[ ]
Summary documents	[ ]	Well data	[ ]
Facility SOPs	[ ]	Construction data	[ ]
OTHER	[X] 15,19		

Question 6. **Estimate the length, width, and depth of the contaminated region. What is the known or estimated volume of the source? If this is an estimated volume, explain carefully how the estimate was derived.**

Block 1 Answer:

There is no evidence that a contaminated region exists. Recent tests confirmed that the bentonite seal remains intact, therefore no release to the environment has occurred.

Block 2 How reliable is/are the information source/s? _XHigh _Med _Low (check one)
Explain the reasoning behind this evaluation.

Information is obtained from engineering drawings, disposal data and a Pond Seepage Test.

Block 3 Has this INFORMATION been confirmed? X Yes _No (check one)
If so, describe the confirmation.

Disposal data is reviewed by Plant Services.

Block 4 Sources of Information (check appropriate box/es & source number from reference list)

No available information	[ ]	Analytical data	[X] 10
Anecdotal	[ ]	Documentation about data	[X] 13
Historical process data	[ ]	Disposal data	[X] 12
Current process data	[ ]	Q.A. data	[ ]
Areal photographs	[ ]	Safety analysis report	[ ]
Engineering/site drawings	[X] 21	D&D report	[ ]
Unusual Occurrence Report	[ ]	Initial assessment	[ ]
Summary documents	[ ]	Well data	[ ]
Facility SOPs	[ ]	Construction data	[ ]
OTHER	[X] 15		

Question 7. **What is the known or estimated quantity of hazardous substance/constituent at this source? If the quantity is an estimate, explain carefully how the estimate was derived.**

Block 1 Answer:

Even though it has been confirmed that approximately 1.32 Troy ounces of silver was released from the Fuel Assembly and Storage Building (FASB) to the Sanitary Waste Lift Station, which discharges to the lagoons, it has not been verified whether the silver was discharged to the sanitary lagoons or if it remained in the lift station. The estimated amount of silver was calculated using efficiency factors obtained from Eastman Kodak, the number of plates processed, and the concentration of the original photoprocessing solution. However, risk based calculations show that the estimated silver concentration for the given amount (1.32 Troy oz.) is well below that required to exceed a risk greater than 1×10^{-6}. Furthermore, photoprocessing was discontinued at FASB in 1981 and subsequently, there has been no further releases to the lift station.

Rare discharges into the lagoons of medical treatment radioactive isotopes have occurred, but periodic sampling of the lagoons confirm that there is no impact on the contamination of the lagoons.

Block 2 How reliable is/are the information source/s? X High _Med _Low (check one)
Explain the reasoning behind this evaluation.

Information is obtained from sampling data and silver concentration calculations.

Block 3 Has this INFORMATION been confirmed? X Yes _No (check one)
If so, describe the confirmation.

This information is confirmed by ANL-W Analytical Lab, CFA and Elon Wood Jr., former manager of FASB.

Block 4 Sources of Information (check appropriate box/es & source number from reference list)

No available information	[ ]	Analytical data	[X] 10
Anecdotal	[X] 18	Documentation about data	[X] 13
Historical process data	[ ]	Disposal data	[X] 12
Current process data	[ ]	Q.A. data	[ ]
Areal photographs	[ ]	Safety analysis report	[ ]
Engineering/site drawings	[ ]	D&D report	[ ]
Unusual Occurrence Report	[ ]	Initial assessment	[ ]
Summary documents	[ ]	Well data	[ ]
Facility SOPs	[ ]	Construction data	[ ]
OTHER	[X] 19,20		

Question 8. **Is there evidence that this hazardous substance/constituent is present at the source as it exists today? If so, describe the evidence.**

Block 1 Answer:

There is no evidence that a source exists at the site. Although it was confirmed that approximately 1.32 Troy ounces of silver was released from the Fuel Assembly and Storage Building (FASB) to the Sanitary Waste Lift Station, it has not been verified whether the silver was discharged to the sanitary lagoons or if it remained in the lift station. However, risk based calculations show that the estimated silver concentration for the given amount (1.32 Troy oz.) is well below that required to exceed a risk greater than 1×10^{-6}. Furthermore, photoprocessing was discontinued at FASB in 1981 and subsequently, there has been no further releases to the lift station.

Rare discharges into the lagoons of medical treatment radioactive isotopes have occurred, but periodic sampling of the lagoons confirm that there is no impact on the contamination of the lagoons.

Block 2 How reliable is/are the information source/s? X High _Med _Low (check one)
Explain the reasoning behind this evaluation.

Information is obtained from sampling data and silver concentration calculations.

Block 3 Has this INFORMATION been confirmed? X Yes _No (check one)
If so, describe the confirmation.

This information is confirmed by ANL-W Analytical Lab, CFA and Elon Wood Jr., former manager of FASB.

Block 4 Sources of Information (check appropriate box/es & source number from reference list)

No available information	[ ]	Analytical data	[X] 10
Anecdotal	[X] 18	Documentation about data	[X] 13
Historical process data	[ ]	Disposal data	[X] 12
Current process data	[ ]	Q.A. data	[ ]
Areal photographs	[ ]	Safety analysis report	[ ]
Engineering/site drawings	[ ]	D&D report	[ ]
Unusual Occurrence Report	[ ]	Initial assessment	[ ]
Summary documents	[ ]	Well data	[ ]
Facility SOPs	[ ]	Construction data	[ ]
OTHER	[X] 19,20		

REFERENCES

1. Initial Assessment Form, 10/15/86

2. Engineering Standards For U. S. Atomic Energy Commission, Idaho Operations Office, Idaho Falls, Idaho (as revised May, 1960)

3. Letter, H.A. Flaugher to File, "Sewage Disposal System - EBR-II," 3/12/64

4. Preliminary Proposal for the Idaho-East Area Sanitary and Industrial Waste-Disposal Expansion for Argonne National Laboratory, 5/25/65

5. Letter, R.P. Hearn to Distribution, "ANL-West Sanitary Sewage Treatment Expansion Preliminary Proposal," 1/16/74

6. Scope of Work for Argonne-West Sanitary Sewage Treatment Expansion Facility No.779 (various sections), July 18, 1974, Document No. W7790-0104-SA-00

7. Letter, R.P. Hearn to R.J. Teunis, "Sanitary Sewage Treatment Expansion, Facility #779," 11/21/74

8. Water Quality Criteria for Sanitary Lagoons

9. Letter, L.C. Witbeck to C.E. Clark, "ANL-W Environmental Sampling and Analysis Information," 2/1/88

10. Argonne National Laboratory-West 1992 Environmental Surveillance Report (selected pages)

11. ANL-W ESH Manual, "Sanitary Lagoon Environmental Sampling Procedure," (Section IX, Chapter 25), December 1990

12. Waste Management Data, Plant Services, ANL-West (Jan.1991 - Dec.1991)

13. INEL Groundwater Monitoring Plan (selected pages)

14. Memo of Conversation, Jennifer Fedder with Bill Stevens, 9/15/92

15. ANL-W 779 Seepage Test, D.R. Braun, November 1992

16. Review Comment Response, 1/5/93

17. Environmental Sample Summary, 2/3/93 and 2/5/93

18. Memo of Conversation, Ed Kennedy with Elon Wood Jr., 2/5/93

19. Silver Concentration Calculations (J. Fedder, 3/18/93)

20. Track 1 Risk Evaluation for Industrial Waste Lift Station, 2/23/93

21. Engineering Drawings: W7790-0103-DD-01 (pages 1-4 of 4)
IPE-779-1 (pages 4,5 of 9)

REFERENCE 1

Initial Assessment Form, 10/15/86

INITIAL ASSESSMENT FORM

I. SITE NAME AND LOCATION

01 SITE NAME	02 ADDRESS
Sewage Lagoons	Idaho National Engineering Laboratory (INEL)

03 CITY	04 STATE	05 ZIP CODE	06 COUNTY
Scoville	Idaho	83403	Bingham

09 COORDINATES: NORTH	EAST	07 COUNTY CODE	08 CONG. DIST.
704,450	370,870	2	2nd

10 DIRECTIONS TO SITE (Starting from nearest public road) West of Idaho Falls, Idaho on U.S. Highway 20 for 30 miles (48 km) then 4 miles (6 km) north on Taylor Blvd.

II. OWNER/OPERATOR

01 OWNER (If known)	02 STREET ADDRESS		
Department of Energy (DOE)	785 DOE Place		
03 CITY	**04 STATE**	**05 ZIP CODE**	**06 TELEPHONE NUMBER**
Idaho Falls	Idaho	83402	(208) 526-1122
07 OPERATOR (If known)	**08 STREET ADDRESS**		
Argonne National Laboratory	Taylor Blvd.		
09 CITY	**10 STATE**	**11 ZIP CODE**	**12 TELEPHONE NUMBER**
Scoville	Id.	83403	208-526-7625

III. CHARACTERIZATION OF POTENTIAL HAZARD

01 ON SITE INSPECTION __ YES X NO DATE __/__/__

02 SITE STATUS (Check one)

X A. Active SWMU __ B. Inactive __ C. Unknown

03 YEARS RECEIVED HAZ WASTE

None / Start Stop Unknown

04 DESCRIPTION OF SUBSTANCES POSSIBLY PRESENT, KNOWN, OR ALLEGED
See Waste Information Section

05 DESCRIPTION OF POTENTIAL HAZARD TO ENVIRONMENT AND/OR POPULATION
See Hazardous Conditions and Incidents Section

IV. INFORMATION AVAILABLE FROM

01 CONTACT	02 OF (Agency/Org.)	03 TELEPHONE NUMBER
Clifford Clark	DOE-ID	(208) 526-1122

04 PERSON RESPONSIBLE FOR ASSESSMENT	05 AGENCY	06 ORG.	07 TELEPHONE NUMBER
L. C. Witbeck	ANL-W	Safety, Security & Safeguards	208-526-7537

08 DATE 10 / 15 / 86
Mon Day Year

WASTE INFORMATION

I. WASTE STATES, QUANTITIES, AND CHARACTERISTICS

01 PHYSICAL STATES (Check all that apply)

__A. Solid
__B. Powder Fines
X C. Sludge
__D. Other _____
__E. Slurry
X F. Liquid
__G. Gas

02 WASTE QUANTITY AT SITE

TONS _____
CUBIC YARDS 14,850
NO. OF DRUMS _____

03 WASTE CHARACTERISTICS (Check all that apply)

__A. Toxic
__B. Corrosive
__C. Radioactive
__D. Persistent
__E. Soluble
__F. Infectious
__G. Flammable
__H. Ignitable
__I. Highly Volatile
__J. Explosive
__K. Reactive
__L. Incompatible
X M. Not Applicable

II. WASTE TYPE

CATEGORY	SUBSTANCE NAME	01 GROSS AMOUNT	02 UNIT	COMMENTS
SLU	Sludge	N/A	N/A	N/A
OLW	Oily Waste			
SOL	Solvents			
PSD	Pesticides			
OCC	Other organic chemicals			
IOC	Inorganic chemicals			
ACD	Acids			
BAS	Bases			
MES	Heavy metals			

III. HAZARDOUS CONSTITUENTS

01 CATEGORY	02 SUBSTANCE NAME	03 CAS NUMBER	04 STOR/DISP METHOD	05 CONC.	06 MEASURE
N/A	N/A	N/A	N/A	N/A	N/A

IV. SOURCES OF INFORMATION

Use specific references, e.g., state titles, sample analysis reports, etc.
Site inspections, personnel interviews, process records, laboratory records.

HAZARDOUS CONDITIONS AND INCIDENTS

I. HAZARDOUS CONDITIONS AND INCIDENTS

01 __ A. GROUNDWATER CONT. 02 __ OBSERVED (Date _____) __ POTENTIAL
03 NARRATIVE DESCRIPTION: __ ALLEGED

Not Applicable

01 __ B. SURFACE WATER CONT. 02 __ OBSERVED (Date _____) __ POTENTIAL
03 NARRATIVE DESCRIPTION: __ ALLEGED

Not Applicable

01 __ C. CONTAMINATION OF AIR 02 __ OBSERVED (Date _____) __ POTENTIAL
03 POULATION POTENTIALLY AFFECTED 688 04 NARRATIVE DESCRIPTION __ ALLEGED

Not Applicable

01 __ D. FIRE/EXPLOSIVE CONDITIONS 02 __ OBSERVED (Date _____) __ POTENTIAL
03 POPULATION POTENTIALLY AFFECTED 688 04 NARRATIVE DESCRIPTION __ ALLEGED

Not Applicable

01 __ E. DIRECT CONTACT 02 __ OBSERVED (Date _____) __ POTENTIAL
03 POPULATION POTENTIALLY AFFECTED 688 04 NARRATIVE DESCRIPTION __ ALLEGED

Not Applicable

01 __ F. CONTAMINATION OF SOIL 02 __ OBSERVED (Date _____) __ POTENTIAL
03 NARRATIVE DESCRIPTION: __ ALLEGED

Not Applicable

01 __ G. DRINKING WATER CONTAMINATION 02 __ OBSERVED (Date _____) __ POTENTIAL
03 NARRATIVE DESCRIPTION: __ ALLEGED

Not Applicable

HAZARDOUS CONDITIONS AND INCIDENTS

I. HAZARDOUS CONDITIONS AND INCIDENTS (Continued)

01 __ J. DAMAGE TO FLORA 02 __ OBSERVED (Date _____) __ POTE __ ALLEGED
04 NARRATIVE DESCRIPTION:

Not Applicable

01 __ K. DAMAGE TO FAUNA 02 __ OBSERVED (Date _____) __ POTENTI __ ALLEGED
04 NARRATIVE DESCRIPTION: (include name(s) of species)

Not Applicable

01 __ L. CONTAMINATION OF FOOD CHAIN 02 __ OBSERVED (Date _____) __ POTENTIAL __ ALLEGED
04 NARRATIVE DESCRIPTION:

Not Applicable

01 __ M. UNSTABLE CONTAINMENT OF WASTES 02 __ OBSERVED (Date _____) __ POTENTIAL
(SPILL RUNOFF, STANDING LIQUIDS/LEAKING DRUMS) __ ALLEGE
03 NARRATIVE DESCRIPTION:

Not Applicable

01 __ N. DAMAGE TO OFFSITE PROPERTY 02 __ OBSERVED (Date _____) __ POTENTIAL __ ALLE
04 NARRATIVE DESCRIPTION:

Not Applicable

01 __ O. CONTAMINATION OF SEWERS,STORM DRAINS, WWTPs 02 __ OBSERVED(Date _____) __ POTENTIAL __ ALLEGED
04 NARRATIVE DESCRIPTION:

Not Applicable

01 __ P. ILLEGAL/UNAUTHORIZED DUMPING 02 __ OBSERVED (Date _____) __ POTENTIAL __ ALLEGED
04 NARRATIVE DESCRIPTION:

Not Applicable

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL OR ALLEGED HAZARDS

None

III. COMMENTS None

IV. SOURCES OF INFORMATION (List specific references, e.g., state files, sample analysis, reports)
Site inspections, personnel interview, disposal quantity records, ANL-West Installation Assessment Report, USGS Report IDO-22053 TID-4500 The Influence of Liquid Waste Disposal on the Geochemistry of Water at the NRTS.

SURFACE WATER ROUTE WORKSHEET

RATING FACTOR	ASSIGNED VALUE (Circle one)	MULTI-PLIER	SCORE Ø	MAX. SCORE	REF. Section
					4.2
1.ROUTE CHARACTERISTICS					
Facility Slope and Intervening Terrain	(0) 1 2 3	1	0	3	
1-yr. 24-hr. Rainfall	0 (1) 2 3	1	1	3	
Distance to Nearest Surface Water	(0) 1 2 3	2	0	6	
Physical State	0 1 2 (3)	1	3	3	
Total Route Characteristics Score			4	15	
2.CONTAINMENT	(0) 1 2 3	1	0	3	4.3
3.WASTE CHARACTERISTICS					4.4
Toxicity/Persistence	(0) 3 6 9 12 15 18	1	0	18	
Hazardous Waste Quantity	(0) 1 2 3 4 5 6 7 8	1	0	8	
Total Waste Characteristics Score			0	26	
4. Multiply lines 1 x 2 x 3			0	1170	
5. Divide line 4 by 1170 and multiply by 100		Ssw=	0		

AIR ROUTE WORKSHEET

RATING FACTOR	ASSIGNED VALUE (Circle one)	MULTI-PLIER	SCORE	MAX. SCORE	REF. Section
1. HISTORIC RELEASE	(0) 45	1	O	45	5.1
Date and Location: See attached supplement pages					
If line 1 is 0, the Sa = 0. Enter on line 5. If line 1 is 45, then proceed to line 2.					
2. WASTE CHARACTERISTICS					5.2
Reactivity and Incompatibility	0 1 2 3	1		3	
Toxicity	0 1 2 3	3		9	
Hazardous Waste Quantity	0 1 2 3 4 5 6 7 8	1		8	
Total Waste Characteristics Score				20	
3. TARGETS					5.3
Population within 4-mile Radius	0 9 12 15 18 21 24 27 30	1		30	
Distance to Sensitive Environment	0 1 2 3	2		6	
Land Use	0 1 2 3	1		3	
Total Target Scores				39	
4. Multiply lines 1 x 2 x 3			O	35100	
5. Divide line 4 by 35100 and multiply by 100 Sa = O					

PRIORITY RANKING SYSTEM

I. GENERAL FACILITY INFORMATION

FACILITY NAME: Sewage lagoons

LOCATION: Idaho National Engineering Laboratory

POINT OF CONTACT: NAME: Argonne National Laboratory-West

ADDRESS: Scoville, Idaho 83403

PHONE: 526-7625

REVIEWER: Michael J. Holzemer DATE: 10/15/86

II. GENERAL FACILITY DESCRIPTION

GENERAL DESCRIPTION OF THE FACILITY: (For example: landfill, surface impoundment, pile, container; types of hazardous substances; location of facility; contamination route of major concern; types of information needed for rating; agency action, etc.)

The sewage lagoons receive waste water from restrooms, change facilities, drinking fountains and the Cafeteria. There are three open lined ponds having a combined area of $9.3 \times 10^{3}\ m^{2}$ (2.3 acres). The bottom of each pond is scaled with Betonite clay to minimize seepage to the underlying basalt strata. The two smaller ponds were constructed in 1965 and the large pond in 1975. Effluent treatment is by biochemical decomposition.

III. SCORES

SM = 0 (Sgw= 0 Ssw= 0 Sa= 0)

SFE = 0

SDC = 0

GROUND WATER ROUTE WORKSHEET

RATING FACTOR	ASSIGNED VALUE (Circle one)	MULTI-PLIER	SCORE Ø	MAX. SCORE	REF. Section
					3.2
1. ROUTE CHARACTERISTICS					
Depth to Aquifer of Concern	(0) 1 2 3	2	0	6	
Net Precipitation	(0) 1 2 3	1	0	3	
Permeability of the Unsaturated Zone	0 1 2 (3)	1	3	3	
Physical State	0 1 2 (3)	1	3	3	
Total Route Characteristics Score			6	15	
2. CONTAINMENT	(0) 1 2 3	1	0	3	3.3
3. WASTE CHARACTERISTICS					3.4
Toxicity/Persistence	(0) 3 6 9 12 15 18	1	0	18	
Hazardous Waste Quantity	(0) 1 2 3 4 5 6 7 8	1	0	8	
Total Waste Characteristics Score			0	26	
4. Multiply lines 1 x 2 x 3			0	1170	
5. Divide line 4 by 1170 and multiply by 100		Sgw=	0		

	S	S^2
GROUNDWATER ROUTE SCORE (Sgw)	o	o
SURFACE WATER ROUTE SCORE (Ssw)	o	o
AIR ROUTE SCORE (Sa)	o	o
$Sgw^2 + Ssw^2 + Sa^2$		o
$SQR(Sgw^2 + Ssw^2 + Sa^2)$		o
$SQR(Sgw^2 + Ssw^2 + Sa^2)/1.73 = SM$		o

DOCUMENTATION RECORDS
FOR
HAZARD RANKING SYSTEM

INSTRUCTIONS: As briefly as possible, summarize the information you used to assign the score for each factor (e.g., "Waste quantity = 4,230 drums plus 800 cubic yards of sludges"). The source of information should be provided for each entry and should be a bibliographic-type reference. Include the location of the document.

FACILITY NAME: Sewage Lagoon

LOCATION: Argonne National Laboratory-West/Idaho National Engineering Laboratory

DATE SCORED: 10/15/86

PERSON SCORING: Michael J. Holzemer

PRIMARY SOURCE(S) OF INFORMATION:

1. Personnel interviews
2. System drawings
3. 40 CFR 300, App. A
4. Sax, "Dangerous Properties of Industrial Materials", sixth edition

FACTORS NOT SCORED DUE TO INSUFFICIENT INFORMATION:

COMMENTS OR QUALIFICATIONS:

From interviews with Plant Services' Manager, who has responsibility for this system and personnel from facilities at ANL-W, there is no indication of any hazardous substances or hazardous wastes ever discarded in these ponds via the sanitary waste system.

GROUNDWATER ROUTE

1. OBSERVED RELEASE - Undertake Corrective Action

Contaminants detected (3 maximum):

No observed release

Rationale for attributing the contaminants to the facility:

Not Applicable

2. ROUTE CHARACTERISTICS

Depth to Aquifer of Concern

Name/description of aquifer(s) of concern:
Snake River Plain Aquifer

Depth(s) from the ground surface to the highest seasonal level of the saturated zone [water table(s)] of the aquifer of concern:

640 feet

Depth from the ground surface to the lowest point of waste disposal/ storage:

6 feet

Net Precipitation

Mean annual or seasonal precipitation (list months for seasonal):

9.07 inches

Mean annual lake or seasonal evaporation (list months for seasonal):

36 inches

Net precipitation (subtract the above figures):

- 26.93 inches

Permeability of Unsaturated Zone

Soil type in unsaturated zone:

An interbedded sequence of basaltic lava flows and sedimentary deposits.

Permeability associated with soil type:

10^{-7} to 10^{-3} cm/sec

Physical State

Physical state of substances at time of disposal (or at present time for generated gases):

Sludge and liquid

3. CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

Ponds lined with Betonite clay to minimize seepage

Method of highest score:

The above method has the highest score. Since this containment is an aritifical means that is used to minimize or prevent a containment (raw sewage) from entering ground water, a containment score of zero was assigned. In addition, investigation shows no hazardous substances disposed in this system.

4. WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated:

Sewage

Compound with highest score:

Sewage

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

None

Basis of estimating and/or computing waste quantity:

Containment score of zero

Identifying Release	Yes	No
1. Potential for Groundwater Releases from the Unit		
o Unit type and design		
- Does the unit type (e.g., land-based) indicate the potential for release?	X	___
- Does the unit have engineered structures (e.g., liners, leachate collection systems, proper construction materials) designed to prevent releases to groundwater?	X	___
o Unit operation		
- Does the unit's age (e.g., old unit) or operating status (e.g., inactive, active) indicate the potential for release?	X	___
- Does the unit have poor operating procedures that increase the potential for release?	___	X
- Does the unit have compliance problems that indicate the potential for a release to groundwater?	___	X
o Physical condition		
- Does the unit's physical condition indicate the potential for release (e.g., lack of structural integrity, deteriorating liners, etc.)?	X	___
o Locational characteristics		
- Is the unit located on permeable soil so the release could migrate through the unsaturated soil zone?	X	___
- Is the unit located in an arid area where the soil is less saturated and therefore a release has less potential for downward migration?	___	X
- Does the depth from the unit to the uppermost aquifer indicate the potential for release?	___	X

	Yes	No
- Does the rate of groundwater flow greatly inhibit the migration of a release from the facility?	___	X
- Is the facility located in an area that recharges surface water?	___	X
o Waste characteristics		
- Does the waste in the unit exhibit high or moderate characteristics of mobility (e.g., tendency not to sorb soil particles or organic matter in the unsaturated zone)?	___	X
- Does the waste exhibit high or moderate levels of toxicity?	___	X
2. Evidence of Groundwater Releases		
o Existing groundwater monitoring systems		
- Is there an existing system?	___	X
- Is the system adequate?	N/A	N/A
- Are there recent analytical data that indicate a release?	___	X
o Other evidence of groundwater releases		
- Is there evidence of contamination around the unit (e.g., discolored soils, lack of or stressed vegetation) that indicates the potential for a release to groundwater?	___	X
- Does local well water or spring water sampling data indicate a release from the unit?	___	X
Determining the Relative Effect of the Release on Human Health and the Environment		
1. Exposure Potential		
o Conditions that indicate potential exposure		
- Are there drinking water well(s) located near the unit?	___	X
- Does the direction of groundwater flow indicate the potential for hazardous constituents to migrate to drinking water wells?	___	X

SURFACE WATER ROUTE

1. OBSERVED RELEASE - Undertake Corrective Action

Contaminants detected in surface water at the facility or downhill from it (3 maximum):

No observed release

Rationale for attributing the contaminants to the facility:

Not Applicable

2. ROUTE CHARACTERISTICS

Facility Slope and Intervening Terrain

Average slope of facility in percent:

Name/description of nearest downslope surface water:

Big Lost River

Average slope of terrain between facility and above cited surface water body in percent:

Less than 3 percent

Is the facility located either totally or partially in surface water?

No

Is the facility completely surrounded by areas of high elevation?

Yes

1-year 24-Hour Rainfall in Inches

less than 2 inches

Distance to Nearest Downslope Surface Water

12 Miles

Physical State of Waste

Sludge and liquid

3. CONTAINMENT

Containment

Method(s) of waste or leachate containment evaluated:

None, intervening terrain precludes runoff from entering surface water

Method with highest score:

Assigned containment score of zero per 40 CFR 300, App. A, Section 4.3, table 9

4. WASTE CHARACTERISTICS

Toxicity and Persistence

Compound(s) evaluated

Sewage

Compound with highest score:

Sewage

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility, excluding those with a containment score of 0 (Give a reasonable estimate even if quantity is above maximum):

None

Basis of estimating and/or computing waste quantity:

Containment score of zero

Checklist for Surface Water/Surface Drainage Releases

	Yes	No
Identifying Releases		
1. Potential for Surface Water/Surface Drainage Release from the Facility		
o Proximity to Surface Water and/or to Off-site Receptors		
- Could surface run-off from the unit reach the nearest downgradient surface water body?	___	X
- Could surface run-off from the unit reach off-site receptors (e.g., if facility is located adjacent to populated areas and no barrier exists to prevent overland surface run-off migration)?	___	X
o Release Migration Potential		
- Does the slope of the facility and intervening terrain indicate potential for release?	___	X
- Is the intervening terrain characterized by soils and vegetation that allow overland migration (e.g., clayey soils, and sparse vegetation)?	___	X
- Does data on one-year 24-hour rainfall indicate the potential for area storms to cause surface water or surface drainage contamination as a result of run-off?	___	X
o Unit Design and Physical Condition		
- Are engineered features (e.g., run-off control systems) designed to prevent release from the unit?	X	___
- Does the operational history of the unit indicate that a release has taken place (e.g., old, closed or inactive unit, not inspected regularly, improperly maintained)?	___	X
- Does the physical condition of the unit indicate that releases may have occurred (e.g., cracks or stress factures in tanks or erosion of earthen dikes of surface impoundments)?	X	___

Checklist for Surface Water/Surface Drainage Releases

	Yes	No
o Waste Characteristics		
- Is the volume of discharge high relative to the size and flow rate of the surface water body?	___	X
- Do constituents in the discharge tend to sorb to sediments (e.g., metals)?	___	X
- Do constituents in the discharge tend to be transported downstream?	___	X
- Do waste constituents exhibit moderate or high characteristics of persistence (e.g., PCBs, dioxins, etc.)?	___	X
- Do waste constituents exhibit moderate or high characteristics of toxicity (e.g., metals, chlorinated pesticides, etc.)?	___	X
2. Evidence of Surface Water/Surface Drainage Releases		
o Are there unpermitted discharges from the facility to surface water that require an NPDES or a Section 404 permit?	___	X
o Is there visible evidence of uncontrolled run-off from units at the facility?	___	X
Determining the Relative Effect of the Release on Human Health and the Environment		
1. o Are there drinking water intakes nearby?	___	X
o Could human and/or environmental receptors come into contact with surface drainage from the facility?	___	X
o Are there irrigation water intakes nearby?	___	X
o Could a sensitive environment (e.g., critical habitat, wetlands) be affected by the discharge (if it is nearby)?	___	X

1. OBSERVED RELEASE

Contaminants detected:

No observed release

Date and Location of detection of contaminants:

Not Applicable

Methods used to detect the contaminants:

Not Applicable

Rationale for attributing the contaminants to the site:

Not Applicable

2. WASTE CHARACTERISTICS

Reactivity and Incompatibility

Most reactive compound:

Not Applicable

Most incompatible pair of compounds:

Not Applicable

Toxicity

Most toxic compound:

Sewage

Hazardous Waste Quantity

Total quantity of hazardous waste:

None

Basis of estimating and/or computing waste quantity:

No hazrdous waste identified every being disposed

Checklist for Air Releases

	Yes	No
Identifying Releases		
1. Potential for Air Releases from the Facility		
o Unit Characteristics		
- Is the unit operating and does is expose waste to the atmosphere?	X	___
- Does the size of the unit (e.g., depth and surface area) create a potential for air release?	X	___
o Does the unit contain waste that exhibits a moderate or high potential for vapor phase release?		
- Does the unit contain hazardous constituents of concern as vapor releases?	___	X
- Do waste constituents have a high potential for volatilization (e.g., physical form, concentrations, and constituent-specific physical and chemical parameters that contribute to volatilization)?	___	X
o Does the unit contain waste and exhibit site conditions that suggest a moderate or high potential for particulate release?		
- Does the unit contain hazardous constituents of concern as particulate releases?	___	X
- Do constituents of concern as particulate releases (e.g., smaller, inhalable particulates) have potential for release via wind erosion, reentrainment by moving vehicles, or operational activities?	N/A	N/A
- Are particulate releases comprised of small particles that tend to travel off-site?	N/A	N/A
o Do certain environmental and geographic factors affect the concentrations of airborne contaminants?		
- Do atmospheric/geographic conditions limit constituent dispersion (e.g., areas with atmospheric conditions that result in inversions)?	X	___
- Is the facility located in a hot, dry area?	___	X

	Yes	No
2. Evidence of Air Releases		
o Does on-site monitoring data show that releases have occurred or are occurring (e.g., OSHA data)?	___	X
o Have particulate emissions been observed at the site?	___	X
o Have there been citizen complaints concerning odors or observed particulate emissions from the site?	___	X

Determining the Relative Effect of the Release on Human Health and the Environment

1. Exposure Potential		
o Is a populated area located near the site?	X	___

Checklist for Subsurface Gas Releases

	Yes	No
Identifying a Release		
1. Potential for Subsurface Gas Releases		
o Does the unit contain waste that generates methane or generates volatile constituents that may be carried by methane (e.g., decomposable refuse/volatile organic wastes)?	X	___
o Is the unit an active or closed landfill or a unit closed as a landfill (e.g., surface impoundments and waste piles)?	___	X
2. Migration of Subsurface Gas to On-site or Off-site Buildings		
o Are on-site or off-site buildings close to the unit?	X	___
o Do natural or engineered barriers prevent gas migration from the unit to on-site or off-site buildings (e.g., low soil permeability and porosity hydrogeologic barriers/liners, slurry walls, gas control systems)?	___	X
o Do natural site characteristics or man-made structures (e.g., underground power transmission lines, sewer pipes/sand and gravel lenses) facilitate gas migration from the unit to buildings?	___	X
Determining the Relative Effect of the Release on Human Health and the Environment		
1. Exposure Potential		
o Does building usage (e.g., residential, commercial) exhibit high potential for exposure?	___	X

1. CONTAINMENT

Hazardous substances present:

No score was computed because neither a state or local fire marshal have certified that the facility presents a significant fire or explosion threat to the public or to sensitive environments.

Type of containment, if applicable:

Not Applicable

2. WASTE CHARACTERISTICS

Direct Evidence

Type of instrument and measurements:

Not Applicable

Ignitability

Compound used:

Not Applicable

Reactivity

Most reactive compound:

Not Applicable

Incompatibility

Most incompatible pair of compounds:

Not Applicable

Hazardous Waste Quantity

Total quantity of hazardous substances at the facility:

None

Basis of estimating and/or computing waste quantity:

No hazardous substances or hazardous waste disposed in this system

3. TARGETS

Distance to Nearest Population

1,000 feet (T-12)

Distance to Nearest Building

1,000 feet (T-12)

Distance to Sensitive Environment

Distance to wetlands:

Greater than 100 feet

Distance to critical habitat:

Greater than 1/2 mile

Land Use

Distance to commercial/industrial area, if 1 mile or less:

The INEL is a research facility. There are no commercial/ industrial facilities within 1 mile.

Distance to national or state park, forest, or wildlife reserve, if 2 miles or less:

Greater than 2 miles

Distance to residential area, if 2 miles or less:

Greater than 2 miles

Distance to agricultural land in production within past 3 years, if 1 mile or less:

Greater than 1 mile

Distance to prima agricultural land in production within past 3 years, if 2 miles or less:

Greater than 2 miles

If a historic or landmark site (National Register or Historic Places and National Natural Landmarks) within the view of the site?

Big Southern Butte

Population Within 2-Mile Radius

688 employees at ANL-W

Buildings Within 2-Mile Radius

See attached plot plan

DIRECT CONTACT

1. OBSERVED INCIDENT

Date, location, and pertinent details of incident:

No observed incident

2. ACCESSIBILITY

Describe type of barrier(s):

Security guards

3. CONTAINMENT

Type of containment, if applicable:

These are open sanitary ponds

4. WASTE CHARACTERISTICS

Toxicity

Compounds evaluated:

Sewage

Compound with highest score:

Sewage

5. TARGETS

Population within one-mile radius

688 employees at ANL-W

Distance to critical habitat (of endangered species)

Greater than 1 mile

REFERENCE 2

Engineering Standards for U.S. Atomic Energy Commission, Idaho Operations Office, Idaho Falls, Idaho (as revised May 1960) (selected pages)

ENGINEERING STANDARDS

FOR

U. S. ATOMIC ENERGY COMMISSION

IDAHO OPERATIONS OFFICE

Idaho Falls, Idaho

As Revised May, 1960

DESIGN (Cont'd)

2. Special Criteria (Cont'd)

d. Sanitary (Cont'd)

(2) Sewerage and Sewage Treatment Systems (Cont'd)

(b) Treatment Requirements (Permanent Installations)

(1[1]) Installations serving 1 to 60 people. Septic tanks to be used (sized for 24 hours retention).

Precast concrete or metal septic tanks are permissible if of adequate size and design. A maximum of three such tanks installed in series is acceptable provided the total volume of the three tanks is equal to or larger than that required for a single tank.

Septic tank effluent must be chlorinated.

Disposal of septic tank effluent permissible:

(a[1]) Into leaching pits or basins: (Recommended in porous soils). Size of leaching pit or basin to be determined from percolation studies or from previous usage data for the area involved.

(b[1]) Into subsurface disposal beds (fields): Distribution boxes required, with length and size of field designed from percolation tests. This method has limited usage.

(c[1]) Into disposal well which goes directly to the water table: This disposal method permissible only in limited areas (impervious soils) and then only if the effluent is filtered before being discharged to the well. (Filters designed on sludge drying bed criteria).

Effluent to the filter and well shall be strongly chlorinated, fed at a rate to produce chlorine residuals of one ppm or more after a 20 minute contact time.

(2[1]) Installations serving 50 to 200 people. Imhoff tanks, Clarigesters or similar type units, or primary sedimentation with separate slude digestion facilities (heated) shall be used.

DESIGN (Cont'd)

2. Special Criteria (Cont'd)

d. Sanitary (Cont'd)

(2) Sewerage and Sewage Treatment Systems (Cont'd)

(b) Treatment Requirements (Permanent Installations) (Cor

(2^1) (Cont'd)
Treatment of effluent from the above units shall be similar to that required for treatment of effluent from septic tanks.

Effluent from these units must be chlorinated.

(3^1) Installations serving over 200 people. Complete treatment to be used. Primary units may be Imhoff Tanks, Clarigesters or equivalent units, or plain settling tanks with separate sludge digestion.

Secondary units may be standard rate trickling filters, or high rate trickling filter with secondary settling (sedimentation) tanks, or intermittent sand filters. It is advisable that filter unit be designed with covers because of the severe winter conditions.

Activated sludge type treatment facilities are not recommended because of the large fluctuation in sewage flows normally encountered. If Imhoff Tanks, or Clarigesters, etc., are not used, separate sludge digestion facilities will be required. Heating of separate sludge digestion units is desirable.

(4^1) Installations serving 50 to 1000 people. Lagoons (oxidation ponds) are permissible for use in areas having impervious type soils. Approval for their use on any site location must be obtained from IDO.

/R

Design of lagoons to follow design criteria as stated in Appendix J.

(c) The American Standard Plumbing Code ASA-A40-8 latest revision, shall be used as guides in the installatior of all plumbing or plumbing systems.

DESIGN (Cont'd)

2. Special Criteria (Cont'd)

d. Sanitary (Cont'd)

(2) Sewerage and Sewage Treatment Systems (Cont'd)

(d) Standard plans for sewer manholes and covers are shown on IDO Drawing No. Misc. -301-IDO-7, listed in Appendix F. Minimum sewer depth shall be five feet. Manhole spacing shall not exceed 400 feet for sewers smaller than 18 inches in diameter and 600 feet for sewers 18 inches or larger in diameter. Minimum size of sewer mains shall be eight inches. Concrete pipe shall be used for all sewer and drain lines over 18 inches in diameter, except in buildings. Bell and spigot vitrified clog sewer pipes shall be used for sewer lines 18 inches in diameter and smaller unless otherwise approved by IDO.

/R
/R

e. Heating, Ventilating and Mechanical

(1) Outside design temperatures shall be minus 20°F. for heating loads and 91°F. dry bulb; 55°F. wet bulb for cooling loads. Total annual degree days is 8500.

/R

(2) All preheat coils shall be sized to suit the outside design temperature of -20°F. but should be installed and protected so they will not freeze up during relatively short periods of air temperatures as low as -45°F. Do not oversize as this increases their susceptability to freezing in mild weather. Arrange ductwork and piping as follows:

(a) Recirculation minimizes freeze-up and should be provided on all systems where it will not spread contamination or objectionable fumes. Return air should be introduced far enough upstream so it will be thoroughly mixed with the fresh air by the time it reaches the preheat coil. If this is not possible mixing baffles must be provided to prevent air stratification.

(b) Each preheat coil shall be provided with a two-position steam control valve in parallel with the modulating valve. An outside air thermostat shall be installed to hold this valve open at all times when the outside air temperature is +35°F. or lower.

Appendix

SUGGESTED MINIMUM DESIGN CRITERIA FOR SEWAGE LAGOONS OR OXIDATION PONDS

Results and observations of experimental lagooning of domestic sewage in several states indicate that the process has application as a practicable method of waste treatment. Lagoons have proven effective in handling domestic sewage from small communities. Significant amounts of trade wastes admixed with domestic sewage have also been treated without difficulty in many instances.

During summer months, lagoon performance shows 80 to 90 percent reductions in unstable organic matter (BOD), exceedingly high reductions in coliform counts, and supersaturated dissolved oxygen conditions. Aerobic conditions exist when there is no ice cover. Anaerobic conditions are common during late winter and early spring before the ice breaks up; ice coverage minimized odor problems during this critical period and treatment has been indicated to be as much as 65 percent BOD reduction under such conditions.

To date, experiences of consulting engineering firms and water pollution control agencies indicate that certain basic design and construction features must be incorporated in the facilities if effective treatment is to be accomplished. The following standards may be considered of a tentative nature; constructive criticism relating to additions, changes and deletions is requested.

1. GENERAL

1.1 Original useable land acquisition should be not less than one (1) surface acre per one-hundred (100) population or population equivalent, or provide for a detention period of 200 days with a maximum depth of five feet, whichever is greater.

1.2 Only one lagoon need be provided; however, multiple cells in parallel may be utilized to permit more operational flexibility and to maintain optimum liquid levels during both wet and dry cycles.

1.3 Overflowing lagoons (minimum detention, 30 days) may be employed where local conditions and water uses do not negate their development; if an overflowing lagoon is proposed, the original useable land acquisition should be the same as set forth in 1.1 above, to provide space for future expansion or enlargement. These should be considered in a different category from other lagoons.

1.4 The lagoon area should be adequately fenced with a stock-tight fence.

1.5 Appropriate signs should be provided to designate the nature of the facility.

1. GENERAL (Cont'd)

1.6 Lagoon areas should be so shaped that the maximum radius of influence - that distance from the discharge end of the influent pipe to the bank - is obtained, the direction of the prevailing winds not withstanding.

2. LOCATION

2.1 Lagoons should be located approximately 1/4 mile or more from nearest isolated habitation.

2.2 If practicable, lagoons should be located so that local prevailing winds carry possible odors in the direction of non-inhabited areas.

2.3 Locating lagoons in watersheds receiving a significant amount of runoff water is discouraged unless adequate provisions are made for storm water to by-pass the lagoon.

2.4 Proximity of lagoons to wells and underground sources of water supply subject to contamination should be critically evaluated to avoid creation of health hazards and other undesirable conditions. Gravel and limestone are to be avoided unless sealed by an impervious layer.

3. EMBANKMENT AND DIKES

3.1 An embankment of compacted impervious material should be constructed.

3.2 Minimum embankment top width should be 10 feet.

3.3 Maximum embankment slopes should not be steeper than:

(a) Inner, 2-1/2 horizontal to 1 vertical.

(b) Outer, 2 horizontal to 1 vertical.

3.4 Minimum embankment slopes should not be flatter than:

(a) Inner, 4 horizontal to 1 vertical.

(b) Outer, not applicable, except that significant volumes of surface water should not enter lagoon.

3.5 Minimum freeboard should be three feet, plus frost heave.

3.6 Minimum liquid depth should be three feet.

3. EMBANKMENT AND DIKES (Cont'd)

3.7 Maximum normal liquid depth should be five feet. Lagoons with surface areas greater than 10 acres; special consideration will be given to the use of maximum liquid depth greater than five feet.

3.8 Provision should be made for protection of the embankments against all types of corrosion.

4. LAGOON BOTTOM

4.1 The lagoon bottom should be as level as possible at all points. Shallow or feathering fringe areas result in unsatisfactory treatment.

4.2 The bottom should be cleared of all vegetation and debris. Organic material cleared from bottom should not be used in embankment construction.

4.3 Soil formations should be relatively tight to avoid high liquid losses through percolation or seepage. High percolation losses will result in sludge exposures and odor problems. It may be necessary to seal the bottom with bentonite or soil cement.

5. INFLUENT LINES

5.1 Any generally accepted material for lagoon piping will be given consideration, but the material selected should be adapted to local conditions, special consideration being given to the character of the wastes, possibilities of septicity, exceptionally heavy external loadings, abrasion, the necessity of reducing the number of joints, soft foundations and similar problems.

5.2 The influent line into single celled lagoons should be essentially center-discharging. Influent lines into the primary section of multiple-celled lagoons should be essentially center-discharging.

5.3 The discharge end of the influent pipe should be located approximately one foot above the bottom of the lagoon and should not extend to such elevation that ice (shifting) will damage the terminal structure during winter operation.

5.4 The end of the discharge line should rest on a suitable concrete apron, minimum size should be two feet square; larger aprons and proper influent piping supports are necessary to prevent ice damage.

5.5 Influent and effluent piping should, insofar as practicable, be located to minimize short circuiting within the lagoon.

5. INFLUENT LINES

5.6 Manholes or clean-outs are suggested where pipes pass through the embankment. The use of a tee, or wye, to permit pumping liquid from the lagoon to clean the pipe may be desirable.

6. DRAIN LINES

6.1 The lagoon drainage pipe valve should be provided with a lock. Cases have been known where unauthorized persons have opened drainage valves with serious consequences to the owner.

7. INTERCONNECTING PIPING AND OVERFLOWS

7.1 Interconnecting piping and overflows should be of cast iron pipe or corrugated metal pipe of ample size. Use of frost-proof overflow manholes or valve boxes for controlling liquid levels in the lagoon, is encouraged. Enlarged influent lines to such manholes or structures should be at least six to twelve inches off the bottom to control eroding velocities and avoid pick-up of bottom deposits.

7.2 Overflow lines should discharge onto anchored concrete slabs. These lines should be vented if siphoning is developed.

7.3 A suitable pipe should be provided to be employed as a siphon in emergencies that may occur because of overflow piping freeze-up or mechanical stoppages in overflows.

8. INDUSTRIAL WASTES

8.1 Lagoons for industrial waste require special planning and study of the site, and these suggested minimum standards do not apply.

/R

8.2 Lagooning of wastes containing excessive amounts of oil or other materials and wastes that impart a light color or colloidal content to the sewage should be reviewed by the Board of Health before the design phase is completed.

9. SOILS, PERCOLATION RATES AND GROUND WATER TABLES

9.1 The soil at the lagoon location and at the depth of the bottom of the lagoon should be analyzed and classed as a clay, sandy clay, loam, sandy loam, etc. The samples should be taken at several locations over the proposed areas.

9.2 The rate of percolation at any point in the lagoon or at any point in the dike should not exceed 1/4" per day. With percolation in excess of this rate, consideration should be given to reducing seepage by lining the lagoon and banks with bentonite or other relatively impervious material.

REFERENCE 3

Letter, H.A. Flaugher to File
"Sewage Disposal System - EBR-II,"
3/12/64

DATE March 12, 1964

SUBJECT Sewage Disposal System - EBR-II

FROM H. A. Flaugher

TO FILE

The purpose of this memo is to record the things that have transpired in the past few weeks and to record the present thinking with regard to the design of the subject item, as envisioned by the Schedule 44 entitled General Facilities Improvement-East Area, dated May, 1963.

During February, 1964, when the design of the Sewage Disposal System was started, it was suggested that the present Imhoff tank-leaching pit system be tied into the new system in order to provide for sewage disposal if the present disposal system should, for some reason, become incapable of handling the load.

It was known at that time that the Imhoff tank-leaching pit system was designed for 200 people and that it had been subjected to an overload population-wise for a considerable period of time; that is to say, there are approximately 300 people at this site, more than 200 of whom have been utilizing it for about a year. During this overload period it was reported that some offensive odors[1] were coming from the present Imhoff tank-leaching pit combination, and the feeling was that this system was severely overloaded[2]. This feeling was reinforced by the fact that the NRTS Engineering Standards for sewage-treatment systems serving over 200 people require a complete treatment, that is, both primary and secondary treatment[3], as well as some method of disposal of the effluent that has been chlorinated. Our system, of course, has only a primary treatment, which is chlorinated and then disposed of in the leaching pit.

To verify the need for this additional tie and to justify the size of the new facilities, tests were run on the present sewage-treatment system. These tests showed that the amount of raw sewage going through the sewage system was considerably less than the design criteria and considerably less than the criteria set down by the NRTS Standards. The NRTS Standards require that the sewage-treatment plant be designed for 50 gallons per day per capita. The present system was designed, according to the report issued by The H. K. Ferguson Company in July, 1957, for 200 people at 35 gallons per day per capita; however, this quantity was substantially increased until it became 35,600 gallons per day as the design quantity. The flow from the Imhoff tank to the leaching pit is so low that it does not rise in the weir high enough to be in the reliable area for measurement; therefore, measurements were taken by pumping cycle time. This showed that there was approximately 3,500 gallons per day of raw sewage going to the Imhoff tank, in other words, about one tenth of the design rate.

In addition to this test, additional water was put into the leaching pit to find out its capacity. Over the week end of March 7 and 8, approximately 40 gallons per minute was put into the leaching pit; and it handled this quantity of water without any apparent trouble.

There are at present approximately 300 people using the three sanitary sewage-disposal systems here at the site. Approximately 25 of these people are using the septic-tank-type sanitary facilities provided with Building 753. Approximately 30 people are using the septic tank-drainfield facilities provided with the Cafeteria. This leaves approximately 245 people who are presently using the Imhoff tank-leaching pit sewage-disposal facilities. Using the figure of 3500 gallons per day and 245 people, we are pumping to this system something slightly less than 15 gallons per person per day. This figure of 15 gallons per day per person seems to agree with the Smith and Loveless engineering data that is attached to Joe Auer's memo to D. F. Wood dated March 10, 1964. This presents the present situation, wherein the Imhoff tank-leaching pit sewage-treatment system is handling more than 200 people per day and, in so doing, is violating the requirements of the Idaho Operations Office design criteria on a population basis but is not violating the gallon-per-day criteria established by the same standards.

It has been decided, therefore, that we are to request, by way of a revised Schedule 44 for the utilities expansion, that money be provided to establish an additional sewage-disposal system that would handle the Cafeteria wastes, the wastes that originate in Building 753, and any future wastes that originate from the Office Addition on the south end of Building 752, the machine shop, or the AFSR-ZPPR complex. This sewage-treatment system will, more than likely, be a lagoon rather than an Imhoff tank, assuming that the lagoon is more economical and assuming that the treatment system will be placed north of the existing fence line in approximately the same location that an Imhoff tank-leaching pit combination was envisioned by the Schedule 44 dated May, 1963.

HAF:ds

1, 2, & 3 - Walt Persky reviewed this memo and his comments are on the attached sheet.

dors that are given off by the Imhoff tank are those of AN aerobic digestion process and are IN THIS CASE local, only anaerobic odors are considered "offensive". An Imhoff tank that has gone bad would give off hydrogen sulfide - which would with prevailing winds, be very evident every day. The existing system has often been criticized by persons who have mistaken the hydrogen sulfide gases which are released to this area atmosphere from the auxiliary boilers flue gas and the heated oil day tank.

(2) The system as it is at present is not loaded to capacity based on three important factors; (1) G.P.D. of sewage, (2) loading in gallons per 8 hour day and (3) strength of sewage.

(3) Secondary system an excellent idea.

Is the planned stabilization pond considered a primary system?

N. Pershing's Comments

REFERENCE 4

Preliminary Proposal for the Idaho-East Area Sanitary and Industrial Waste-Disposal Expansion for Argonne National Laboratory, 5/25/65

PRELIMINARY PROPOSAL

FOR

THE IDAHO-EAST AREA SANITARY AND INDUSTRIAL WASTE-

DISPOSAL SYSTEM EXPANSION

FOR

ARGONNE NATIONAL LABORATORY

AT

NATIONAL REACTOR TESTING STATION
IDAHO FALLS, IDAHO

May 25, 1965

A. General Description of Work

This proposal covers the construction of a 200-foot-square sewage lagoon located off the northeast corner of the EBR-II site, the installation of interconnecting sewer lines, and the abandonment of two septic tanks and drain fields.

B. Justification of Basic Need

There are at present a septic tank receiving sanitary waste from the Plant Services and Materials Handling buildings and a similar installation receiving waste from the sanitary facilities and the Cafeteria in the most recent addition to Building 752. The effluent from these two systems is discharged to their respective drain fields, which are of an undetermined, but in all probability a relatively short, life.

Consolidation of the wastes from these two systems in the east side of the EBR-II area to facilitate the abandonment of the septic systems is necessary at this time because these existing systems are located either directly under or contiguous to proposed new roadways, building extensions, or expansions to other underground utility systems. If the existing drain fields are not abandoned at this time, it will be necessary to locate all planned expansion farther from existing facilities, thereby increasing the cost of each enlarged system. It would also be necessary to provide individual industrial and/or sanitary disposal systems for the authorized facilities: the Zero Power Plutonium Reactor and the Inspection and Testing Facility, plus the proposed facilities; the Irradiated Fuel Examination Facility; the Materials Handling-Machine Shop complex; and the Office Addition to the Laboratory and Office Building.

The individual-disposal-system approach, in addition to necessitating the spreading of the facilities farther apart and increasing the cost of other utilities serving them, also creates the possibility of contamination of

PRELIMINARY ESTIMATE OF COST

FOR

PROPOSED SEWAGE LAGOON - IDAHO-EAST ARRA

May 25, 1965

		Amount
1. Engineering - Title II, Title III		$ 7,000
Argonne National Laboratory		
2. Construction		55,000
Utilities - Outdoor		
Sewage System		
3. Contingency		3,000
Engineering	$ 350	
Construction	2,650	
Total Project Cost		$ 65,000

the underground water strata. The single-disposal-unit approach allows more efficient utilization of existing facilities and eliminates the possibility of contamination of our underground water resources.

In addition to the above, it has been established that the present waste-disposal system serving the balance of the EBR-II complex is undersized and cannot be expected to accommodate the additional material from the planned new construction identified above. When EBR-II was planned, the sewage system was designed for a population of 200 persons. Current population of the area is more than 300 persons, and it is anticipated that this number will reach 400 by 1968. In order to accommodate the present population with the existing system, it has been necessary to by-pass the leaching pit with industrial waste and route it directly to a nearby low area in the desert, thereby reducing the volume of effluent handled.

Experience with existing sewage lagoons on the NRTS and in the surrounding area indicates the absence of obnoxious odors, which seem inherent in an Imhoff tank installation.

The proposed lagoon has been sized on the basis of a population of 200 persons at 35 gallons per day, no percolation, and a 120-day retention period. Provisions are made, however, to enlarge the installation to a two-pond system with the addition of minor piping and earthwork for additional dikes.

Operation will be by present Plant Services personnel.

No safety, fire, explosion, or radiation risks are anticipated in the proposed installation.

C. Existing Structures and Commercial-Industrial Sources

There are no existing structures, nor is there equipment available from commercial sources for this type of facility.

D. Preliminary Plans

Drawing No. IPE-X-750-4, entitled "Proposed Sewage Lagoon - EBR-II Area," dated February 26, 1964, indicates the location and general features of the proposed installation.

E. Outline Specifications

Dikes will be compacted earth. Dikes and botton of lagoon will be sealed with an asphaltic emulsion such as "Peneprime."

Piping will be vitrified clay and extra-strength cast iron with mechanical joints.

Pumps in lift station will be electrical duplex with approximately a 3 KVA loading.

F. Preliminary Estimate of Cost

The preliminary cost estimate is $65,000, as indicated on the attached Preliminary Estimate of Cost.

G. Proposed Starting and Completion Dates

	Start	Complete
Title II Design	June 15, 1965	July 15, 1965
Construction	August 15, 1965	October 31, 1965
Field Inspection	August 15, 1965	November 15, 1965

H. Proposed Method of Accomplishment

It is planned to accomplish the design work with Laboratory personnel and the construction work by Laboratory-administrated lump-sum contract, with field inspection performed by Laboratory personnel.

I. Source of Funds

The necessary funds are available from Budget Account No. 04-2-65-9-000-47.

REFERENCE 5

Letter, R.P. Hearn to Distribution
"ANL-West Sanitary Sewage Treatment Expansion
Preliminary Proposal," 1/16/74

ARGONNE
NATIONAL
LABORATORY

INTRA-LABORATORY MEMO

DATE: January 16, 1974

TO: Distribution

FROM: R. P. Hearn R P Hearn Manager, Site Engineering

SUBJECT: ANL-West Sanitary Sewage Treatment Expansion Preliminary Proposal

Transmitted herewith for your review and comments is the Preliminary Proposal for the above project.

You or your authorized representative are invited to attend an approval meeting which will be held in the Site Engineering Conference Room on January 29, 1974, at 2:00 P.M. Your approval signature may be requested at this meeting after all review comments have been discussed and resolved.

Unless we receive comments prior to the meeting and you are absent from the meeting, we will assume that you have no comments and approve the Preliminary Proposal.

RPH:MWJ:jl

Attachments

Distribution:

C. S. Abrams
J. W. Auer
R. L. Black
J. I. Burt ✓
E. D. Graham/L. Witbeck/F. J. Sommers/D. Helmer
M. W. Jackson
B. H. Johnson
W. C. Persky
R. J. Teunis
R. C. Watson
D. F. Wood
File S.R. 80733

Document Control No.

PRELIMINARY PROPOSAL

FOR

ANL-W SANITARY SEWAGE TREATMENT EXPANSION

FOR

ARGONNE NATIONAL LABORATORY

AT

NATIONAL REACTOR TESTING STATION

IDAHO FALLS, IDAHO

January 16, 1974

A. DESCRIPTION OF WORK

1. General

The ANL-West Sanitary Sewage Treatment Expansion consists of the construction of a 1-acre lagoon with impervious liner north of the present two lagoons, relocation of connecting pipes, installation of aeration equipment, and installation of cascades between the new and existing lagoons with alternate flow paths for summer and winter operations.

2. Detailed Description

The evaporation area of the existing evaporation lagoons will be expanded by the construction of an adjoining lined lagoon with an additional evaporation area of approximately one acre. The evaporation area fluctuates with changes of the level of the surface of the lagoon. The new construction will approximately double the present evaporation area. The new lagoon will require excavation of soil, placing of compacted fill around the lagoon area with a width suitable for operation of a vehicle if and when necessary.

The two existing lagoons and the new lagoon will be connected by concrete cascades which will permit some aeration of the liquid in moving between each lagoon. The cascade will consist of a reinforced concrete flat-bottom channel with cobblestones set in the concrete to increase the roughness. Thus each lagoon will be operated at a level such that the liquid flows over the cascade into the next lagoon.

Each lagoon will also be connected to the next in line with a culvert and headgate. This will require installation of a headgate between the two existing lagoons, and the installation of a culvert and headgate to the new lagoon. The lagoons will normally be operated with the

headgate closed and all liquid flowing over the cascade. Under severe winter conditions when there is hazard of the cascade building up with ice to the extent that the lagoon would overflow, the headgates would be opened to permit flow from one lagoon to the other below the ice surface lowering the level of the inlet lagoon.

A new inlet diverter will be installed over the existing pumped inlet line to assist in spreading and aerating the inlet flow. This diverter will consist of a steel grid supported on legs with steel bearing plates flat on the bottom of the existing lagoon lining. The diverter will be placed approximately 2 feet above the existing discharge point but below the surface of the lagoon. Surges of liquid mixed with air will be broken up as the surges impinge on the diverter. Where some of the openings in the diverter become clogged or reduced by a build-up of solid matter in the sewage, the air and sewage will be diverted over a wider area and eventually around the projecting edges of the diverter grid. The diverter will be replaceable.

Compressed air will be introduced into the pumped sewage line at the existing pump house. A small air compressor will be placed in the pump house and operated simultaneously with the sewage pump. The compressed air will assist in oxidation of the sewage to some extent and introduce turbulence at the discharge point in the existing lagoon assisting in the mixing action of the raw sewage with the material exposed to biodegradation in the lagoon.

The existing dirt and gravel roadway will be paved from the existing Security Fence line to the lagoon to provide all-weather access for surveillance, monitoring, and maintenance operations.

An animal-control fence will be placed around the lagoons to prevent access by stray cattle, sheep, antelope, and coyotes. It will be a five-foot-high wire mesh fence with no barbed wire and one manual truck gate.

3. Preliminary Plans

The following drawing is attached showing the principal features of the proposed construction:

Drawing No.

B. SAFETY CONSIDERATIONS

The proposed facility is basically a holding area for the evaporation of sewage to prevent the sewage being discharged to the underground water table approximately 600 feet below ground.

1. Analysis of Principal Hazards and Risks

a. Potential Injury and Property Damage

(1) Fire

None. There is no combustible construction proposed and no combustible fluids to be processed.

(2) Explosion

The likelihood of explosion occuring within this facility is considered nil.

(3) Radiation

Potential loss resulting from radiation is considered negligible. Radiation exposure would occur from radioactive contamination of sewage. Potential loss to this facility resulting from radiation emanating from adjacent facilities is discussed in the Hazard Summary Report, Experimental Breeder Reactor II, ANL-5719.

(4) Structural Failure

The potential for structural failure is very low from severe winds or ice conditions which could result in bank erosion.

(5) Seismic Activity

The potential loss due to seismic activity is negligible and would not result in any likelihood of personnel injury.

b. Predicted Consequences

(1) Fire

None.

(2) Explosion

None.

(3) Radiation

Uncontrolled release of radiation could cause severe personnel injury or even death. This includes not only operating personnel, but any other person within reach of the effects of radiation. It could also result in pollution of the immediate ground surface, and the air surrounding.

In the event of exposure or contamination spread exceeding administrative control limits, there could be delay in operations due to time required for training additional personnel and/or delay in work for decontamination of the facility.

(4) Structural Failure

Embankments will be constructed to same standards that have resulted in satisfactory performance of the existing lagoons.

(5) Seismic Activity

It is predicted that, should an earthquake occur, damage would be limited to disturbance of lagoon embankments.

c. Preventive Measures

(1) Fire

Construction materials will be non-combustible.

The external area is protected by existing fire fighting forces which are located in the immediate vicinity and are equipped to respond quickly to alarms.

A.E.C. fire department procedures provide additional assistance when the crew at the ANL-West Site is occupied with one emergency.

(2) Explosion

Administrative controls prohibit introduction of explosive fluids into the Sanitary Sewage System.

(3) Radiation

The Sanitary Sewage System is monitored in the existing pump house to detect any uncontrolled release or discharge of radiation in the system.

Radiological control procedures will be in accordance with the requirements of the ANL-W Health and Safety Manual.

(4) Structural Failure

Embankment construction will be in accordance with Idaho Highway Department Standards.

(5) Seismic Activity

The design and construction where applicable will be accomplished in accordance with Uniform Building Code, Seismic Zone 3.

C. ENVIRONMENTAL CONSIDERATIONS

1. Construction Work

a. The potential pollutants resulting from the proposed construction work per se will be:

(1) Construction debris and litter.

(2) Gaseous exhaust from construction machinery (i.e., carbon monoxide, sulfur dioxide, hydrocarbons, etc.).

(3) Noise from construction.

b. The proposed treatment and control methods with respect to these potential pollutants include:

(1) Removal of debris in accord with practices established at ANL-West and stipulated in the General Conditions of the construction subcontract.

(2) The periodicity of gaseous exhausts based on the 8-hour day average releases, plus the small increments of these exhausts, imply no need for special or unusual method of control.

(3) Noise levels (associated with normal construction activity) are not expected to exceed the 85 decibel level; hence, no special controls are considered.

2. Potential Environmental Impact

The potential interaction with the environment from activities related to the Sanitary Sewage Treatment expansion occurs in the confinement of the sewage effluent to permit it to evaporate without seepage to the underground water table. The existing lagoons are intended to provide complete evaporation, but due to growth of the ANL-West Site population the capacity is exceeded at times. At such times it is necessary to lower the level of the existing lagoons by pumping or spraying the material on the surrounding desert area, a disposal method not contemplated in the original construction. This pumping or spraying is not necessarily injurious to the environment but subject to the criticism that it could result in dispersion of disease-causing organisms or dispersion of some nominal radiological contamination in the sewage lagoon. Complete control of the sewage within the boundaries of the engineered lagoons and disposal of the liquid by evaporation will reduce potential environmental problems.

3. Alternatives to the Proposed Action

Alternatives to the proposed action would be the construction of a complete 3-stage sewage treatment system or simple discharge of sewage to the ground. The first would be economically unacceptable due to cost, and the second would be environmentally hazardous.

4. Cumulative and Irreversible and Irretrievable Commitments

Cumulative and irreversible and irretrievable commitments of resources involved in the implementation of this proposed action will be minimal and limited to loss of about 1-1/2 acres from the desert environment for the life of the facility.

5. Conflicts with State Plans or Programs

There are no known potential conflicts with local, state, or regional ordinances, plans, or programs.

6. Anticipated Benefits vs. Environmental and Other Costs

The primary anticipated benefit resulting from implementing the proposed plan will be the added evaporation area for disposal of sewage.

It has been concluded that the anticipated benefits outweigh the expected economic and environmental costs, which include loss of about 1-1/2 acres of desert land area.

D. JUSTIFICATION OF BASIC NEED

The existing lagoon sanitary sewage treatment facility was sized for utilization by approximately 200 people. At the time of construction in 1965 the site population was 300, with sanitary sewage for one area treated in a separate Imhoff tank and leaching pit. Subsequently the Imhoff tank-leaching pit was abandoned because of obnoxious odors, and flow diverted to the lagoon because the lagoon appeared to have sufficient capacity above the 200-design to accommodate flow for 300-400 persons. The present site population of 650 people has overloaded the lagoon treatment facility to the point that liquid effluent must be discharged to the surrounding land with less than 60 percent BOD removal and one to two p.p.m. dissolved oxygen content.

The current Idaho State Board of Health "Rules and Regulations for the Establishment of Standards of Water Quality and for Waste Water Treatment Requirements for Waters of the State of Idaho" states that ". . .where a higher standard can be achieved, the highest and best practicable treatment... shall be provided so as to maintain. . .coliform bacteria concentrations, dissolved chemical substances, toxic materials, radioactivity, and other deleterious factors at the lowest desirable levels." In addition, the regulations state that the "minimum adequate treatment for domestic sewage or industrial wastes containing significant organic material shall be equal to that which is commonly known as secondary treatment or the equivalent of 85 percent removal of the BOD including adequate disinfection of any wastes which may contain organisms that may produce disease in man or animals."

The U.S.A.E.C. Idaho Operations Office states that "in keeping with the intent of AECM 0510, it will be the policy of ID to cooperate with the Idaho State Board of Health and the Idaho Department of Health to the extent practicable and within available appropriations in assuring compliance with the regulations."

Installation of the proposed aerated lagoon, when used in conjunction with the existing structures, will produce an effluent that will meet the requirements of the Idaho State Board of Health.

E. CONSIDERATION GIVEN TO EXISTING STRUCTURES AND COMMERCIAL-INDUSTRIAL SOURCES

There are no existing structures or commercial-industrial sources within a reasonable distance to provide evaporation area or mechanical evaporation facilities for the sewage.

F. RELATIONSHIP TO PROJECT AND PROGRAM

This facility is required to support LMFBR program activities required at the ANL-West Site.

G. METHOD OF ACCOMPLISHMENT

Engineering will be performed by Laboratory personnel. Construction will be accomplished by a Laboratory-administered, lump-sum construction subcontract.

H. OUTLINE SPECIFICATIONS

1. General Construction

a. Codes and Standards

Uniform Building Code

American Concrete Institute

American Society for Testing and Materials

Idaho Department of Highways Specifications

b. Lagoon Construction

Embankments will be compacted earth. Slopes and bottom of lagoon will be sealed with plastic film or Hypalon liner.

Lagoon slopes will be riprapped with hand-placed cobblestones. Cascades will be reinforced concrete with cobblestones for increasing the roughness of surfaces. Asphaltic road paving materials will conform to Idaho Highway Specifications Section T02.

The air compressor to be installed at the Sanitary Sewage Lift Station shall be a 10 cfm, 208 volts, 50 psig, continuous-duty, oil-free compressor.

The animal control fence will be five feet high, 11 gauge wire mesh, galvanized, with no barbed wire. One manual truck gate, 12'-0" wide, will be provided at the road for access to the lagoon areas.

I. COST ESTIMATE

The total estimated cost of performing the work as shown on the attached Cost Estimate Summary is $110,000.

J. SCHEDULE

	Start	Complete
Title I Engineering	Dec., 1973	Jan., 1974
Title II Engineering	March, 1974	April, 1974
Solicit Bids	April, 1974	April, 1974
Award	April, 1974	May, 1974
Construction	May, 1974	Sept., 1974
Title III Engineering	May, 1974	Oct., 1974

K. SOURCE OF FUNDS

Funds for this project are available from those allocated for FY-1974 General Plant Projects.

ARGONNE NATIONAL LABORATORY — SITE ENGINEERING - AW

COST ESTIMATE SUMMARY

ANL-West Sanitary Sewage Treatment Expansion
Project Title and Building Number

W.P. _____ S.R. _____

Date January 15, 1974

ITEM				Subtotal	Total
A. ENGINEERING	Title I	Title II	Title III		
1. ANL	$2,000.	$10,000.	$3,500.	$	
2. A-E	$	$	$	$	
TOTAL ENGINEERING					$15,500.
B. CONSTRUCTION (Include removal costs less salvage value)					
1. Improvements to Land ☐ Walks ☒ Roads ☒ Fences ☐ Other Roadway, $6,600 Fences $12,400.				$ 19,000.	
2. Building (For new space show area, volume, etc.)					
Gross Area _____ s.f. @ $_____	AMOUNT (DOLLARS)				
Gross Vol. _____ c.f. @ $_____	Remod.	New Space			
a. Structure					
b. Mechanical					
(1) Plumbing					
(2) Heating					
(3) Ventilating					
(4) Air Conditioning					
(5) _____					
Total Mechanical					
c. Electrical					
(1) Power					
(2) Light					
(3) Alarms					
(4) Communications					
(5) _____					
Total Electrical					
Total Building Costs				$	
3. Other Structures (Retention basins, pits, towers, stacks, etc., when not a part of a building) a. _____				$	
4. Special Facilities & Equipment (Reactor vessels, high vacuum systems, accelerator components, shielding, waste disposal systems, air- and water-pollution control) a. _____				$ 57,000.	
5. Utility Services & Mains (Beyond 5 ft of Building)					
a. Water					
b. Sewer					
c. Steam					
d. Electrical					
e. _____					
Total Utilities				$	
6. Standard Equipment (Office, cafeteria, lab furniture, etc.) a. _____				$	
TOTAL CONSTRUCTION					$ 76,000.

AW-SE(3-72) (See Reverse Side)

TOTAL ENGINEERING AND CONSTRUCTION BROUGHT FORWARD ..... $ 91,500.

C. ANL SHOPS (Indicate type of work to be done) _____ $_____

D. PROCUREMENT (Include actual costs for obtaining excess property) ..... $_____

E. CONTINGENCY: Engr. $3,000. Constr. $15,500. Procur. $_____ Total .. $18,500.

F. INDIRECT COSTS (Include Above) OH&P 38.5 % Pay. & Perf. Bond 1.5 %

G. SUBTOTAL (Funds Required) ..... $110,000.

H. EXCESS OR SALVAGED PROPERTY (Non-Fund)

I. RECAPITULATION

ITEM	AEC	ANL	TOTAL
ENGINEERING	$	$ 15,500.	$15,500.
CONSTRUCTION CONTRACT	$	$ 76,000.	$76,000.
ANL SHOPS	$	$ 0	$ 0
PROCUREMENT	$	$ 0	$ 0
CONTINGENCY	$	$ 18,500.	$18,500.
SUBTOTAL (Funds Required)	$	$110,000.	$110,000.
EXCESS OR SALVAGED PROPERTY (Non-Fund)		0	
TOTAL PROJECT ESTIMATED COST	$	$110,000.	

$ 110,000

J. BIDDING ALTERNATES

Item Description	ADD (+) OR DEDUCT (-)
	$
	$
	$
	$
	$

K. FUNDING DETERMINATION

1. Plant Additions	$
2. Equipment (Including Installation	$
3. Repairs	$
4. Spare Parts	$
5. Removal of Existing Plant or Equipment	$
6. Relocation of Plant or Equipment	$
TOTAL (Exclusive of Engineering and Contingency)	$
7. Estimated Value (i.e., Current Replacement Cost) of Plant Assets Removed or Bandoned	$

L. REMARKS:

REFERENCE 6

Scope of Work for Argonne-West Sanitary Sewage Treatment Expansion Facility No. 779 (various sections), Document No. W7790-0104-SA-00, 7/18/74

SPECIAL CONDITIONS

FOR

ARGONNE-WEST

SANITARY SEWAGE TREATMENT EXPANSION

FACILITY NO. 779

These Special Conditions shall apply to all divisions of these Specifications.

1. SCOPE OF WORK

The work covered by these Specifications includes, but is not necessarily limited to, the furnishing of all labor, supervision, material, plant, equipment, and services necessary to construct the expansion of the existing sewage treatment system and associated modifications and additions.

All work shall be in accordance with these specifications, the included drawings, and the applicable referenced standards.

The divisions of these Specificcations are as follows:

Section	Title
Division I	General Conditions
Division II	Special Conditions
Division III	Earthwork
Division IV	Roadwork & Paving
Division V	Concrete Work
Division VI	Fencing & Gates
Division VII	Culverts and Turnout Gates
Division VIII	Sewage Lagoon Liner
Division IX	Mechanical Work
Division X	Electrical Work

The following drawings accompany these Specifications and form a part of the contract documents:

ANL Drawing No. W7790-0103-DD-00, 4 sheets, dated June 3, 1974, entitled "Sanitary Sewage Treatment Expansion"

Sheet No.	Subtitle
1.	Plot Plans & Probe Hole Log
2.	Roadwork Plan & Sections
3.	Misc. Sections & Details
4.	Lagoon Details & Lift Station Work

2. LOCATION OF THE WORK

The construction work will be performed at the Experimental Breeder Reactor No. II (EBR-II) area of Argonne National Laboratory at the Argonne-West Site, National Reactor Testing Station, Idaho.

3. SECURITY REQUIREMENTS

Only persons meeting the security requirements of the United States Atomic Energy Commission shall be employed. The work will be performed in an unrestricted area; however, all employees of the Subcontractor and all Sub-subcontractors shall comply with all Laboratory and AEC requirements pertaining to badging, identification, and Health Physics. All persons visiting or performing work at the job site may be required to register at the Reception Building (Bldg. No. 751) upon entering or leaving, and access to the work area may be restricted as to routes and by conditions necessary for Laboratory operations.

4. SANITARY FACILITIES

The Subcontractor's personnel will be limited to use of sanitary facilities available at Plant Services Building, Building 753, at the Argonne-West Site.

5. SCHEDULING AND COORDINATION OF WORK

The Subcontractor shall notify the Laboratory at least two (2) days in advance of starting actual field construction work.

The work is to be performed in an area where normal Laboratory operations may be performed as this work progresses. The Subcontractor shall work in close cooperation and shall coordinate his activities with the Laboratory Representative. If it is impossible to schedule any required services interruptions during normal working hours, it shall be required that the work be planned so that the existing system shutdown and final connections will be accomplished on an overtime basis, for which appropriate compensation will be made.

6. TEMPORARY HEAT AND COLD WEATHER ENCLOSURES

This Subcontractor shall provide, at his own expense, any temporary heat and/or heating equipment required for his use. He shall provide and pay for fuel and attendants for temporary heating. The use of open type or oil pot salamanders is prohibited. All waste products of combustion-type heaters shall be directly vented to the exterior of a structure and/or temporary enclosure. The Subcontractor shall provide all enclosures required for protection of his work.

7. OTHER SUBCONTRACTORS

Other construction subcontractors may be engaged in work in the general area covered by the work under this contract. These other subcontractors may be working concurrently with this Subcontractor, and will have equal rights of access to the areas and of the Laboratory furnished facilities. This Subcontractor will be expected to cooperate with the others to best utilize the available areas roadways and facilities.

8. MAINTAINING SERVICE

The Subcontractor shall support, maintain in place and in operation, all service pipes, electric conduits and other services within the Argonne-West construction limits and restore all such services if damaged through the operations of this subcontract.

9. SAFE WORK PERMIT

The Subcontractor shall perform no work at the Argonne-West area without a Safe Work Permit issued by the Laboratory in conformance with Section II, Chapter I of the Health and Safety Manual published by the Laboratory. The Subcontractor shall obtain such permit by transmitting to the Contracting Officer, or his authorized representative, a written request for such permit, containing a reference to the subcontract, the date when the work will commence, and describing any special risks known to the Subcontractor.

10. HEALTH AND SAFETY INDOCTRINATION FOR SUBCONTRACTOR PERSONNEL

All Subcontractor personnel are required to receive formal Health and Safety indoctrination prior to working in the Argonne-West area. Records will be maintained by the Laboratory, and if the indoctrination of any employee is not current (valid for one year), he shall, upon notice given by the Laboratory, receive such further indoctrination as is deemed necessary.

Subcontractor personnel may receive Health and Safety indoctrination at 8:15 A.M. or 12:45 P.M. on any normal work day. An indoctrination period will normally require thirty (30) minutes time.

11. MATERIALS REMOVED

All salvagable materials removed by the Subcontractor shall remain the property of the Laboratory and shall be delivered to the designated

Laboratory Representative in such condition that re-use may be made of the materials to the greatest extent possible.

Waste materials and debris shall be removed as described in the General Conditions, Division I, of this subcontract.

12. CONTRACTOR'S SUPERVISION

The Subcontractor shall provide and keep on the work during its progress a competent full-time superintendent and necessary assistants, all subject to the Laboratory's approval. Said superintendent shall not be changed without consent of the Laboratory unless he proves to be unsatisfactory to the Subcontractor and/or ceases to be in his employ. Said superintendent shall represent the Subcontractor during his absence and all directions given to him shall be as binding as if given to the Subcontractor. Important directions shall be confirmed in writing to the Subcontractor. Other directions will be so confirmed upon written request in each case.

13. CONSTRUCTION LIMITS

The work area, material and equipment storage area, location of construction office and similar installation areas are established by the authorized Laboratory Representative. The Subcontractor shall be limited in his access to these areas to the most direct route from public and plant roads, shall be responsible for restricting the movement of his employees, watchmen, subcontractors and all associated personnel to the construction limits, and shall have no privileges of access beyond the established limits except as permitted for the installation of utilities and services, and as described in Section 4, SANITARY FACILITIES.

14. PROTECTION

A. The Subcontractor shall continuously protect all work under this Subcontract from damage and also protect the Laboratory's property from injury or loss arising in connection with this Subcontract. The Subcontractor shall make good at his own expense and without cost to the Laboratory any such damage, loss, or injury. Adequately protect adjacent property as provided by law and the subcontract documents. Provide and maintain all shoring, bracing, sheathing, lights and other facilities for protection as required by the Laboratory. Protect all walks, drives, pavements, buildings, ramps and all existing utilities.

B. The Subcontractor shall keep appropriate parts of the work free from ice, snow and water, as a part of this Subcontract and provide at all times proper protection against weather. This protection shall maintain work and fixtures free from injury or damage. He shall cover (in an approved manner) all work liable to be damaged whenever work is not in progress.

C. If low temperatures make it impossible to continue operations safely in spite of cold weather precautions, the Subcontractor shall cease work and so notify the Laboratory.

15. TEMPORARY STRUCTURES

A. Construction

The Subcontractor shall furnish at his own expense all temporary structures, utilities and services required for use as offices, warehouses, shops, etc. The location and type of any temporary structure shall be subject to approval of the Laboratory before construction. Minimum acceptable requirements for temporary structure standards are as follows:

1. Wiring: All wiring in temporary buildings and services to such buildings shall conform to the National Electric Code.

2. Heating: Approved types include steam, high-pressure oil furnaces, butane-fired heaters in buildings containing more than 500 square feet of area (gravity-fed space heaters in buildings of less than 500 square feet area), and approved portable heaters of Herman-Nelson type when located outside with heat duct to building. Use of wood and coal-burning space heaters is not permitted. Use of electrical heaters is not permitted except in accordance with the section on temporary power and upon specific approval by the Laboratory.

B. Fire Protection Requirements

1. Inside Buildings: One approved type fire extinguisher for Class A fires (ordinary combustible) shall be installed for each 2500 square feet of floor area as a minimum requirement. In buildings where special hazards exist, fire extinguishers (CO_2, Dry Chemical, etc.) of the type approved for the respective hazard shall be installed in addition to the Class A type.

2. Outside Storage Areas: Fire barrels with buckets are acceptable for protection of ordinary combustible materials.

3. General: Fire protection for the entire work area must be established and maintained to conform with AEC Fire Department requirements.

C. Use of Tarpaulins: All tarpaulins shall be of approved fire-resistant type treated to be equal to Federal Specification No. CCC-D-746, which requires that a 1/2" strip sample of the canvas subjected to a Bunsen-burner flame for twelve seconds shall show not more than 5/8" charring and that the sample does not continue to burn upon the removal of the flame.

16. STORAGE

A. All operations of the Subcontractors, including storage of materials, upon premises of the Laboratory shall be confined to the areas specified, approved and/or authorized by the Laboratory. All materials and equipment shall be stored so as to insure preservation of their quality and fitness for the work. Ferrous metals shall be stored in a manner which will prevent objectionable changes in original surface characteristics. All stored materials shall be arranged in an orderly manner for ease of identification and inspection. This Subcontractor's storage areas shall be maintained in a neat and orderly condition at all times, and shall be kept free of accumulation of trash and debris.

B. Oils, fuels, welding gas, and other flammables shall be stored in areas located away from operational or construction buildings; and shall further be stored in containers with dispensing devices that comply with fire-safety regulations at the National Reactor Testing Station.

17. DISPENSARY, FIRST-AID AND FIRE-PROTECTION FACILITIES

A. The Laboratory and the Atomic Energy Commission will maintain and operate the following services for the protection of life and property normal to an installation of this nature.

Dispensary service, including part-time services of a nurse, ambulance service, and professional fire-fighting service are available at Central Facilities. Without guaranteeing the adequacy thereof, or assuming any liability whatsoever in connection therewith, the Laboratory will permit the Subcontractor to use such facilities as may be available without charge.

B. First-aid supplies and equipment for each job shall be furnished by the Subcontractor, at his own expense, and shall be kept under the supervision of a responsible person. Records on all first-aid treatments shall be kept and forwarded to the Laboratory.

C. Fire-protection supplies and equipment for the job such as fire extinguishers, etc., shall be furnished by the Subcontractor, at his own expense. Periodic inspections will be made by the AEC Fire Department to determine the adequacy of the fire protection.

18. SAFETY AND FIRE PROTECTION

Pursuant to Terms and Conditions Article entitled "Safety, Health and Fire Protection", compliance with the following codes and standards shall be considered minimum requirements.

Safety Standards (American National Standards Institute) including Safety Code for Building Construction, ANSI A10.2.

National Fire Codes.

Uniform Building Code 1970 (International Conference of Building Officials).

Argonne-West Health and Safety Manual

Motor Carrier Safety Regulations (Interstate Commerce Commission).

Lists of Inspected Appliances, Equipment and Materials (Underwriters Laboratories, Inc.).

Occupational Safety and Health Act (OSHA) 29-CFR-17.

A. The Subcontractor shall remove construction debris from the work area prior to the end of each work day. All scrap and debris shall be removed in accordance with the established policy in the General Conditions.

B. A full-time fire watch shall be provided by the Subcontractor during all cutting, burning and welding operations; and for at least 30 minutes thereafter. All combustible materials in the immediate vicinity, or beneath the welding operation, shall be covered with asbestos blankets to reduce the fire hazard. Fire watch personnel shall be equipped with a 2 1/2-gallon capacity water-type fire extinguisher and an ABC dry-chemical fire extinguisher.

19. TEMPORARY ELECTRICAL POWER

A. Electrical power at 120 volts will be available at Building 778 from existing receptacles. This power is available free of charge.

B. The electrical power furnished by the Laboratory shall be handled economically by this Subcontractor, with all possible precautions being taken to avoid waste. Electrical power shall not be used as a means of providing temporary heat for construction purposes.

20. VERIFYING MEASUREMENTS, LOCATIONS, ETC.

A. Each Sub-subcontractor shall obtain all necessary measurements and details from the Subcontractor in order that his work may fit other branches of work. Each Sub-subcontractor shall further verify all measurements, grades, levels and conditions in order that his work shall fit that of other Subcontractors and properly engage with the work in place.

B. The Subcontractor shall avoid confliction of work between trades. The Subcontractor shall check working and shop drawings of all trades and inform the trades as to correct locations of other work in order to avoid interference.

21. GENERAL CUTTING AND PATCHING

The Subcontractor shall be responsible for all cutting and patching required for the work of all trades.

22. BID ALTERNATES

The Subcontractor shall furnish an alternate bid for the following item, identified as Alternate Number 1:

> In lieu of installing a Hypalon liner sheet for the entire lagoon, provide a Bentonite clay seal over the lagoon bottom, and Hypalon liner over the inside of the dikes only.

This alternate is further described on the drawing, and in Division VIII of these specifications.

The Subcontractor shall specify in his bid proposal the amount to be deducted, or added, to the base bid for Alternate No. 1.

EARTHWORK

FOR

ARGONNE-WEST

SANITARY SEWAGE TREATMENT EXPANSION

FACILITY NO. 779

1. GENERAL

The requirements of the "General Conditions" of the contract and of the "Special Conditions," Divisions I and II of these specifications, shall form a part of this division of these specifications.

2. SCOPE OF WORK

The work to be performed under this division of these specifications consists of furnishing all plant, labor, materials, equipment, supervision and services necessary to perform all operations in connection with excavation, backfilling, and earthwork for the construction of the Sanitary Sewage Treatment Expansion as shown on the drawings and as described hereinafter.

The work includes, but is not necessarily limited to, the following:

A. Excavation for the sewage lagoon, culverts, and turnout gates.

B. Performing all operations in connection with placing, shaping, grading, and compaction of the sewage lagoon dike.

C. Backfilling of all trenches and excavated areas where required.

D. Disposal of any casual water encountered in excavation or on the surface during construction, by pumps or other equipment as required.

E. Establishing and setting all lines, grades, and appropriate surveys of any other type.

All work under this section shall be performed in accordance with applicable sections of the State of Idaho, Department of Highways, Standard Specifications for Highway Construction, 1967 Edition, and Supplemental Specifications, 1974, hereinafter referred to as "Idaho Specifications," which shall be considered as a part of these specifications, except as modified herein. Where, in said Idaho Specifications, reference is made to the State of Idaho, any of its departments, officials, or representatives, it shall be considered to mean, for the purpose of this contract, the Laboratory and/or it's designated representatives. All reference to unit-price bid items shall be disregarded, and all work included in this contract shall be for the lump-sum price. Idaho Specifications are available for inspection at offices of the Department of Highways, State of Idaho, and at the ANL Site Engineering office at Argonne-West.

3. RELATED WORK INCLUDED UNDER OTHER DIVISIONS OF THESE SPECIFICATIONS

A. Lagoon Liner - Division VIII

B. Roadwork and Paving - Division IV

4. DEFINITIONS AND/OR APPLICABLE PUBLICATIONS

Moisture Density Relations of Soils	AASHO T 180
Field Determination of Density of Soils in Place	AASHO T 147

5. EXCAVATION

A. The Subcontractor shall be responsible for ascertaining the nature of the subsurface soil conditions from information obtained from log of exploratory holes shown on the drawing, and/or from information obtained from his own investigations. Excavation shall not be classified, and material of all types shall be removed as required by the drawings and these specifications at the contract lump-sum price and without additional payment. Prior to any excavation operations, the Subcontractor shall obtain a safe work permit from the Laboratory. All excavation of every description and of whatever substances encountered shall be performed to the depths indicated on the drawings or as otherwise specified. During excavation, material suitable for backfilling shall be piled in an orderly manner at a sufficient distance from the banks of the excavations to avoid overloading and to prevent slides or cave-ins. All excavated materials not required or not suitable for backfill shall be removed and wasted as indicated in the General Conditions. Special care must be taken to prevent damage to any existing utility line crossed by this work. Grading for drainage control shall be done as may be necessary to prevent surface water from flowing into trenches or other excavations, and any water accumulating therein shall be immediately removed. Sheeting and shoring shall be done as may be necessary for the protection of the work and for the safety of personnel. Unless otherwise indicated, excavation shall be by open cut except that short sections of a trench may be tunneled if, in the opinion of the Laboratory, the pipe can be safely and properly installed and backfill can be properly tamped in such tunnel sections. Excavation shall comprise and include the satisfactory removal and disposition of all materials excavated regardless of the nature of the materials encountered and which shall, therefore, be understood to include both rock excavation and common excavation when both classes are present. When rock is encountered, it shall be fragmented for excavation by mechanical means. Blasting will not be permitted.

B. Trenches shall be of the necessary width for proper laying of pipes or concrete. The banks of trenches shall slope as practicable. Care shall be taken not to over-excavate. Where the excavation is made below the elevations shown on the drawings, the Subcontractor may restore the trench bottom to the proper elevation by placing and compacting fill material to 85 percent of maximum density. The bottom of trenches shall be accurately graded to provide uniform bearing and support for each section of the pipe on undisturbed soil at every point along it's entire length, except for the portions of the pipe sections where it is necessary to excavate for pipe joints.

C. The width of the trench at and below the top of pipe shall be no more than 3' - 0". The trench above the top of pipe shall be as wide as necessary for sheeting and bracing and the proper performance of the work. The bottom of the trench shall be rounded so that at least the bottom quadrant of the pipe shall rest firmly on undisturbed soil for as nearly the full length of the barrel as proper jointing operations will permit. This part of the excavation shall be done manually.

6. CONSTRUCTION OF SEWAGE LAGOON AND DIKE

A. Construction of the lagoon and dike shall include the work of clearing, grubbing, removal of organic or undesirable material from the lagoon area, and preparation of dike foundations. Construction of the lagoon and dike shall also include all excavation, including rock excavation, hauling, placing and compacting of material within the lagoon area from borrow pits, and the watering and rolling of dike sections. Disposal areas for soil and rock waste material are located within one-half (1/2) mile of the work area and shall be neatly piled or spread as directed by the Laboratory.

B. Earth borrow (select fill) material as may be required may be obtained, free of charge, from borrow areas within one mile of the site as designated by the Laboratory. All necessary pit development, loading, hauling, and handling shall be the responsibility of this Subcontractor at his own expense. The Subcontractor is advised that the designated borrow areas do not have unlimited depth of usable overburden over the underlying bedrock. The Subcontractor, at his option and expense, may extend the designated borrow areas or may develop new borrow areas upon approval of the Laboratory.

C. Construction requirements for the lagoon and dike shall be in accordance to applicable Sections 201, 203, and 205, of Idaho Specifications. A minimum of six inches of soil cover, compacted to 95 percent density, shall be maintained over all lava rock throughout the lagoon bottom. All earth fill on top and slopes of lagoon dike, for a depth of one (1) foot, shall be compacted to 95 percent of maximum density. All other earth dike material shall be compacted to 90 percent of maximum density.

D. After completion of dike construction, and installation of the liner specified in Division VIII, one layer of hand-placed rip-rap (4" minimum size smooth stones) shall be installed over the liner, covering the entire inner slope of the lagoon dike. Stones shall be neatly and tightly placed to provide a uniforn finished slope.

E. Pit-run aggregate is available, free of charge, in it's natural ungraded and unprocessed state from the gravel pit located approximately 1.0 mile northeast of the Central Facilities Concrete Batch Plant. The Subcontractor may use this pit as a source of road embankment material, base course, or other pit-run aggregate; or he may, at his option, develop other pits, if necessary and if approved by the Laboratory. All necessary pit development, processing, loading and hauling for completion of the work under these specifications shall be the full responsibility of the Subcontractor. The Subcontractor shall not work in any immediate area that is presently being used, or has been stripped for use, by others.

7. BACKFILLING

The trenches shall not be backfilled until the systems as installed conform to the requirements specified in the divisions covering the installation of overflows, valves, and culverts. Except as otherwise specified for conditions of overdepths, trenches shall be backfilled to the ground surface with selected excavated material or other material that is suitable for the density of compaction as hereinafter specified. Existing base course materials disturbed by trenching operations shall be replaced in an acceptable manner with materials equal to the adjacent base course. Top surfaces of dikes and berms shall be finished with 4" of pit-run gravel.

A. Lower Portion of Trenches

Backfill material shall be deposited in 6-inch-maximum-thickness layers and compacted with suitable hand tamping to 95 percent of maximum density, or as hereinafter specified, until there is a cover of not less than 2 feet. The backfill material in this portion of the trench shall consist of select earth materials or other approved materials free from stones. Special care shall be taken not to damage the piping.

B. Remainder of Trenches

The remainder of the trench, except the top 4 inches shall be backfilled with material that is free of stones larger than six inches. Backfill material shall be deposited in layers not exceeding the 6" thickness, and each layer shall be compacted to 95% of maximum density.

C. Top 4 Inches of Backfill

All areas to be backfilled, except lagoon bottom and dike side-slopes, shall be brought up to grade by depositing and spreading a 4-inch-thick blanket of pit-run gravel having a maximum aggregate size of 2 inches.

8. COMPACTION CONTROL

a. The degree of compaction and density of backfill shall be determined and controlled in accordance with AASHO Standards as follows:

T 180,	Method A	- for determining moisture density relations of soils.
T 147		- for field determination of density of soil in place.

b. All tests for density of soils in place will be made by the Laboratory, it's representative, or an independent testing laboratory engaged by the Laboratory Tests will be made at such locations and elevations, and in such number, as determined by the Laboratory to be necessary to ascertain and/or control the quality of the Subcontractor's work. The Subcontractor shall notify the Laboratory at least 24 hours in advance of any backfilling operations he intends to perform, and he shall conduct his operations in such a manner as to facilitate making the tests.

C. Backfill improperly placed shall be removed to the depth required for proper compaction as directed by the Laboratory and then replaced and compacted as specified.

ROADWORK & PAVING

FOR

ARGONNE-WEST

SANITARY SEWAGE TREATMENT EXPANSION

FACILITY NO. 779

1. GENERAL

The requirements of the "General Conditions" of the contract and of the "Special Conditions", Divisions I and II of these specifications, shall form a part of this division of these specifications.

2. SCOPE OF WORK

The work under this section consists of furnishing all plant, supervision, labor, materials, equipment, supplies and incidentals necessary and required to perform all operations in connection with paving and roadway construction for this project. The work delineated on the drawing includes, but is not limited to, the following:

A. Subgrades and roadbeds

B. Surface treatment

C. Finish grading

All work under this section shall be performed in accordance with applicable sections of the State of Idaho, Department of Highways, Standard Specifications for Highway Construction, 1967 Edition, and Supplemental Specifications, of 1974, hereinafter referred to as "Idaho Specifications," which shall be considered as a part of these specifications, except as modified herein. Where, in said Idaho Specifications, reference is made to the State of Idaho, any of its departments, officials, or representatives, it shall be considered to mean, for the purpose of this contract, the Laboratory and/or its designated representatives. All reference to unit-price bid items shall be disregarded, and all work included in this contract shall be for the lump-sum price. Idaho Specifications are available for inspection at offices of the Department of Highways, State of Idaho, and at the ANL Site Engineering office at Argonne-West.

3. RELATED WORK INCLUDED UNDER OTHER DIVISIONS OF THIS SPECIFICATION

Earthwork - Division III

4. DEFINITIONS AND/OR APPLICABLE PUBLICATIONS

Moisture Density Relations of Soils	AASHO T 180
Field Determination of Density of Soils in Place	AASHO T 147

5. ROADWAY

A. General

Select base course and materials shall conform to Idaho Specifications, Sections 303 and 703, 2-1/2-inch maximum.

Crushed gravel for gravel surface course shall conform to Idaho Specifications, Sections 303 and 703, 3/4-inch maximum.

Asphaltic road materials shall conform to Idaho Specifications, Section 702.

Prime coat, seal coat and cover coat shall conform to the requirements of Idaho Specifications 402, 403 and 703.

Construction of the surface treatment shall conform to the requirements of Idaho Specifications, Section 404.

B. Subgrades and Roadbeds

Construction of embankment and subgrade shall include all hauling, placing and compacting of material within the roadway embankment section, and the grading, watering and rolling of subgrade and embankment sections.

Each borrow (select fill) material as may be required may be obtained, free of charge, from borrow areas within one mile of the site as designated by the Laboratory Representative. All necessary pit development, loading, hauling, and handling shall be the responsibility of this Subcontractor at his own expense.

Pit-run aggregate is available, free of charge, in its natural ungraded and unprocessed state from the gravel pit located approximately 1.0 mile northeast of the Central Facilities Concrete Batch Plant. The Subcontractor may use this pit as a source of road embankment material, base course, or other pit-run aggregate; or he may, at his option, develop other pits, if necessary and if approved by the Laboratory. All necessary pit development, processing, loading and hauling for completion of the work under these specifications shall be the full responsibility of the Sub-contractor. The Sub-contractor shall not work in any immediate area that is presently being used, or has been stripped for use, by others.

Gravel base material shall be placed and compacted in 4-inch layers, being properly compacted before placing subsequent materials. Compaction shall be class A, Section 205 of the Idaho Specifications,

except that the minimum compaction required shall be 95 percent maximum density at optimum moisture. While compacting the base course, the Subcontractor shall exercise initiative in the most economical utilization of watering. Any displacement of subgrade due to negligence in distribution of water in compaction of base course shall be removed or dried, processed and recompacted in subgrade before any further courses of gravel are applied. Water and rolling will be applied as required to meet the minimum compaction requirements of this subcontract.

C. Gravel Surface Course

The Subcontractor shall be responsible for making his own arrangements for furnishing the 3/4-inch maximum crushed gravel for the 2-inch surface course. The aggregate shall be produced from tough, durable sand and gravel or rock and shall be uniform in quality and gradation. The material shall show a loss of not more than 40 percent in the Los Angeles Abrasion Test.

The aggregate shall conform to the gradations shown in Section 703 of the Idaho Specifications.

The compaction requirement for all 3/4-inch maximum gravel surface or leveling courses shall be in accordance with Section 205 of the Idaho Specifications for class A compaction.

Before final placement and compaction of the surface course, water shall be applied to the material in amounts as required. The water shall be thoroughly mixed with the aggregate by processing until the mixture is uniform throughout. Any segregated material shall be removed or segregation corrected as directed. Cost of correcting segregation shall be born by the Subcontractor.

Watering and rolling shall be applied in the amounts as required to meet the minimum compaction requirements of this Subcontract and the Idaho Specifications.

Upon completion of any specific portion of completed 2-inch surface course requiring a subsequent surface treatment, the Subcontractor shall maintain the grade and state of compaction by means of additional watering and rolling as directed by the Laboratory until time of final acceptance of the work under this subcontract.

6. PAVING

A. Type "B" Surface Treatment

Prime coat shall be liquid asphaltic road material, MC-70, MC-250, or as determined by temperature and surface conditions in accordance

to the Subcontractor's recommendations and with the approval of the Laboratory. Application shall be at the rate of 0.40 gallons per square yard. The Laboratory may terminate all work if, in its opinion, the wind is blowing excessively hard to prevent good workmanship.

The seal-coat liquid asphaltic road material shall be MC-800 or 3000, as determined by temperature and surface conditions, and shall be applied at a rate of 0.30 gallons per square yard.

The cover coat aggregate shall conform to the Idaho Specifications for aggregate for cover coat material, and shall be applied at a rate of 30 pounds per square yard. It shall be the responsibility of the Subcontractor to make his own arrangements for providing the cover coat material.

B. Application of Surface Treatment

The surface to be primed prior to application of Type "B" surfacing shall be processed and shaped to the required grade and section and shall be free of all ruts, corrugations, segregated material or other irregularities, and watered and rolled to provide a uniformly compacted surface.

All areas to be primed must be inspected and approved by the Laboratory prior to the application of the prime coat.

The spread of asphaltic material shall be uniform in thickness throughout; and special precautions shall be taken to prevent the end sprays of the spray bar from feathering out, resulting in a thinner application at the edges of the spread. The distributor shall be equipped with hand spray and nozzle to be used in areas too small or inaccessible to use the distributor. Hand spray shall be capable of applying bituminous material uniformly and in the amounts specified.

A self-propelled, pneumatic-tired roller of an approved type, exerting tire pressure and having an effective rolling width and a power roller will be required for rolling the cover coat. A steel, flat-faced, self-propelled power roller weighing eight (8) to ten (10) tons will be required for finish rolling of the gravel course to be Type "B" surfaced.

7. TESTS

Compaction tests and other tests felt necessary by the Laboratory shall be arranged by and shall be the responsibility of the Laboratory. The Subcontractor shall cooperate with the Laboratory in scheduling and performing the tests. The number of tests required will be determined by the Laboratory. Any materials or work tested and found below the requirements of the specifications shall be replaced or reworked by the Subcontractor at no additional cost to the Laboratory.

CONCRETE

FOR

ARGONNE-WEST

SANITARY SEWAGE TREATMENT EXPANSION

FACILITY NO. 779

1. GENERAL

The requirements of the General Conditions of the contract and of the Special Conditions, Divisions I and II of these specifications, shall form a part of this division of these specifications.

2. SCOPE OF WORK

The work to be performed under this division of these specifications consists of furnishing all plant, labor, materials, equipment, supervision, and services necessary to perform all operations in connection with concrete work for the construction of the Sanitary Sewage Treatment Expansion project as shown on the drawings and as described hereinafter.

The work includes, but is not necessarily limited to, the following:

A. Furnish and install concrete supports for turnout gates.

B. Furnish and install concrete blocks for inlet deflector head.

C. Furnish and install concrete for encasement of fence posts and gate posts.

D. Embedment in concrete of any item, including those installed under other divisions of these specifications, e.g., anchor bolts, sleeves, etc.

3. WORK INCLUDED UNDER OTHER DIVISIONS OF THESE SPECIFICATIONS

A.	Earthwork	Division III
B.	Fencing and Gates	Division VI
C.	Culverts and Turnout Gates	Division VII

4. GENERAL REQUIREMENTS

All concrete work shall be carried out with the use of an adequate number of workmen, proper and sufficient equipment, and under careful procedures, and in accord with applicable sections of the American Concrete Institute

"Building Code Requirements for Reinforced Concrete," ACI 318. All concrete shall be furnished in accord with the requirements of ASTM C-94. In the case of improperly placed concrete or poor concrete work, its removal and replacement shall be required at the expense of the Subcontractor.

5. MATERIALS

The concrete used for all work shall develop 3000 psi at 28 days strength, using the following materials:

A. Type I Portland Cement - Low alkali.

B. Fine Aggregate - Clean, hard sand, conforming to ASTM C-33-64.

C. Coarse Aggregate - Crushed stone or gravel, conforming to ASTM C-33.

D. Water - Potable.

E. Admixtures - Air entrainment to obtain 4 to 6 per cent by volume Vinsol resin or Darex.

6. PROPORTIONING

A. The maximum allowable water content shall be 5.25 gallons per sack of cement.

B. The minimum cement content shall be 5.0 sacks per cubic yard.

7. CURING AND PROTECTION

A. Protect all concrete surfaces from drying out. Wet curing of concrete shall begin as soon as possible without marring the surface of the work. Horizontal surfaces shall be covered with a cover such as burlap, kraft paper, or plastic, and shall be kept wet. Vertical forms shall be left in place and kept sufficiently wet at all times to prevent opening at the joints and the drying of concrete. Wet curing shall be continued for seven (7) days with Type I cement.

B. If approved by the Laboratory, membrane curing may be used as an alternate to wet curing specified above. The membrane curing shall conform to ASTM Designation C-309, Type I. Concrete shall be in moist condition when curing compound is applied. If forms are removed, a protective cover shall be placed on horizontal and vertical surfaces.

C. Protect fresh concrete from rain and the elements by an approved protective covering at all times.

D. Concrete shall not be placed when the temperature is, or is predicted to be within three (3) days, below 40°F., unless proper provisions have been made to maintain the following conditions:

(1) Concrete shall be heated to a minimum temperature of 50°F. and a maximum of 70°F.

(2) Form temperatures of 50°F. shall be maintained for a minimum of five (5) days for Type I concrete.

E. During hot weather, all surfaces shall be protected from direct sunlight for a minimum period of 48 hours when the air temperature is expected to exceed 90°F. within two (2) days after placement. Maximum concrete temperature shall not exceed 80°F. when mixing and placing.

F. Concrete shall be protected by a windbreaker or other suitable device to prevent dust, dirt, etc., from contaminating the surfaces of fresh or green concrete, or to prevent crazing of the surfaces.

8. FORM WORK

The Contractor shall provide all necessary form work and carpentry in connection with the concrete placement.

9. CONCRETE FINISHES

Finished concrete surfaces shall be in a true plane. Do not float or trowel excessively while concrete is still soft. After screeding, allow concrete to become stiff before troweling.

10. TESTING OR CONCRETE

The Laboratory reserves the right to have the concrete tested for strength, in accord with ASTM C31 and C39, for slump, and for materials, in accord with ASTM C231-62, if felt necessary by the authorized Laboratory Representative. Any defective work or work not in accordance with these specifications shall be removed and replaced at no cost to the Laboratory.

FENCING AND GATES

FOR

ARGONNE-WEST

SANITARY SEWAGE TREATMENT EXPANSION

FACILITY NO. 779

1. GENERAL

The requirements of the "General Conditions" of the contract and of the "Special Conditions," Divisions I and II of these specifications, shall form a part of this division of these specifications.

2. SCOPE OF WORK

The work under this section of these specifications consists of furnishing all supervision, labor, materials, equipment supplies and incidentals necessary and required to perform all operations in connection with the installation of a stock fence and gates for the Sanitary Sewage Treatment Expansion project, as shown on the drawings and as hereinafter specified.

The work includes, but is not necessarily limited to, the following:

A. Furnish and install a 3'-9" high steel stock fence and barbed wire.

B. Furnish and install two 14'-9" steel gates.

3. RELATED WORK INCLUDED UNDER OTHER DIVISIONS

Earthwork	Division III
Concrete Work	Division V

4. MATERIALS

A. Barbed Wire

The barbed wire shall be galvanized, 12½-gauge, copper-bearing steel, with 14-gauge, 2-point barbs, 5 inches apart, similar to Red Brand No. 80, as manufactured by Keystone Consolidated Industries, Inc.

B. Stock and Field Fence

The fabric for stock and field fence shall be galvanized copper-bearing steel, 39 inches high with nine 9-gauge line wires, graduating from three inches apart to the bottom to seven inches apart at the top. The vertical stay wires shall be 11-gauge, spaced at 6 inches apart. The fabric shall be similar to Red Brand, style number 939-6-11.

C. Line Fence Posts

Fence posts, except corner posts, shall be 7 feet long, studded-tee type, high-strength steel posts, with anchor plates and baked-enamel finish. Posts shall be furnished with five fasteners per post, for attaching barbed wire and stock fence.

D. Corner Fence Posts and Braces

Corner posts and braces shall be galvanized steel angles, of the sizes and lengths shown on the drawing. Steel members shall conform to ASTM Specification A-36.

E. Gate Posts

The gate posts shall be Schedule 40, galvanized steel pipe, conforming to ASTM Specification A-120, of the sizes and lengths shown on the drawing.

F. Gates

The gates shall be galvanized steel, single-swing, 5-panel, 52-inch-high by 14-foot-wide Life-Time model, as supplied by Morrison-Merrill and Company, Idaho Falls, Idaho, or approved equal. Gate shall be of the type shown on the drawings and shall be complete with bracing and manufacturer's standard gate hardware.

5. INSTALLATION

Corner posts, gate posts, braces, and the first adjacent line posts in each direction shall be encased in concrete footings of the size, shape, and depth shown on the drawing.

Line posts shall be driven to an approximate depth of two feet, keeping the post-tops in a line of gradual elevation change where necessary. Horizontal alignment shall be maintained between corner posts.

Stock fence fabric and barbed wire shall be properly stretched and fastened to posts with standard fasteners at line posts, and 11-gauge galvanized steel wire at corner posts and braces. Stock fence shall be fastened four places at each post, and barbed wire shall be fastened at each post.

CULVERTS AND TURNOUT GATES

FOR

ARGONNE-WEST

SANITARY SEWAGE TREATMENT EXPANSION

FACILITY NO. 779

1. GENERAL

The requirements of the General Conditions of the contract and of the Special Conditions, Divisions I and II of these specifications, shall form a part of this division of these specifications.

2. SCOPE OF WORK

The work covered by this division consists of furnishing all supervision, plant, labor, materials, equipment, supplies and incidentals necessary and required to perform all operations in connection with culverts, turnout gates, and miscellaneous metalwork, complete and acceptable, in conformance with this specification and the applicable drawing. The work includes, but is not necessarily limited to, the following:

A. Furnish and install overflow culverts, complete with turnout gate valves, within the sewage lagoon dikes.

B. Furnish and install inlet deflector at Lagoon No. 1 inlet pipe.

3. RELATED WORK INCLUDED UNDER OTHER DIVISIONS

Earthwork	-	Division III
Concrete Work	-	Division V

4. MATERIALS

A. Plain corrugated metal pipe culverts shall be eight-inch diameter, 16 gauge galvanized steel, conforming to AASHO Specification M-36.

B. Turnout gate valves shall be eight-inch diameter, ARMCO Model 101C spigot back slide gate, complete with 8-feet high support frame, all accessories, attachments, fasteners, and mastic.

C. Plain corrugated metal pipe for standpipes shall be 36-inch diameter, 16 gauge galvanized steel, conforming to AASHO Specification M-36.

D. Inlet deflector shall be fabricated as detailed on the drawing from steel plate conforming to ASTM Specification A36.

5. INSTALLATION

The corrugated metal pipe shall be carefully bedded in a soil foundation that has been accurately shaped and rounded to conform to the lowest

1/4 of the outside portion of circular pipe. Only undamaged pipe shall be laid. No pipe culvert shall be placed until the foundation has been approved. All pipes shall be laid with ends true to line and grade. The Subcontractor will be responsible for providing adequate cover over pipes during construction to protect them from damage.

The installation of culvert pipe in trenches shall be inspected by the Laboratory and approved prior to backfilling operations. Such approval shall not release the Subcontractor from his responsibility to provide an acceptable and undamaged installation at the time of final acceptance.

6. SUBMITTALS

The Subcontractor shall submit the following items of information to the Laboratory for approval and/or record file in accordance with Division I:

Shop drawings for Turnout Gate Valves.

SEWAGE LAGOON LINER

FOR

ARGONNE-WEST

SANITARY SEWAGE TREATMENT EXPANSION

FACILITY NO. 779

1. GENERAL

The requirements of the "General Conditions" of the contract and of the "Special Conditions", Divisions I and II of these specifications, shall form a part of this division of these specifications.

2. SCOPE OF WORK

The work under this section of these specifications consists of furnishing all supervision, labor, materials, equipment, supplies and incidentals necessary and required to perform all operations in connection with the installation of an impervious liner in the bottom and sloped sides of the new sewage lagoon. The work includes, but is not necessarily limited to, the furnishing and installing of the following:

A. Preparation of the excavated lagoon to receive the liner.

B. Installation of the liner.

C. Seaming joints to seal the bottom and sides of the lagoon.

D. Securing outside edges of the liner to prevent shifting or movement.

3. CODES AND SPECIFICATIONS

The following documents are applicable to this division of the specifications:

A.	ASTM D 412	Liner Tensile Strength, Elongation
B.	ASTM D 573	Heat Resistance
C.	ASTM D 471	Resistance to Water
D.	ASTM D 746	Brittleness
E.	ASTM D 2136	Bending Strength
F.	ASTM D 1149	Exposure to Weathering

4. MATERIAL

The liner material shall be fabricated from high-quality unvulcanized elastomeric compound, DuPont "Hypalon" or approved equal. Sheet shall be smooth, free from pinholes and surface blemishes, and shall show no evidence of ply delamination. Thickness shall be 30 mils with 2 ply lamination. The following physical properties shall be met:

A. Tensile strength, ASTM D 412, 1000 psi, minimum

B. Elongation at break, ASTM D 412, 250%, minimum

C. Resistance to heat aging. Change in original properties after 14 days at 212°F, ASTM D 573, Elongation - 40%, maximum, tensile strength + 30%, maximum.

D. Resistance to water. Change in weight after immersion for
7 days @ 70°F - + 5%, maximum
14 days @ 120°F - + 10%, maximum, ASTM D 471.

E. Low temperature properties
Brittleness temperature ASTM D 746, - 45°F
Cold bend (1/8" mandrel) ASTM D 2136; no cracks at -30°F.

F. Resistance to ozone, condition after exposure to 300 pphm ozone in air for 400 hours at 140°F. (Sample under 20% strain)
ASTM D 1149; no cracks.

5. INSTALLATION

The installation of the liner must be accomplished by an experienced contractor in accordance with a written procedure approved by the Laboratory.

A. The bottom and side walls of the lagoon shall be prepared as previously specified in Division III of this specification. The liner installation must be coordinated with the earthwork to insure that all holes, rocks, stumps, clods and other debris have been removed from the bed and inside slopes of the lagoon and that the surface is suitable to receive the liner.

B. The liner material shall be unfolded in place. Do not stretch the liner but place it loosely to accommodate soil settling.

C. Field seaming of the liner shall be accomplished by overlapping panels and sealing with an approved adhesive, or by welding overlap with hot air heat welding equipment in accordance with the liner manufacturer's recommendations. A written procedure approved by the Laboratory shall be followed.

D. The edge of the liner shall be anchored as shown on drawing W7790-0103-DD-00 and in accordance with the liner manufacturer's recommendations.

6. SUBMITTALS

The Subcontractor shall submit the following information in accordance with the procedure specified in the "General Conditions" Division I:

A. Material certification.

B. Installation procedure.

7. ALTERNATE NO. 1

In lieu of installing the liner sheet specified above, the Subonctractor shall provide the following, if acceptable to the Laboratory:

A. Liner sheet, as specified above, shall be installed over the inside slopes of the lagoon dike only. Edges shall be anchored as detailed on the drawing.

B. Bentonite clay shall be provided over the entire lagoon bottom, including the bottom of the lower liner-sheet anchorage-trench. The Bentonite shall be evenly distributed at a rate of one-half pound (minimum) per square foot of surface area.

C. A two-inch thick layer of blow sand shall be installed over the Bentonite. The blow sand shall be evenly distributed over the entire area to provide a uniform finished surface.

Blow sand is available, free of charge, from borrow areas within three miles of the site as designated by the Laboratory. All necessary pit development, loading, hauling, and handling shall be the responsibility of this Subcontractor at his own expense. The Subcontractor is advised that the designated borrow areas do not have unlimited depth of usable overburden over the underlying bedrock. The Subcontractor, at his option and expense, may extend the designated borrow areas or may develop new borrow areas upon approval of the Laboratory.

MECHANICAL WORK

FOR

ARGONNE-WEST

SANITARY SEWAGE TREATMENT EXPANSION

FACILITY NO. 779

1. GENERAL

The requirements of the "General Conditions" of the contract and of the "Special Conditions", Divisions I and II of these specifications, shall form a part of this division of these specifications.

2. SCOPE OF WORK

The work under this section of these specifications consists of furnishing all supervision, labor, materials, equipment, supplies and incidentals necessary and required to perform all operations in connection with the mechanical work. The work includes, but is not necessarily limited to, the furnishing and installing of:

(1) One four-cylinder air compressor with pressure regulator and relief valve.

(2) Discharge piping, fittings and check valve between the air compressor discharge and the sanitary lift station #778 discharge piping.

3. CODES AND SPECIFICATIONS

The following documents are applicable to the extent indicated in this specification and/or on the drawings:

(1) American Society for Testing and Materials

ASTM A 53 - 73	Welded and Seamless Steel Pipe
ASTM A 181 - 68	Forged or Rolled Steel Pipe Flanges, Forges Fittings, and Valves and Parts for General Service
ASTM A 307 - 68	Low-Carbon Steel Externally and Internally Threaded Standard Fasteners

(2) American National Standards Institutes, Inc. (ANSI)

ANSI B 16:11-1966	Forged Steel Fittings, Socket-Welding and Threaded
ANSI B 31.1-1973	Code for Pressure Piping
ANSI B 31.1b-1973	Addendum

4. EQUIPMENT

The following equipment shall be furnished and installed as shown on Drawing W7790-0103-DD-00, Sheet 4:

(1) One Piston Compressor, 4 cylinder, Gast Manufacturing Corporation, Model 7LDE-10, with 1-1/2 H.P., 230 volt, 3 phase, explosion proof motor, 10 cfm maximum flow 7.5 cfm @ 50 psig, with four filters and safety relief valve on compressor.

(2) One Pressure Regulator, Gast Manufacturing Corporation, Model 2R 000 A.

(3) One Pressure Gauge, Gast Manufacturing Corporation, Model AF 583.

5. PIPING MATERIAL

Includes 1-inch compressor discharge pipe installed from the 3/8-inch compressor outlet port to the Sanitary Lift Station #778 pump discharge pipe.

(1) Pipe - Schedule 40, black, ASTM A-53, Grade A threaded for connection to equipment.

(2) Fittings - Forged steel fitting, threaded, ASTM A181, Grade 1, ANSI B16:11.

(3) Valve - Check Valve, 125 lb. WSP, brass or bronze body with screwed ends, horizontal swing check, brass or bronze disc, Crane No. 34, Walworth No. 406 or approved equal.

(4) Union - 300 lb., black iron, screwed, brass to iron seats, ASTM A-197.

6. PIPE INSTALLATION

(1) General

(a) Piping shall be arranged and installed as indicated on the drawings with exposed piping straight, and where possible, run parallel and at right angles to walls and the floor unless otherwise indicated on the drawings.

(b) Parallel lines shall be located and grouped in the same horizontal or vertical plane and as close as possible but with ample spacing for access to valves.

(c) Full lengths of pipe shall be used wherever possible. Short lengths of pipe with couplings will not be permitted.

(d) All pipe shall be cut to exact measurement to be installed without forcing and shall be reamed and cleaned to eliminate foreign matter.

(e) All changes in direction shall be made by using pipe fittings.

(2) Cleaning and Protection

Before construction of any line, care shall be taken that the interior surfaces of all piping, tubing, and components are thoroughly clear and free of foreign material. During progress of construction, ends of all piping and tubing shall be protected to prevent ingress of dirt, water, and foreign material.

(3) Screwed Joints

(a) Threads shall conform to requirements of ANSI B2.1.

(b) Threads shall be made up with teflon tape.

(4) Hangers and Supports

(a) All piping shall be supported as shown on the drawings or as specified herein. All necessary structural steel, hanger rods, turnbuckles, beam clamps, angle iron clamps, inserts, brackets, pipe straps, supports, and bracing shall be provided as shown or as required.

(b) All materials and construction methods shall be in accordance with the latest edition of the Code for Power Piping, ANSI B31.1.0.

(c) Each pipe shall be separately supported, except that where two or more pipes are installed at the same elevation they may be supported on a trapeze hanger.

(d) Hangers shall be secured to the masonry or poured concrete structures with self drill expansion shields or ANL-approved equal.

7. TESTS

(1) At such time as progress of construction will permit and when designated by the authorized Laboratory representative, all piping installed under this subcontract shall be inspected and pressure tested for leaks.

(2) All devices, gauges and instruments which might be damaged due to test pressure shall be removed or isolated.

(3) The compressor piping shall be charged at 10 psig and the system checked for leakage with a glycerine-soap distilled water solution. Any leaks shall be repaired and the system retested at 10 psig until all leaks are corrected. The system shall be thus soap-bubble tested again at 10 psig pressure increments until 60 psig is reached. The system shall be isolated at 60 psig and the pressure held for two hours without a loss in pressure other than that which might result from changes in the surrounding temperature, such pressure loss not to exceed 5 psig.

8. SUBMITTALS

The Subcontractor shall submit the following items of information in accordance with the procedure specified in the GENERAL CONDITIONS, Division I:

(1) Shop drawings and instruction manual for the air compressor.

(2) Descriptive data shall be submitted on the following:

(a) Pressure regulator

(b) Check valve

(c) Pressure gauge

ELECTRICAL WORK

FOR

ARGONNE-WEST

SANITARY SEWAGE TREATMENT EXPANSION

FACILITY NO. 779

1. GENERAL

The requirements of the "General Conditions" of the contract and of the "Special Conditions", Divisions I and II of these specifications, shall form a part of this division of these specifications.

2. SCOPE OF WORK

The work under this section of these specifications consists of furnishing all plant, supervision, labor, materials, equipment, supplies and incidentals necessary and required to perform all operations in connection with the electrical work. The work includes, but is not necessarily limited to the following:

(a) Furnish and install (1) 208-volt 3-phase combination motor starter in a nema type 7D (explosion proof) enclosure. Included in the installation will be the power and control circuits shown on Dwg. No. W7790-0103-DD-00.

(b) Furnish and install additional grounding as indicated on the drawing.

(c) Furnish and install one (1) three-phase, 15-amp. circuit breaker (G.E. type T.Q.) in the existing 208/120 V panel located in Building 778.

3. DEFINITIONS AND/OR APPLICABLE PUBLICATIONS

National Electrical CODE (1971)

National Electrical Manufacturer's Association (NEMA)

4. RELATED WORK SPECIFIED IN OTHER SECTIONS

Valves, piping, compressor, and other devices are specified in the MECHANICAL WORK section.

5. EQUIPMENT AND INSTALLATION

The Subcontractor shall furnish all electrical materials and equipment, as shown on the drawings and all other equipment and materials necessary to complete the entire installation. The construction area is a Class I, Division I, Group D hazardous area as defined in the National Electrical Code. Therefore, all installation shall be in accordance with Code criteria for all Class I, Division I, Group D area.

Electrical materials shall be new and approved by the Underwriters' Laboratories, Inc., wherever standards have been established by that agency. All materials shall be the standard products of manufacturers regularly engaged in the production of such equipment and shall be the manufacturer's latest standard design that complies with the specification requirements.

The installation work shall be performed by skilled electrical workmen under the direct supervision of the Subcontractor and shall be executed in a neat and workmanlike manner, in accordance with the requirements of the National Electrical Code for a Class I Division I Group D hazardous area. The drawings indicate the extent and general arrangement of the conduit and the wiring systems. If any departures from the drawings are deemed necessary by the Subcontractor, details of such departures and reasons therefor shall be submitted as soon as practicable to the Laboratory for approval. No such departures shall be made without the prior written approval of the authorized Laboratory representative.

(a) Conduit

All conduit to be installed shall be rigid-steel, hot-dipped galvanized.

(b) Conduit Installation

Where installed in hazardous atmospheres, all conduit shall be galvanized rigid steel with threaded fittings. Short lengths of explosion-proof (Class I Group D) flexible metal conduit shall be used for making final raceway connections to motors and other vibrating equipment.

Conduit shall be installed complete with all accessories, fittings and boxes approved for Class I, Division I hazardous area. All work shall be run true, plumb, and parallel with adjacent members of the building, and shall present an orderly, neat, and workmanlike appearance. In addition to all other requirements for a heat and workmanlike installation, the following special requirements are mandatory for a Class I Group D hazardous area:

(1) Where conduit enters existing panels, sheet-metal junction boxes, outlet boxes, etc., it shall be solidly attached with double locknuts and bushings.

(2) Conduit shall be supported on each side of conduit bends or fittings with 1-hole conduit clamps and clamp backs.

(3) Manufactured elbows or field bends fabricated with the correct size of bending machine or hickey shall be used. Conduit bends that are crushed or deformed in any way shall not be installed.

(4) Conduit runs which have more than two 90° bends require a pull box; however, in cases of runs of conduit of 25 feet or less, it is possible that a conduit with three 90° bends can be pulled without the aid of a pull box. The Subcontractor shall be responsible for seeing that pull boxes are installed where they are needed, regardless of whether they are specifically shown on the drawings.

(5) Conduits entering an enclosure for switches, circuit breakers, fuses, relays, etc., shall be sealed according to the National Electrical Code for a Class I Division I hazardous area.

(c) Conduit Supports

One-hole conduit slamps shall be galvanized, malleable iron or steal straps with clamp backs of the correct size for the conduit being supported.

(d) Conductors

(1) Wire No. 8 AWG and larger shall be stranded copper with 600-volt, Type THW insulation, or approved equal.

(2) Control wire shall be No. 12 stranded copper with 600-volt, Type TW insulation as shown on the drawings.

(3) All phase and ground wire and cable No. 10 AWG size and smaller shall have factory color-coded conductors. This shall be extended to No. 4 AWG size and smaller for neutral wire and cable. Sizes larger than that above shall be factory color-coded or identified with "All temperature" color-coded markers. This marker identification shall include letters or numbers with color as listed below:

Service	Color
Phase A	Red
Phase B	Blue
Phase C	Black
Neutral	White
Ground	Green

(4) All control wiring, except where noted otherwise, shall be stranded and in the following color-coded insulation:

120-volt Circuits	Yellow

(5) Conductors having a green covering shall be used for grounding purposes only. All phase and neutral wire and cable shall be continuous in the same color-coded insulation and type to its extreme termination points.

(6) Where two or more circuits run to or through a single junction box and for all control wiring, each conductor shall be tagged with an approved marker identifying circuit, phase, or number. All feeders and mains shall be identified in pull boxes, wireways, and in wiring gutters of all panels to which they connect.

(7) Motor starter shall be connected so that when facing the circuit breakers or starters the phase conductor terminals shall be in the order A-B-C from left to right.

(e) Boxes

Pull and junction boxes shall be threaded for connection to conduit or cable terminations, and shall be explosion proof. Box sizes will not be less than the minimum size recommended by the National Electrical Code.

(f) Grounding

All electrical equipment shall be grounded as shown on the drawings.

6. TESTS

After installation is completed, and at such times as the Laboratory may direct, the Subcontractor shall conduct an operating test for approval. The test shall demonstrate that the system meets the operating requirements of the specifications, particularly the following:

(1) Individual conductors shall be free of grounds, shorts, and breaks. All conductors shall be given insulation resistance tests between adjacent conductors and to ground. The test shall be performed on completed circuits with all conductors connected and all enclosures grounded.

(2) No grounds shall exist between various items of equipment and their cabinets, enclosures, etc.

(3) All electrical circuits shall be checked for continuity after completion of wiring using an ohmmeter, and all complex circuitry, such as control circuits or other circuits consisting of several circuit elements, shall be checked for conformance with connection wiring diagrams.

(4) All electrical grounds shall be checked for continuity between the grounded equipment and siteground. Ground connections shall be visually examined and physically tested to assure firm attachment to equipment.

(5) All equipment shall be operated to demonstrate that all connections are properly made, that motor rotation is correct, that circuit protective devices are functioning, and that no circuits, motors, or other devices are overloaded.

(6) All elements of the electrical system shall be visually inspected to assure compliance with the circuit requirements, particularly, motor starter heater sizes, circuit breaker sizes, and other devices of similar nature.

REFERENCE 7

Letter, R.P. Hearn to R.J. Teunis
"Sanitary Sewage Treatment Expansion, Facility #779,"
11/21/74

ARGONNE
NATIONAL
LABORATORY

INTRA-LABORATORY MEMO

DATE: November 21, 1974

TO: R. J. Teunis — Site Manager, ANL-West

FROM: R. P. Hearn — Manager, Site Engineering

SUBJECT: Sanitary Sewage Treatment Expansion, Facility #779

I. BACKGROUND

ANL-West is in the process of constructing a third sewage lagoon at the Sanitary Sewage Treatment Facility, #779. This expansion is necessary to accommodate the present and projected site population at the EBR-II area. The third lagoon was designed to be basically identical to the existing No. 1 and 2 lagoons. The third lagoon is approximately 1,300 feet northeast of the EBR-II site drinking water pumps. The water table at the well is approximately 750 feet below the surface of the bottom of the lagoons.

Construction had progressed to the point where the bottom bentonite liner and the dike's plastic liner and riprap had been installed during the week of November 11. The next and final phase of the construction consisted of installing new culverts between all three lagoons to facilitate future transfer from lagoon to lagoon. Half of two of the culverts had been installed in lagoon No. 3 prior to November 11. In order to install the second half of the culverts to lagoon No. 3 and a new culvert between lagoon No. 1 and lagoon No. 2, it was necessary to drain the existing lagoons No. 1 and 2 to a point at least below the new culvert level. Plant Services decided that, since the existing lagoons were to be drained at least to this level, it would be an opportune time to fully drain the existing lagoons to inspect the bentonite liner. Consequently, during the week of November 11 the contents of the existing lagoons were transferred to the new lagoon and sewage from the Lift Station was diverted directly to lagoon No. 3. This transfer operation was closely monitored by Plant Services and Site Engineering personnel to determine whether there was any sign of leakage. The transfer was essentially complete late Friday afternoon, November 15, 1974, at which time Plant Services and Site Engineering personnel again monitored the level and detected no leakage.

II. UNEXPECTED EVENT

Monday morning, November 18, Plant Services reported that lagoon No. 3 was almost empty, most of the water, over a million gallons, disappeared. A large leak was found at the northeast corner of the lagoon, which appeared to be the opening of a fissure in the substrata lava rock. This leak was barricaded by a small coffer dam and sewage continued to be pumped directly from the Lift Station into this lagoon. It is evident there may also be other leaks.

III. RECOVERY ACTION

After damming the fissure, it was necessary to continue diverting sewage to this lagoon in order to allow the Construction Contractor time to complete the culvert installation. Installation of the culverts was pressed and essentially complete by 1600 hours, November 20, except for sealing around the ends. It is planned to complete the sealing of the culverts by 1600 hours, November 21, and place No. 1 and No. 2 lagoons back in normal operation.

A sample of the EBR-II Site drinking water was obtained November 20. The preliminary analysis indicates no bacterial contamination. Daily samples of the drinking water will be obtained for the next several weeks. In addition, an analysis will be made of a sample of liquid from lagoon No. 2 to obtain a rough estimate of the bacteria count of the escaped water.

With the return of the sewage disposal system to normal operation, adequate time should be available to evaluate the damage caused by the leak and recommend remedial action. This investigation will include further inspection of the new lagoon to determine if additional leak points can be found and to determine if the existing bentonite will seal. This will require that the new lagoon bottom be covered with water from a fire hydrant. In the meantime, we plan to request a price from the Construction Contractor for installing a plastic lining in the new lagoon. The plastic liner installation may have to be deferred until warm spring weather, however, if it is decided to proceed with this alternate.

We should point out that some liquid in lagoons No. 1 and 2 would have had to have been diverted to the desert at this time of the year (approximately 1/2 million gallons) if lagoon No. 3 had not been constructed. This drain-off allows for wintertime accumulation since evaporation is essentially reduced to nil.

RPH:jl

cc: C. S. Abrams
J. W. Auer
B. A. Kiemlen
R. L. Knaus
E. W. Krenz
G. L. Savidis
File 80733
CF

REFERENCE 8

Water Quality Criteria for Sanitary Lagoons

WATER QUALITY CRITERIA FOR SANITARY LAGOON

Analysis	Limit	Reference
Total Alpha Activity	5×10^{-6} µCi/ml	AECM-0524, Annex A, Table II - Soluble Pu-239
Total Beta Activity	3×10^{-7} µCi/ml	AECM-0524, Annex A, Table II - Soluble Sr-90
Tritium	3×10^{-3} µCi/ml	AECM-0524, Annex A, Table II - Soluble Tritium
Biochemical Oxygen Demand	None	California Water Quality Criteria discusses B.O.D. effect on fish life and bacteria. However, criteria are only applicable to flowing streams.
Dissolved Oxygen	None	California Water Quality Criteria discusses D.O. deficiencies or complete absence, and effect on fish life. Idaho standard is a minimum of 6 ppm or 90% of saturation for flowing waterways.
pH	None	Idaho standards are within 6.5-9.0 for surface and underground flowing waterways.

REFERENCE 9

Letter, L.C. Witbeck to C.E. Clark
"ANL-W Environmental Sampling and Analysis Information," 2/1/88

U.S. Department of Energy
ARGONNE NATIONAL LABORATORY
ARGONNE-WEST P.O. Box 2528, Idaho Falls, Idaho 83403-2528 Telephone 208/526-

February 1, 1988

C. E. Clark
Environmental Protection Office
U.S. Department of Energy
Idaho Operations Office
785 DOE Place
Idaho Falls, ID 83402

Subject: ANL-W Environmental Sampling and Analysis Information

Reference: Letter, J. H. Barry to Addressees, "Environmental Sampling and Analysis Information," dated 1/6/88.

Dear Mr. Clark:

Attached is the requested information for ANL-W. It is understood that DOE-ID will transmit the information on to the DOE-HQ Survey Team.

If you have any questions please contact M. J. Holzemer (526-7625) or myself (526-7537).

Very truly yours,

L. C. Witbeck
Assistant to Manager, Safety Security & Safeguards

LCW/MJH:jh

cc: w/Attach.
C. S. Abrams, w/o attach
B. R. Fritz, DOE-CH
G. C. Marshall, DOE-CH
J. H. Talboy, ANL-E
R. J. Teunis, w/o attach

bcc: w/attach

J. P. Bacca
D. W. Cissel, w/o
L. J. Harrison
C. E. Holson
M. J. Holzemer
R. E. Kaiser
D. S. Kirschner
W.H. Olson
R. A. Peralta, w/o
W. E. Stephens
R. Villarreal

LEGEND

β-SC - Beta Scintillation

DF - Silicon Diffused Junction

NaI - Sodium Iodide

ZNS - Zinc Sulfide

C - Continuous

M - Monthly

ZPPR - Zero Power Physics Reactor

TREAT - Transient Reactor Test

FASB - Fuel Assembly and Storage Building

L&O - Lab and Office Building

SCMS - Sodium Component Maintenance Shop

HFEF/N - Hot Fuel Examination Facility-North

HFEF/S - Hot Fuel Examination Facility-South

EBR-II - Experimental Breeder Reactor-II

FMF - Fuel Manufacturing Facility

NDA - Non Destructive Analysis

RLWTF - Radioactive Liquid Waste Treatment Facility

ANL-W - Argonne National Laboratory-West

ANL-E - Argonne National Laboratory-East

DOE-CH - Department of Energy - Chicago Operations

DOE-ID - Department of Energy - Idaho Operations

ENVIRONMENTAL SAMPLING ANALYSIS INFORMATION
ENVIRONMENTAL MONITORING OR EFFLUENT/EMISSION POINT

Specific Sample Location	Sampled By	Type of Sample	Parameters Analyzed For	Sampling Frequency	Analyzed By	Where Reports Are Reported	Written Procedure For Sampling and/or Analysis
Sanitary Lagoon	ANL-W Waste and Environmental Engineering	Liquid	Alpha and Beta Activity, Tritium and Gamma-Emitting Nuclides	Monthly (April-October)	ANL-W Analytical Laboratory	Annual Environmental Monitoring Report to DOE-CH with copy to DOE-ID Radiological and Environmental Sciences Laboratory	Sampling - No. * Analyses - ANL-W Analytical Laboratory Analytical Methods Manual
Sanitary Lagoon	ANL-W Waste and Environmental Engineering	Liquid	Low-Level Plutonium and Gamma-Emitting Nuclides	April and October	ANL-E Analytical Laboratory	Annual Environmental Monitoring Report to DOE-CH with copy to DOE-ID Radiological and Environmental Sciences Laboratory	Sampling - No. * Analyses- Plutonium - Standard Operating Procedure ACL-037 Gamma - Standard Operating Procedure ACL-072
Sanitary Lagoon	ANL-W Waste and Environmental Engineering	Liquid	Biological Oxygen Demand (BOD), Dissolved Oxygen (DO) and pH	Monthly (April-October)	Westinghouse Idaho Nuclear Company (WINCO) Laboratory	Annual Environmental Monitoring Report to DOE-CH with copy to DOE-ID Radiological and Environmental Sciences Laboratory. Monthly INEL Industrial Waste Management Information System (IWMIS) Report.	Sampling - No. Analyses - Part 900 of Standard Methods for Examination of Water and Wastewater - 16th Edition

* Sampling Procedures to be written and implemented by March 1, 1988.

ENVIRONMENTAL SAMPLING ANALYSIS INFORMATION
ENVIRONMENTAL MONITORING OR EFFLUENT/EMISSION POINT (contd)

Specific Sample Location	Sampled By	Type of Sample	Parameters Analyzed For	Sampling Frequency	Analyzed By	Where Reports Are Reported	Written Procedur For Sampling and/ Analysis
Industrial Waste Pond	ANL-W Waste and Environmental Engineering	Liquid	Alpha and Beta Activity, Tritium and Gamma-Emitting Nuclides, Hexavalent Chromium, Total Chromium, pH, Sulfate Ion, Phosphate Ion, Chloride Ion, Sodium Ion, Zinc, and Silver	Monthly (April-October)	ANL-W Analytical Laboratory	Annual Environmental Monitoring Report to DOE-CH with copy to DOE-ID Radiological and Environmental Sciences Laboratory	Sampling - No. * Analyses - ANL-W Analytical Laboratory Analytical Methods Manual
Industrial Waste Pond	ANL-W Waste and Environmental Engineering	Liquid	Low-Level Plutonium and Gamma-Emitting Nuclides	April and October	ANL-E Analytical Laboratory	Annual Environmental Monitoring Report to DOE-CH with copy to DOE-ID Radiological and Environmental Sciences Laboratory	Sampling - No. * Analyses - Plutonium - Standa Operating Procedur ACL-031 Gamma - Standard Operating Proce ACL-072
Production Wells (#1,#2) (through 1986)	Plant Services	Liquid	Arsenic, Barium Cadium, Chromium, Cyanide, Fluoride Lead, Mercury, Nitrate (N), Selenium and Silver	Annually	Westinghouse Idaho Nuclear Company (WINCO) Laboratory	Annual Environmental Montoring Report to DOE-CH with copy to DOE-ID Radiological and Environmental Sciences Laboratory	Sampling - No Analyses: WINCO Procedures Anion - 4-0022 (Anion-EPA-1) Metals-3-0019 (toxic metals-EPA-1

* Sampling Procedures to be written and implemented by March 1, 1988.

ENVIRONMENTAL SAMPLING ANALYSIS INFORMATION
ENVIRONMENTAL MONITORING OR EFFLUENT/EMISSION POINT (contd)

Specific Sample Location	Sampled By	Type of Sample	Parameters Analyzed For	Sampling Frequency	Analyzed By	Where Reports Are Reported	Written Procedure For Sampling and/or Analysis
Production Wells (#1,#2)	EG&G Industrial Hygiene (1987) ANL-W Waste and Environmental Engineering (Beginning in 1988)	Liquid	Arsenic, Barium Cadmium, Chromium, Cyanide, Flouride, Lead, Mercury Nitrate, Seleium, Silver, Sodium, Endrin, Lindane, Methoxychlor, Toxaphane; 2, 4-D; 2, 4, 5-TP Silvex, Trihalomethanes	Annually	Analytical Laboratories Inc., Boise, ID (1987) DATA CHEM, Salt Lake, Utah (Beginning in 1988)	To DOE-ID for submission to State of Idaho	EG&G Sampling - QA-026 ANL-W Sampling - No. * Analyses - Analytical Laboratories, Inc. State of Idaho certified laboratory for drinking water Data Chem. - State Idaho approved laboratory for drinking water
ANL-W Drinking Water Distribution System	ANL-W Waste and Environmental Engineering	Liquid	Coliform	Monthly (alternating drinking fountains)	EG&G Industrial Hygiene Laboratory	DOE-ID for submission to the State of Idaho	Sampling - ANL-W Health and Safety Manual, Section IX, Chapte 22, Part 900 of Standard Met s for the Examination of Water and Wastewater - 16th Editio Analyses - Part 900 of Standard Methods for the Examination of Water and Waste water - 16th Editio

*Sampling Procedure to be written and implemented March 1, 1988.

ENVIRONMENTAL SAMPLING ANALYSIS INFORMATION
ENVIRONMENTAL MONITORING OR EFFLUENT/EMISSION POINT (contd)

Specific Sample Location	Sampled By	Type of Sample	Parameters Analyzed For	Sampling Frequency	Analyzed By	Where Reports Are Reported	Written Procedur For Sampling and/ Analysis
ANL-W EBR-II Area (in the corners of the site-security perimeter; six samples total)	ANL-W Waste and Environmental Engineering	Soil	Plutonium and Gamma-Emitting Nuclides	Annually	ANL-E Analytical Laboratory	Annual Environmental Monitoring Report to DOE-CH with a copy to DOE-ID Radiological and Environmental Sciences Laboratory	Sampling - No. * Analyses - Plutonium - Standa Operating Proce ACL-031 Gamma - Standard Operating Procedur ACL-072
ANL-W Radioactive Scrap and Waste Facility	ANL-W Waste and Environmental Engineering	Soil	Plutonium and Gamma-Emitting Nuclides	Annually	ANL-E Analytical Laboratory	Annual Environmental Monitoring Report to DOE-CH with copy to DOE-ID Radiological and Environmental Sciences Laboratory	Sampling - No. * Analyses - Plutonium - Standa Operating Procedur ACL-031 Gamma -Standard Operating Procedur ACL-072
Outfall of the Hot Fuel Examination Facility-North Industrial Pipe	ANL-W Waste and Environmental Engineering	Sediment	Plutonium and Gamma-Emitting Nuclides	Annually	ANL-E Analytical Laboratory	Annual Environmental Monitoring Report to DOE-CH with copy to DOE-ID Radiological and Environmental Sciences Laboratory	Sampling - No. * Analyses - Plutonium - Standa Operating Procedur ACL-031 Gamma - Standard Operating Procedur ACL-072

* Sampling Procedure to be written and implemented by March 1, 1988.

ENVIRONMENTAL SAMPLING ANALYSIS INFORMATION
ENVIRONMENTAL MONITORING OR EFFLUENT/EMISSION POINT (contd)

Specific Sample Location	Sampled By	Type of Sample	Parameters Analyzed For	Sampling Frequency	Analyzed By	Where Reports Are Reported	Written Procedure For Sampling and/or Analysis
Interceptor Canal inlet to the Industrial Waste Pond	ANL-W Waste and Environmental Engineering	Sediment	Plutonium and Gamma-Emitting Nuclides	Annually	ANL-E Analytical Laboratory	Annual Environmental Monitoring Report to DOE-CH with copy to DOE-ID Radiological and Environmental Sciences Laboratory	Sampling - No. * Analyses: Plutonium - Sta Operating Procedure ACL-031 Gamma - Standard Operating Procedure ACL-071
Industrial Waste Pond (4-samples) and one sample from each corner of site perimeter	ANL-W Waste and Environmental Engineering	Vegetation	Plutonium and Gamma-Emitting Nuclides	Annually	ANL-E Analytical Laboratory	Annual Environmental Monitoring Report to DOE-CH with copy to DOE-ID Radiological and Environmental Sciences Laboratory	Sampling - No. * Analyses: Plutonium - Standar Operating Procedure ACL-031 Gamma - Standard Operating Proce ACL-072
ANL-W Site	N/A	Errosion Control	Errosion	Annually or following severe weather conditions	Plant Services	ANL-W Waste and Environmental Engineering	Analysis - No

*Sampling Procedures to be written and implemented by March 1, 1988.

ENVIRONMENTAL SAMPLING ANALYSIS INFORMATION
ENVIRONMENTAL MONITORING OR EFFLUENT/EMISSION POINT (contd)

Specific Sample Location	Sampled By	Type of Sample	Parameters Analyzed For	Sampling Frequency	Analyzed By	Where Reports Are Reported	Written Procedure For Sampling and/or Analysis
Radioactive Scrap and Waste Facility	Radiation, Fire, and Safety Engineering	Direct Reading and smear survey	Gamma - Direct Reading; Alpha and Beta-Gamma Smears	April and October	Radiation, Fire, and Safety Engineering	Annual Environmental Monitoring Report to DOE-CH with copy to DOE-ID Radiological and Environmental Sciences Laboratory	Sampling/Analyses Direct reading - ANL-W Radiation Safety Manual, Section IV, Chapter 1 Smear - ANL-W Radiation Safety Manual Section III, Chapter 4
Industrial Waste Ditches	Radition, Fire, and Safety Engineering	Direct Reading	Low-level Beta-Gamma	October	Radiation, Fire, and Safety Engineering	Annual Environmental Monitoring Report to DOE-CH with copy to DOE-ID Radiological and Environmental Sciences Laboratory	Sampling/Analyses Direct Reading - ANL-W Radiation Safety Manual, Section IV, Chapter 1
Suspect Radioactive Retention Tanks	Plant Services	Liquid	Alpha (plutonium), Beta, gamma, Uranium, pH, total solids and tritium	Prior to processing radioactive retention tank liquids	ANL-W Analytical Laboratory	ANL-W Waste Management Engineer	Sampling - ANL-W Radioactive Liquid Wastes Operating and Maintenance Procedures Analyses - ANL-W Analytical Laboratory Analytical Methods Manual

ENVIRONMENTAL SAMPLING ANALYSIS INFORMATION
ENVIRONMENTAL MONITORING OR EFFLUENT/EMISSION POINT (contd)

Specific Sample Location	Sampled By	Type of Sample	Parameters Analyzed For	Sampling Frequency	Analyzed By	Where Reports Are Reported	Written Procedure For Sampling and/or Analysis
Sanitary and Industrial Waste Lift Station	ANL-W Waste and Environmental Engineering	Liquid	Alpha, Beta and Gamma-Emitting Nuclides	Upon receipt of an alarm from in-line monitors	ANL-W Analytical Laboratory	ANL-W Waste Management Engineer	Sampling - No. * Analyses - ANL W Analytical Laboratory Analytical Meth Manual
EBR-II Turbine Condensate	EBR-II Chemistry	Liquid	Tritium	Bimonthly	ANL-W Analytical Laboratory	Monthly INEL Radioactive Waste Management Information System Report	Sampling - No. * Analyses - ANL-W Analytical Laboratory Analytical Methods Manual
HFEF/N Stack	Eberline continuous air monitor	Gaseous	See Table I	Continuous	N/A	N/A	HFEF-OMM 2640 Stack Effluent Monitoring System ANL-W Radiation Safety Manual - Operational and Source Check - Section I, Chapter 8 SIM-MC-50, Calibration

* Sampling Procedure to be written and implemented by March 1, 1988.

ENVIRONMENTAL SAMPLING ANALYSIS INFORMATION
ENVIRONMENTAL MONITORING OR EFFLUENT/EMISSION POINT (contd)

Specific Sample Location	Sampled By	Type of Sample	Parameters Analyzed For	Sampling Frequency	Analyzed By	Where Reports Are Reported	Written Procedure For Sampling and/or Analysis
RLWTF Stack	Eberline Continuous Air Monitor	Gaseous	See Table I	Continuous	N/A	N/A	Eberline Factory Manual-Calibration ANL-W Radiation Safety Manual - Operational and Source Check - Section I, Chapter 8
ZPPR Stack	Victoreen Continuous Air Monitor	Gaseous	See Table I	Continuous	N/A	N/A	Victoreen Factory Manual-Calibration ANL-W Radiation Safety Manual - Operational and Source Check - Section I, Chapter 8
TREAT Stack	Radiation, Fire and Safety Engineering	Fixed Filter (particulate)	See Table I	Monthly	ANL-W Waste and Environmental Engineering	Monthly INEL Radioactive Waste Management Information System Report	Sampling - No Analyses - ANL-W Radiation Safety Manual Section I, Chapter 4
FASB Stack	Radiation, Fire, and Safety Engineering	Fixed Filter (particulate)	See Table I	Monthly	ANL-W Waste and Environmental Engineering	Monthly INEL Radioactive Waste Management Information System Report	Sampling - No Analyses - ANL-W Radiation Safety Manual Section I, Chapter 4

ENVIRONMENTAL SAMPLING ANALYSIS INFORMATION
ENVIRONMENTAL MONITORING OR EFFLUENT/EMISSION POINT (contd)

Specific Sample Location	Sampled By	Type of Sample	Parameters Analyzed For	Sampling Frequency	Analyzed By	Where Reports Are Reported	Written Procedure For Sampling and/or Analysis
L&O Stack	Eberline Continuous Air Monitor	Gaseous	See Table I	Continuous	N/A	N/A	Eberline Factory Manual-Calibration ANL-W Radiation Safety Manual-Operational and Source Check - Section I, Chapter 8
MDA Stack	Eberline Continuous Air Monitor	Gaseous	See Table I	Continuous	N/A	N/A	Eberline Factory Manual-Calibration ANL-W Radiation Safety Manual-Operational and Source Check - Section I, Chapter 8
SCMS Stack	Eberline Continuous Air Monitor	Gaseous	See Table I	Continuous	N/A	N/A	Eberline Factory Manual-Calibrat ANL-W Radiation Safety Manual-Operational and Source Check - Section I, Chapter 8

ENVIRONMENTAL SAMPLING ANALYSIS INFORMATION
ENVIRONMENTAL MONITORING OR EFFLUENT/EMISSION POINT (contd)

Specific Sample Location	Sampled By	Type of Sample	Parameters Analyzed For	Sampling Frequency	Analyzed By	Where Reports Are Reported	Written Procedur For Sampling and/ Analysis
FMF Stack	Eberline Continuous Air Monitor	Gaseous	See Table I	Continuous	N/A	N/A	Eberline Factory Manual-Calibration ANL-W Radiation Safety Manual-Operational and Source Check Section I, Chapter 8
EBR-II/ IIFEF/S Stack	Eberline Continuous Air Monitor	Gaseous	See Table I	Continuous	N/A	N/A	ANL-W STM-MC-50 (Calibration) ANL-W Radiation Safety Manual, Section I, Chapter 8
EBR-II Reactor Cover Gas	Germanium - Lithium Argon Sampling System (GLASS)	Gaseous	Kr-85m, Kr-85 Kr-88, Xe-133, Xe-135, Xe-135m, Xe-138, Br-83, H-3, and Ar-41	Hourly	Germanium Lithium Argon Sampling System (GLASS)	Monthly INEL Radioactive Waste Management Information System Report	GLASS Operating Instruction, Division IV - Section K Tritium and Agron-41 are calculated values from measured values
TREAT Stack	Calculated from correlations with reactor power and air flow	N/A	Ar-41, Kr-88 Xe-133, and Xe-135	N/A	ANL-W Waste and Environmental Engineering	Monthly INEL Radioactive Waste Management Information System Report	Reactor Power and air flow correlations determined in 1977 from grab samples

ENVIRONMENTAL SAMPLING ANALYSIS INFORMATION
ENVIRONMENTAL MONITORING OR EFFLUENT/EMISSION POINT (contd)

Specific Sample Location	Sampled By	Type of Sample	Parameters Analyzed For	Sampling Frequency	Analyzed By	Where Reports Are Reported	Written Procedur For Sampling and/ Analysis
HFEF/S Stack	HFEF/S Personnel	Gaseous Grab Sample	Xe-133, Xe-135, and alpha	Change of Operations	ANL-W Analytical Laboratory	Monthly INEL Radioactive Waste Management Information System Report	Sampling - No Analyses - ANL-W Analytical Labora- tory Analytical Methods
HFEF/N Stack	Radiation Fire, and Safety Engineering	Fixed Filter (particu- late)	Alpha and beta-gamma	Monthly	ANL-W Waste and Environ- mental Engi- neering	Monthly INEL Radioactive Waste Management Information System Report	Sampling - No Analyses - ANL-W Radiation Safety Manual, Section I Section I, Chapter
L&O Stack	EBR-II Chemistry	Gaseous (Xenon tag sample)	Xe-133 and Xe-135	As necessary for experiment	ANL-W Analytical Laboratory	Monthly INEL Radioactive Waste Management Information System Report	Sampling - Standar Operating Instruct Division IV, Section M Analysis - ANL-W Analytical Lab. Analytical Meth Manual
L&O Stack	Radiation, Fire, and Safety Engineering	Fixed Filter (particu- late)	Alpha and Beta-Gamma	Monthly	ANL-W Waste and Environ- mental Engi- neering	Monthly INEL Radioactive Waste Management Information System Report	Sampling - No Analyses - ANL-W Radiation Safety Manual, Section I, Chapter

ENVIRONMENTAL SAMPLING ANALYSIS INFORMATION
ENVIRONMENTAL MONITORING OR EFFLUENT/EMISSION POINT (contd)

Specific Sample Location	Sampled By	Type of Sample	Parameters Analyzed For	Sampling Frequency	Analyzed By	Where Reports Are Reported	Written Procedure For Sampling and/or Analysis
ZPPR Stack	Calculated based on grab sample use to correlate watt-hours and air flow	N/A	Xe-133 and Xe-135	Monthly	ANL-W Waste and Environmental Engineering	Monthly INEL Radioactive Waste Management Information System Report	Sampling - N/A Analyses - Calculat
ZPPR Stack	Radiation, Fire, and Safety Engineering	Fixed Filter (particulate)	Alpha and Beta-Gamma	Monthly	ANL-W Waste and Environmental Engineering	Monthly INEL Radioactive Waste Management Information System Report	Sample - No Analyses - ANL-W Radiation Safety Manual, Section I, Chapter 4
SCMS Stack	Radiation, Fire, and Safety Engineering	Fixed Filter (particulate)	Alpha and Beta-Gamma	Monthly	ANL-W Waste and Environmental Engineering	Monthly INEL Radioactive Waste Management Information System Report	Sampling - No Analyses - ANL-W Radiation Safety Manual, Section I, Chapter
RLWTF Stack	Radiation, Fire, and Safety Engineering	Fixed Filter (particulate)	Alpha and Beta-Gamma	Monthly	ANL-W Waste and Environmental Engineering	Monthly INEL Radioactive Waste Management Information System Report	Sampling - No Analyses - ANL-W Radiation Safety Manual, Section I, Chapter 4

ENVIRONMENTAL SAMPLING ANALYSIS INFORMATION
ENVIRONMENTAL MONITORING OR EFFLUENT/EMISSION POINT (contd)

Specific Sample Location	Sampled By	Type of Sample	Parameters Analyzed For	Sampling Frequency	Analyzed By	Where Reports Are Reported	Written Procedur For Sampling and/ Analysis
RLWTF Stack	Plant Services samples radioactive retention tank in RLWTF	Liquid Sample	Tritium	Per batch	ANL-W Analytical Laboratory	Monthly INEL Radioactive Waste Management Information System Report as a gaseous release from evaporators	Sampling - ANL-W Radioactive Liqui Wastes Operating and Maintenance Procedures Analyses: - ANL-W Analytical Labora- tory Analytical Methods Manual
Fuel Oil used (type 2)	Contractor	Fuel Oil	% sulphur, ash	Fuel oil purchased	Contractor	Monthly INEL Industrial Waste Management Information System Report	Contractor Specifi cations for the identified paramet
EBR-II, Plant Services and Photo Laboratory. Chemical usage and disposal to Indus- trial Waste Pond	N/A	Monthly usage records	Betz neutrmeen, sodium ion, sulfate ion, monoethyline, Nalco 7270, Eliminox, Chlorine gas, Betz 2020, Betz 20K, Slimicide J-12, Photo Lab Chemicals (established quantity)	Monthly usage records	EG&G has breakdown of chemicals and computes indi- vidual chemical constituents based on pro- vided water disposal to Industrial Waste Pond	Monthly INEL Industrial Waste Management Information System Report	N/A

ENVIRONMENTAL SAMPLING ANALYSIS INFORMATION
ENVIRONMENTAL MONITORING OR EFFLUENT/EMISSION POINT (contd)

Specific Sample Location	Sampled By	Type of Sample	Parameters Analyzed For	Sampling Frequency	Analyzed By	Where Reports Are Reported	Written Procedures For Sampling and/or Analysis
FMF Stack	Radiation, Fire, and Safety Engineering	Fixed Filter	Alpha and Beta-Gamma	Monthly	ANL-W Waste and Environmental Engineering	Monthly INEL Radioactive Waste Management Information System Report	Sampling - No Analyses - ANL-W Radiation Safety Manual, Section I, Chapter 4

TABLE I

RADIONUCLIDES MONITORED AND TYPE OF DETECTORS

Facility	Radionuclides	Detector	Frequency
EBR-II/HFEF/S	α	ZNS	C
	Cs-137	NaI	C
	Gross Particulate	NaI	C
	I-131	NaI	C
	Xe-133	NaI	C
	Gross Gas	NaI	C
HFEF/N	Kr-85	NaI	C
	Xe-133	NaI	C
	I-131	NaI	C
	β-Particulate	β-Sc	C
	Gross β-Gas	β-Sc	C
	Cs-137	NaI	C
	α	DF	C
RLWTF	I-131	NaI	C
	β-Particulate	β-Sc	C
	α	DF	C
ZPPR	β-γ	β-Sc	C
	α	ZNS	C
TREAT	Gross β-γ	Filter	M
	Gross α	Filter	M
FASB	Gross β-γ	Filter	M
	Gross α	Filter	M
L&O	Gross β Gas	β-Sc	C
	Beta-Particulate	β-Sc	C
	α	DF	C
	I-131	NaI	C
NDA	α	DF	C
	β-Particulate	β-Sc	C
SCMS	α-Particulate	NaI	C
	α	DF	C
FMF	β-Particulate	β-Sc	C
	α	DF	C

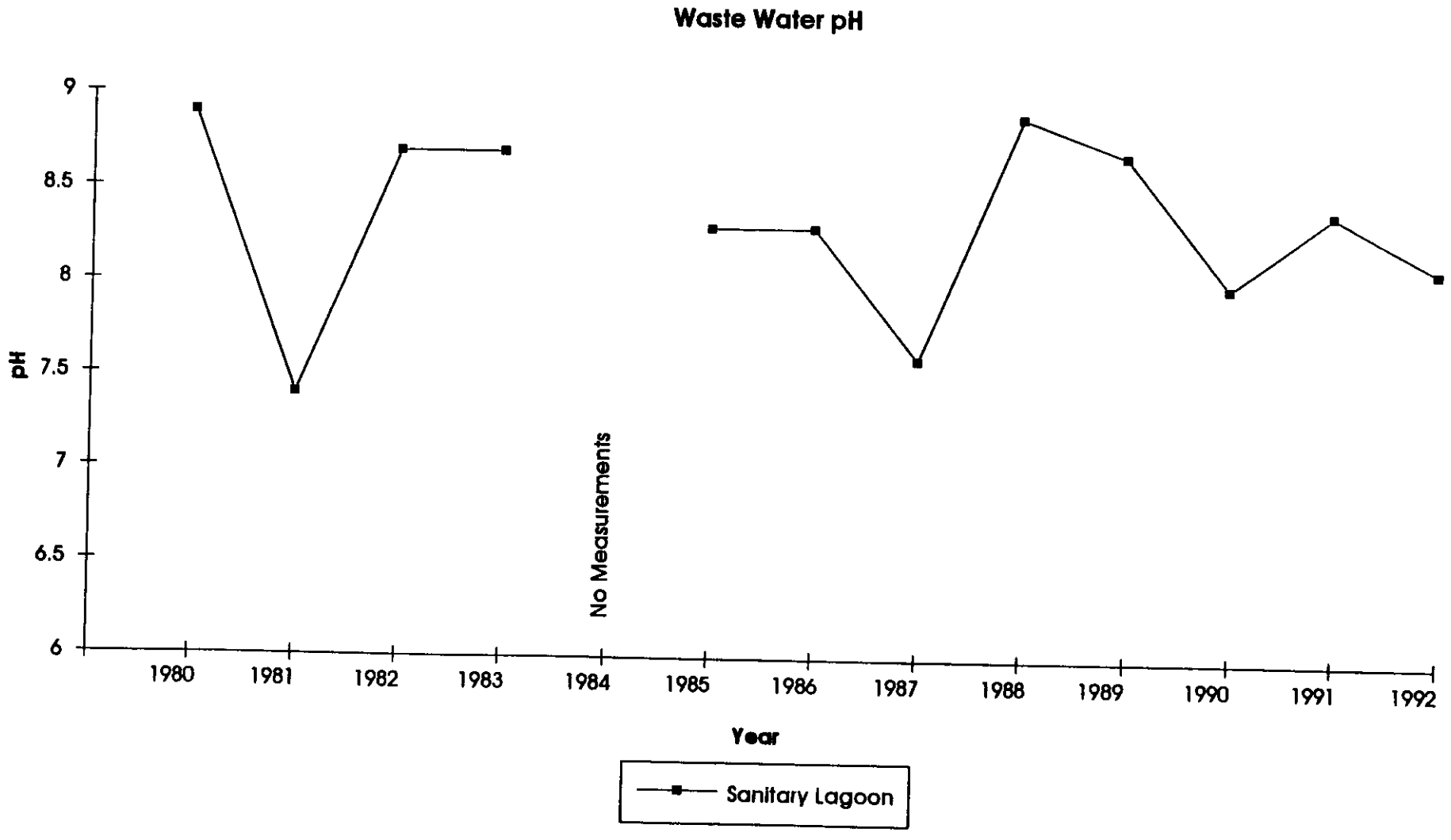
REFERENCE 10

Argonne National Laboratory-West
1992 Environmental Surveillance Report
(selected pages)

Sanitary waste waters

Year	Raw BOD (mg/L)	Final BOD (mg/L)	Raw DO (ppm)	Final DO (ppm)	pH
1980	139	56	0.6	4.8	8.9
1981	135	53	0.1	5.9	7.4
1982	299	38	0.3	4.7	8.7
1983	299	38	0.3	4.7	8.7
1984	No Measurements				
1985	172	12	1.1	4.2	8.3
1986	99.4	5.3	0.9	5.8	8.3
1987	169	2	0.3	2	7.6
1988	210	10	0.8	5.3	8.9
1989	203	9.3	0.8	5.3	8.7
1990	376	7.7	0.21	5.6	8
1991	245	17	2.12	4.2	8.4
1992	372	26	4.5	8.5	8.1

Figure 9.



PH.XLC

Figure 10.

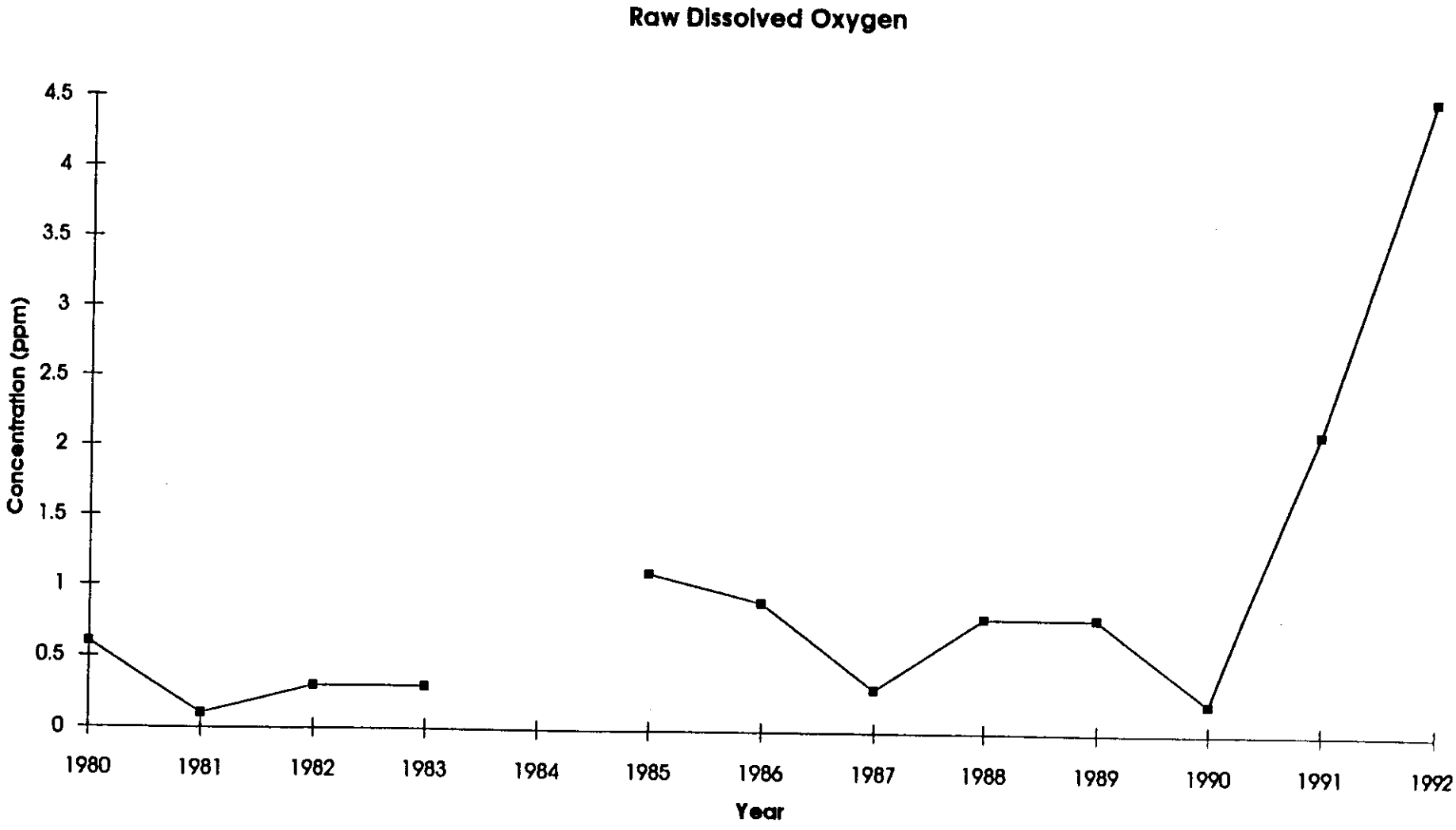
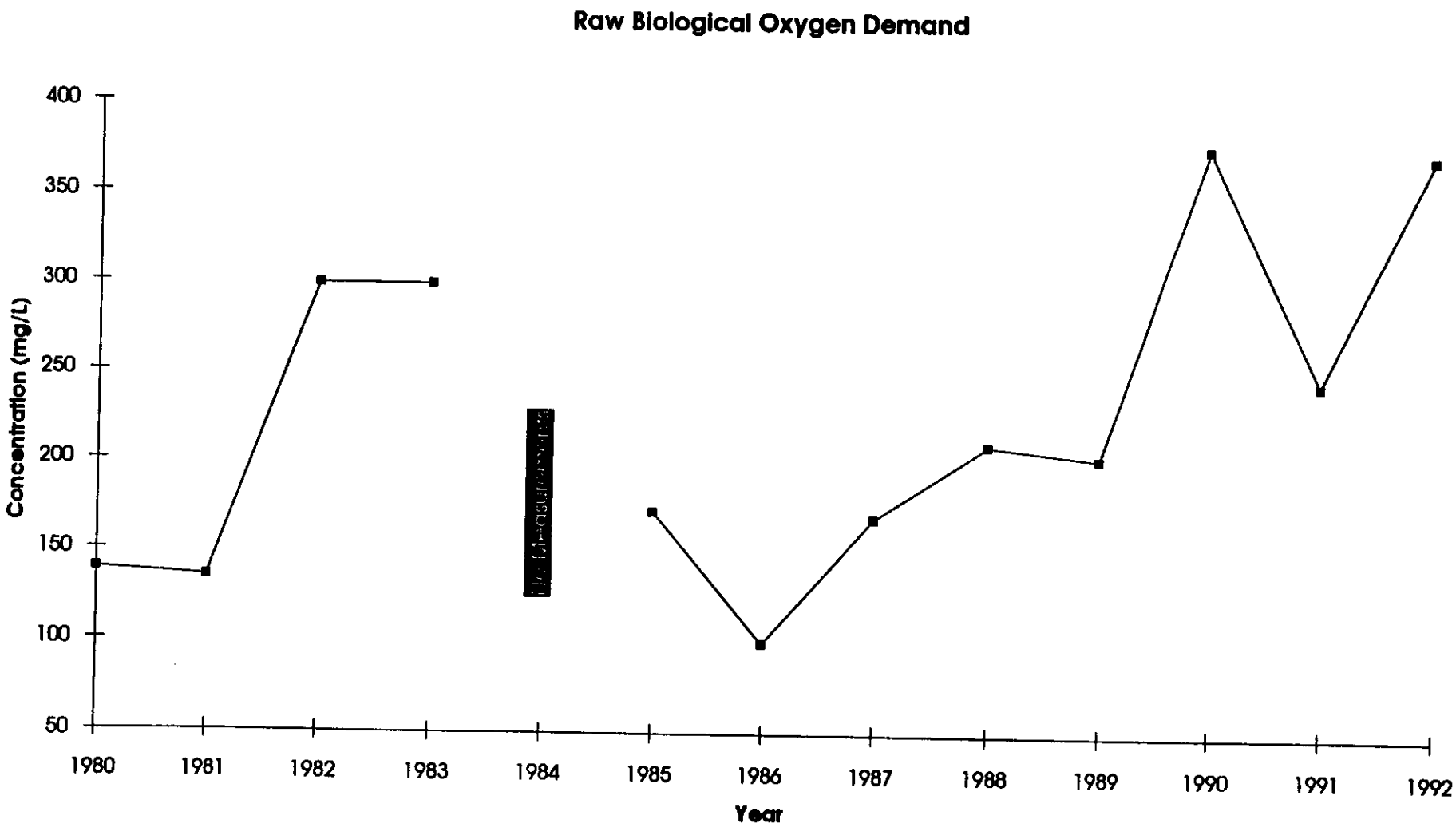

Raw Dissolved Oxygen
Concentration (ppm)
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
1980
1981
1982
1983
1984
1985
1986
1987
1988
1989
1990
1991
1992
Year

Figure 12.



RAW_BOD.XLC

REFERENCE 11

ANL-W ESH Manual
"Sanitary Lagoon Environmental Sampling Procedure"
(Section IX, Chapter 25), December 1990

SECTION IX - CHAPTER 25

SANITARY LAGOON ENVIRONMENTAL SAMPLING PROCEDURE

1.0 PURPOSE

This chapter provides the procedures to be used to collect liquid samples from the Argonne National Laboratory-West (ANL-W) sanitary lagoons for a variety of subsequent analyses. The use of these procedures will ensure that ANL-W meets sampling commitments outlined in DOE Orders 5400.1, 5400.5, and 5400.6. In addition, use of these procedures will provide assurance that sample integrity is maintained from the time of collection in the field until the time of analysis. Normally, sanitary lagoon samples are to be collected in conjunction with the collection of industrial waste pond samples (see Chapter 24, Section IX, of this manual).

2.0 GENERAL

Sanitary lagoon samples are collected for several types of analyses. The analytes and corresponding sampling frequencies and collection points are as follows:

2.1 ANALYTES: PRIMARY LAGOON

Alpha activity	Beta activity
Gamma-emitting nuclides	Tritium
Cadmium	pH

Frequency: Monthly (April through October)

2.2 ANALYTES: SECONDARY LAGOON

Gamma-emitting nuclides	Low-level plutonium

Frequency: Semi-annually (April and October)

2.3 ANALYTES: SECONDARY LAGOON and BLDG. 778 LIFT STATION

Biological Oxygen Demand (BOD)	pH
Suspended Solids	Dissolved Oxygen (DO)

Frequency: Monthly (April through October)

In addition to directing the collection of the samples described above, Environment, Waste Management (EWM) personnel shall also:

(1) Take monthly (April through October) pH and/or dissolved oxygen (DO) readings, as applicable.

(2) Collect trip blanks, equipment blanks, and field duplicates as described in 3.1.

3.0 REQUIREMENTS

3.1 Trip blanks, equipment blanks, and field duplicate samples shall be collected. Refer to 3.3, Chapter 6, Section IX, of this manual, for the procedures to be used to collect these samples.

3.1.1 Trip blanks

a. One 1-liter trip blank will be prepared each month. This trip blank will cover the monthly samples collected at both the sanitary lagoon sources and at the industrial waste pond and is also referred to in 3.1.1.a, Chapter 24, Section IX, of this manual.

b. A trip blank will be prepared for both the April and October low-level plutonium, gamma-emitting nuclides samples. A single 1-gallon trip blank will represent both the sanitary and IWP samples. This is the same trip blank referred to in 3.1.1, Chapter 24, Section IX, of this manual.

3.1.2 Equipment Blanks

a. One 1-liter equipment blank shall be collected while at the sanitary lagoon in April of each year. It shall be analyzed for the analytes listed in 2.1.

b. An equipment blank will not be collected for the April and October low-level plutonium, gamma-emitting nuclide samples due to the low probability of this type of inadvertent contamination.

3.1.3 Field Duplicates

a. One 1-liter field duplicate shall be collected at the primary lagoon in April of each year. It shall be collected, handled, and analyzed following the procedure used for the true sample, see 3.2.

b. Field duplicates shall be collected monthly in conjunction with the samples collected in 3.4. This collection is explained in 3.4.

3.2 ANALYTES LISTED IN 2.1 WILL BE SAMPLED AS FOLLOWS:

3.2.1 The appropriate number of pre-cleaned one-liter polyethylene bottles must be obtained by EWM from Stores prior to the planned sampling. If pre-cleaned bottles are not available, non-cleaned polyethylene bottles can be used if cleaned by ANL-W Analytical Laboratory (AL) personnel. Cleaning involves rinsing a bottle with a 1:1 solution of nitric acid and deionized (DI) water, followed by rinsing the bottle with DI water twice.

3.2.2 Once the sample bottles leave stores or the AL, they shall be under the direct custody of EWM or be locked in a secure area maintained by EWM.

3.2.3 Before leaving for the sample site, EWM shall obtain the required number of sample numbers from the EWM Chain-of-Custody (COC) log. The next available sample numbers (ANL-#-last two numbers of the year) in the Chain-of-Custody (COC) log shall be assigned to the samples to be collected and shall be recorded on the appropriate sample labels, in the Environmental Monitoring (EM) field log book, in the COC log, and, if one is used, on the sample analysis request form.

3.2.4 Prior to leaving for the sample sites, EWM shall calibrate the portable pH/DO meter. All calibration procedures shall be followed in accordance with the manufacturers instructions and shall be recorded in the EM field log book.

3.2.5 EWM shall meet with the Plant Services (PS) representative at the time previously agreed upon. EWM shall bring all items required for sampling (see Attachment 1) except the extension rod; this will be brought by the PS representative.

3.2.6 EWM shall observe the sample collection by PS personnel, assist as necessary, and record data in the EM field log book.

3.2.7 Sample collection involves the following:

a. Mentally divide the lagoon into four quadrants, sample from a different quadrant of the PRIMARY lagoon each sampling period. Each of the four quadrants shall be sampled once in a four month period.

b. Select a sample site and collect the sample a minimum of three feet from the shore line.

c. Label the bottle just prior to sample collection with:

(1) Date

(2) Time

(3) Pond designation (industrial vs sanitary)

(4) Quadrant sampled

(5) Sample number (see 3.2.3 for instructions)

(6) Name of person collecting the sample.

d. Collect the sample (wearing rubber gloves):

(1) Attach the uncapped bottle to the extension rod.

(2) Submerge the bottle beneath the lagoon surface until a small amount of liquid enters the bottle.

(3) Rinse the inside of the bottle with the liquid, then dump the liquid out.

(4) Submerge the bottle beneath the lagoon surface, fill the bottle with lagoon liquid.

(5) Retrieve the sample bottle and secure the cap.

e. Wash off the exterior of the sample bottle with DI water.

3.2.8 The information recorded on the sample bottle shall also be recorded in the EM field log book.

3.2.9 The following pH and/or DO readings shall be taken monthly at the indicated sanitary lagoon sources in conjunction with the physical collection of the above mentioned liquid samples using procedures provided by the instrument manufacturer. This data shall be recorded in the EM field book.

Building 778 (Lift Station) - pH

Primary Lagoon - pH

Secondary Lagoon - pH and DO

3.2.10 A visual check for oil and grease on the lagoon shall be made and recorded in the EM field log book.

3.2.11 EWM shall maintain visual contact with the sample from time of collection until it is taken to the AL. If this is not possible:

a. EWM shall affix a COC seal to the sample bottle in such a way that the seal must be broken if the sample bottle is opened.

b. An ANL-W COC form is to be filled out by EWM.

(1) EWM shall sign in the "Relinquished by: (Signature)" blank.

(2) The person assigned to deliver the sample to the AL will sign in the "Received by: (Signature)" blank.

(3) This form will accompany the sample to the AL.

3.2.12 If a COC form has not already been initiated, one will be initiated by EWM when the sample is delivered to the ANL-W AL.

3.2.13 Upon delivery to the AL:

a. The sample deliverer shall sign in the "Relinquished by: (Signature)" blank

b. AL personnel shall sign in the "Received for Laboratory by: (Signature)" blank and shall mark the appropriate boxes.

c. A copy of the COC form, appropriately completed, shall be returned to EWM by AL personnel.

3.2.14 The sample shall be split and appropriately preserved by AL personnel immediately upon receipt.

3.3 ANALYTES LISTED IN 2.2 SHALL BE SAMPLED AS FOLLOWS:

3.3.1 Prior to actual sample collection an ANL-W Shipping Order must be filled out and an authorized signature obtained by EWM.

3.3.2 The same procedures as delineated in 3.2.1 through 3.2.11 shall be followed with the following exceptions:

a. Where one 1-liter sample bottle was used in 3.2, three 1-gallon polyethylene sample bottles shall be used in 3.3.

b. The word "sample" in 3.3 will refer to all three, filled, 1-gallon sample bottles.

c. Each of the three bottles comprising the one sample will each be filled in a different quadrant of the SECONDARY lagoon. The fourth quadrant, the one that does not get sampled in April, shall be one of the quadrants sampled during the second sampling in October.

d. Enough room must be left in each sample bottle to add up to 15 ml of nitric acid later.

3.3.3 The samples shall be preserved to a pH of <2 using concentrated nitric acid (approximately 5 ml per 1-gallon bottle) by AL personnel.

3.3.4 Following preservation, a COC seal shall be affixed to each sample bottle by EWM in such a way that the seal must be broken if the bottle is opened.

3.3.5 At this point a COC form is to be filled out by EWM. This form will accompany the sample to Materials Supply (MS) and ultimately ANL-E, being signed each time someone new relinquishes responsibility for the sample. The sample shall remain in the custody of the person listed on the COC form or be locked in a secure area.

3.3.6 The sample shall be delivered to MS personnel, who shall arrange for a radioactive contamination survey of the sample, package, and ship the sample (with the COC paperwork and the analysis form) to the ANL-E Analytical Laboratory. Copies of the COC form, appropriately completed, shall be returned to EWM by both MS personnel and ANL-E AL personnel.

a. The samples shall remain in the custody of the person listed on the COC form or be locked in a secure area at all times.

b. When MS personnel ship the sample, they should write "transferred to Shipping Order #XXXXX", in the "Received by: (Signature)" blank after they sign in the "Relinquished by: (Signature)" blank.

3.4 ANALYTES LISTED IN 2.3 SHALL BE SAMPLED AS FOLLOWS:

3.4.1 Four clean, glass, ground-glass stoppered, 500 ml containers shall be provided by the Westinghouse Idaho Nuclear Company (WINCO) Laboratory.

3.4.2 Once the sample containers are delivered to ANL-W, they shall be under the direct custody of EWM (or a designated alternate) or be locked in a secure area maintained by EWM.

3.4.3 EWM shall call the Supervisor, Environmental Analysis Group, at WINCO to confirm the date that the WINCO courier will be picking up the samples, to determine when the samples should be collected. This is normally the third Wednesday of each month (April through October).

3.4.4 The same procedures as delineated in 3.2.3 through 3.2.10 shall be followed, with the following exceptions:

a. Sample bottles shall be wiped off with paper towels rather than washed off following sample collection.

b. Samples are to be taken at both the Bldg. 778 Lift Station (raw) and secondary lagoon (final).

c. Two (duplicate) samples are to be taken at each location. In the secondary lagoon these duplicate samples should both be taken from the same spot in the same quadrant. The lift station samples should both be taken from the same dipper bucket sample.

d. Bottles are to be filled such that a small amount of sample is displaced when the stopper is inserted. Care must be taken not to create or trap air bubbles during the sampling process.

3.4.5 The four samples shall be placed in the WINCO supplied metal shipping container.

3.4.6 EWM shall maintain visual contact with the samples from time of collection until they are locked in a refrigerator accessible only to authorized personnel. The samples shall be refrigerated as soon as practical following collection.

3.4.7 EWM shall arrange for a radioactive contamination survey of the samples.

3.4.8 The samples are to be refrigerated in the locked EWM refrigerator until the WINCO courier arrives to pick up them up. No preservatives are added to these sample bottles.

3.4.9 When the WINCO courier calls from the ANL-W gatehouse, EWM will take the samples to the gatehouse.

3.4.10 Upon arriving at the gatehouse, EWM shall:

a. Allow the guard to inspect the shipping container.

b. Affix a COC seal to the outside of the shipping container in such a way that the seal must be broken if the container is opened.

c. Initiate a ANL-W COC form.

3.4.11 The samples shall be delivered to the WINCO laboratory courier at the ANL-W gatehouse.

a. All COC paperwork shall be completed

(1) EWM shall sign in the "Relinquished by: (Signature)" blank.

(2) The courier shall sign in the "Received for Laboratory by: (Signature)" blank and check the appropriate boxes.

b. A completed copy of the COC form shall be given to the WINCO courier; EWM shall keep the other copies.

4.0 RESPONSIBILITIES

4.1 ENVIRONMENT, WASTE MANAGEMENT PERSONNEL shall:

4.1.1 Obtain new sample bottles from Stores (except for those supplied by WINCO), deliver them to the ANL-W Analytical Laboratory for cleaning if necessary, and deliver cleaned bottles to the sampling site.

4.1.2 Initiate Shipping Orders, as necessary.

4.1.3 Arrange for appropriate laboratory analyses of the lagoon samples.

4.1.4 Assign unique numbers to each sample physically collected.

4.1.5 Provide assistance and direction to Plant Services personnel during all sampling campaigns.

4.1.6 Implement COC procedures as necessary.

4.1.7 Arrange for a radioactive contamination survey of the samples being sent to WINCO.

4.1.8 Assure that samples are delivered to the ANL-W Analytical Laboratory, Materials Supply, or WINCO courier, as appropriate, as soon as possible after collection.

4.1.9 Calibrate and operate the direct reading instrumentation for analysis of pH and dissolved oxygen.

4.1.10 Evaluate data results.

4.1.11 Provide an annual report of the results to DOE-CH and DOE-ID, as well as supply monthly BOD, DO, suspended solids, oil/grease, and pH data to the Waste Management Engineer for inclusion in the Industrial Waste Management Information System (IWMIS) report.

4.2 PLANT SERVICES PERSONNEL shall:

4.2.1 Perform all sanitary lagoon sampling.

4.2.2 Assist EWM with COC procedures.

4.3 ANL-W ANALYTICAL LABORATORY PERSONNEL shall:

4.3.1 Clean sample bottles provided by EWM.

4.3.2 Provide materials for and carry out appropriate preservation on sanitary lagoon samples.

4.3.3 Analyze lagoon samples for the analytes listed in 2.1 per ANL-W Analytical Methods Manual.

4.3.4 Assist EWM with COC procedures.

4.4 ANL-E ANALYTICAL CHEMISTRY LABORATORY PERSONNEL shall:

4.4.1 Provide analytical services for those analytes listed in 2.2 per Standard Operating Procedures ACL-037 and ACL-072, respectively.

4.4.2 Assist EWM with COC procedures.

4.5 MATERIALS SUPPLY PERSONNEL shall:

4.5.1 Arrange for a radioactive contamination survey of the samples to be shipped to ANL-E. The survey shall be completed prior to packaging.

4.5.2 Package and ship samples to the ANL-E AL.

4.5.3 Assist EWM with COC procedures.

4.6 HEALTH PHYSICS PERSONNEL shall:

4.6.1 Perform radioactive contamination surveys on samples to be sent off the ANL-W site.

5.0 REFERENCES

5.1 DOE Order 5400.1, "General Environmental Protection Program," November 9, 1988.

5.2 DOE Order 5440.5, "Radiation Protection of the Public and the Environment," February 8, 1990.

5.3 DRAFT DOE Order 5400.6, "Radiological Effluent Monitoring and Environmental Surveillance," September 14, 1988.

5.4 "Test Methods for Evaluating Solid Waste - Physical/Chemical Methods," 3rd Edition, EPA-SW-846.

5.5 Standard Methods for the Examination of Water and Waste Water, 17th edition, American Public Health Association.

5.6 State of Idaho Regulations, Title 1, Chapter 2, "Water Quality Standards and Wastewater Treatment Requirements."

ATTACHMENT 1

ENVIRONMENTAL SAMPLING CHECKLIST
SANITARY LAGOON

Call WINCO - Caroline Filby - to confirm sample pickup, normally the third Wednesday of the month.

Call Plant Services - Newell Bingham - to schedule sampling. Normally sample the morning of the day the WINCO samples will be picked up.

Signed shipping order (if April or October) _____

Analysis request forms _____

Field log book _____

Sample numbers from COC log _____

Chain of Custody form(s) _____

COC seals _____

Indelible marking pen _____

Regular pen _____

Trip blank(s) Monthly: (1) 1-liter _____
April and October (1) 1-gallon _____

Cleaned bottles

Monthly:	(1)	1-liter	_____
	(4)	500-ml glass	_____
Additional in April:	(3)	1-gallon	_____
	(2)	1-liter	_____
Additional in October:	(3)	1-gallon	_____

Deionized water _____

pH/DO meter - calibrated _____

Paper towels _____

Rubber gloves - 4 to 6 pair _____

Extension Rod _____

REFERENCE 12

Waste Management Data, Plant Services
ANL-West (Jan. 1991 - Dec. 1991)

WASTE MANAGEMENT DATA
PLANT SERVICES, ANL-WEST

Form WM-1 (Rev. #6)

Month of: January, 1991

I. NON-RADIOACTIVE LIQUIDS:

A. Industrial Waste		300,432	gallons
B. Sanitary Waste		383,909	gallons
C. Production Well Volume		12,425,000	gallons
D. Boiler Blowdown Volume	*	1,500	gallons

II. RADIOACTIVE LIQUIDS:

A. Total volume processed in RLWTF, Building 798		467	gallons
A.1 RLWTF, Batch No. 241		467	gallons
A.2 RLWTF, Batch No. ---		---	gallons
A.3 RLWTF, Batch No. ---		---	gallons
A.4 RLWTF, Batch No. ---		---	gallons
A.5 RLWTF, Batch No. ---		----	gallons

III. CHEMICALS:

A. $Na\ SO_3$ - Sulfite	*	2.2	pounds
B. Na_3PO_4 - Phosphate	*	1.9	pounds
C. Na OH - Caustic	*	3.6	pounds
D. Liquimine VI	*	1.4	pounds

IV. OIL:

A. Fuel Oil used (Auxiliary Boilers)		19,348	gallons
B. Fuel Oil purchased for Building 721		300	gallons

Comments: * Readings a little higher than normal due to draining of #2 Boiler for repairs and then refilling it.

R W Heinzbh
Signature

2/12/91
Date

RWH/esj 8/07/90

Form WM-1 (Rev. #6)

Month of February, 1991

I. NON-RADIOACTIVE LIQUIDS:

A. Industrial Waste	272,688	gallons
B. Sanitary Waste	336,462	gallons
C. Production Well Volume	12,950,000	gallons
D. Boiler Blowdown Volume	400	gallons

II. RADIOACTIVE LIQUIDS:

A. Total volume processed in RLWTF, Building 798	-0-	gallons
A.1 RLWTF, Batch No. ---	---	gallons
A.2 RLWTF, Batch No. ---	---	gallons
A.3 RLWTF, Batch No. ---	---	gallons
A.4 RLWTF, Batch No. ---	---	gallons
A.5 RLWTF, Batch No. ---	---	gallons

III. CHEMICALS:

A. Na SO_3 - Sulfite	0.3	pounds
B. Na_3PO_4 - Phosphate	0.2	pounds
C. Na OH - Caustic	0.9	pounds
D. Liquimine VI	0.1	pounds

IV. OIL:

A. Fuel Oil used (Auxiliary Boilers)	3,406	gallons
B. Fuel Oil purchased for Building 721	-0-	gallons

Comments: _____

Michael J. Svancik
Signature

3/7/91
Date

RWH/esj 8/07/90

Form WM-1 (Rev. #6)

Month of March, 19 91

I. NON-RADIOACTIVE LIQUIDS:

A. Industrial Waste	305,648	gallons
B. Sanitary Waste	341,932	gallons
C. Production Well Volume	12,917,000	gallons
D. Boiler Blowdown Volume	300	gallons

II. RADIOACTIVE LIQUIDS:

A. Total volume processed in RLWTF, Building 798	425	gallons
A.1 RLWTF, Batch No. 242	425	gallons
A.2 RLWTF, Batch No. ---	----	gallons
A.3 RLWTF, Batch No. ---	----	gallons
A.4 RLWTF, Batch No. ---	----	gallons
A.5 RLWTF, Batch No. ---	----	gallons

III. CHEMICALS:

A. Na SO_3 - Sulfite	3.5	pounds
B. Na_3PO_4 - Phosphate	1.0	pounds
C. Na OH - Caustic	0.2	pounds
D. Liquimine VI	1.1	pounds

IV. OIL:

A. Fuel Oil used (Auxiliary Boilers)	11,195	gallons
B. Fuel Oil purchased for Building 721	300	gallons

Comments: _____

R W Humphries
Signature

4/8/91
Date

RWH/esj 8/07/90

WASTE MANAGEMENT DATA
PLANT SERVICES, ANL-WEST

Form WM-1 (Rev. #6)

Month of April, 1991

I. NON-RADIOACTIVE LIQUIDS:

A. Industrial Waste	268,368	gallons
B. Sanitary Waste	315,796	gallons
C. Production Well Volume	3,050,000	gallons
D. Boiler Blowdown Volume	400	gallons

II. RADIOACTIVE LIQUIDS:

A. Total volume processed in RLWTF, Building 798	448	gallons
A.1 RLWTF, Batch No. 243	448	gallons
A.2 RLWTF, Batch No. ---	---	gallons
A.3 RLWTF, Batch No. ---	---	gallons
A.4 RLWTF, Batch No. ---	---	gallons
A.5 RLWTF, Batch No. ---	---	gallons

III. CHEMICALS:

A. Na SO_3 - Sulfite	0.5	pounds
B. Na_3PO_4 - Phosphate	0.75	pounds
C. Na OH - Caustic	1.0	pounds
D. Liquimine VI	5.7	pounds

IV. OIL:

A. Fuel Oil used (Auxiliary Boilers)	62,200	gallons
B. Fuel Oil purchased for Building 721	---------	gallons

Comments: _____

Michael Swanich
Signature

5/7/91
Date

RWH/esj 8/07/90

PLANT SERVICES, ANL-WEST

Form WM-1 (Rev. #6)

Month of May, 1991

I. NON-RADIOACTIVE LIQUIDS:

A. Industrial Waste	298 560	gallons
B. Sanitary Waste	242 968	gallons
C. Production Well Volume	4 826 000	gallons
D. Boiler Blowdown Volume	600	gallons

II. RADIOACTIVE LIQUIDS:

A. Total volume processed in RLWTF, Building 798	2800	gallons
A.1 RLWTF, Batch No. 244	1050	gallons
A.2 RLWTF, Batch No. 245	750	gallons
A.3 RLWTF, Batch No. 246	1000	gallons
A.4 RLWTF, Batch No. —	—	gallons
A.5 RLWTF, Batch No. —	—	gallons

III. CHEMICALS:

A. Na SO_3 - Sulfite	1.6	pounds
B. Na_3PO_4 - Phosphate	2.0	pounds
C. Na OH - Caustic	1.7	pounds
D. Liquimine VI	4.9	pounds

IV. OIL:

A. Fuel Oil used (Auxiliary Boilers)	68 169	gallons
B. Fuel Oil purchased for Building 721	—	gallons

Comments: _____

Michael Savanich
Signature

6/11/91
Date

RWH/esj 8/07/90

PLANT SERVICES, AML-WEST

Form WM-1 (Rev. #6)

Month of June, 19 91

I. **NON-RADIOACTIVE LIQUIDS:**

A. Industrial Waste	304,704	gallons
B. Sanitary Waste	228,889	gallons
C. Production Well Volume	5,382,000	gallons
D. Boiler Blowdown Volume	800	gallons

II. **RADIOACTIVE LIQUIDS:**

A. Total volume processed in RLWTF, Building 798	1295	gallons
A.1 RLWTF, Batch No. 247	420	gallons
A.2 RLWTF, Batch No. 248	450	gallons
A.3 RLWTF, Batch No. 249	425	gallons
A.4 RLWTF, Batch No. ---	---	gallons
A.5 RLWTF, Batch No. ---	---	gallons

III. **CHEMICALS:**

A. $Na\ SO_3$ - Sulfite	1.3	pounds
B. Na_3PO_4 - Phosphate	1.2	pounds
C. Na OH - Caustic	3.2	pounds
D. Liquimine VI	5.3	pounds

IV. **OIL:**

A. Fuel Oil used (Auxiliary Boilers)	31,516	gallons
B. Fuel Oil purchased for Building 721	------	gallons

Comments: _____

Michael Swanick
Signature

7/8/91
Date

RWH/esj 8/07/90

WASTE MANAGEMENT DATA
PLANT SERVICES, ANL-WEST

Form WM-1 (Rev. #6)

Month of July, 1991

I. NON-RADIOACTIVE LIQUIDS:

A. Industrial Waste	367,248	gallons
B. Sanitary Waste	165,862	gallons
C. Production Well Volume	4,483,000	gallons
D. Boiler Blowdown Volume	2,000*	gallons

II. RADIOACTIVE LIQUIDS:

A. Total volume processed in RLWTF, Building 798	-0-	gallons
A.1 RLWTF, Batch No. _____	-0-	gallons
A.2 RLWTF, Batch No. _____	-0-	gallons
A.3 RLWTF, Batch No. _____	-0-	gallons
A.4 RLWTF, Batch No. _____	-0-	gallons
A.5 RLWTF, Batch No. _____	-0-	gallons

III. CHEMICALS:

A. Na SO_3 - Sulfite	1.6*	pounds
B. Na_3PO_4 - Phosphate	2.0*	pounds
C. Na OH - Caustic	6.0*	pounds
D. Liquimine VI	5.0*	pounds

IV. OIL:

A. Fuel Oil used (Auxiliary Boilers)	26,872	gallons
B. Fuel Oil purchased for Building 721	-0-	gallons

Comments: * Large volume of blowdown due to draining of Number 1 boiler for inspection. Large chemical usage due to refill of Number 1 boiler.

Michael R. Swanick
Signature

8/5/91
Date

RWH/esj 8/07/90

PLANT SERVICES, AML-WEST

Form WM-1 (Rev. #6)

Month of August, 19 91

I. NON-RADIOACTIVE LIQUIDS:

A. Industrial Waste	364,992	gallons
B. Sanitary Waste	178,676	gallons
C. Production Well Volume	14,981,000	gallons
D. Boiler Blowdown Volume	800	gallons

II. RADIOACTIVE LIQUIDS:

A. Total volume processed in RLWTF, Building 798	1,500	gallons
A.1 RLWTF, Batch No. 250	500	gallons
A.2 RLWTF, Batch No. 251	1,000	gallons
A.3 RLWTF, Batch No. ----	------	gallons
A.4 RLWTF, Batch No. ----	------	gallons
A.5 RLWTF, Batch No. ----	------	gallons

III. CHEMICALS:

A. Na SO_3 - Sulfite	1.3	pounds
B. Na_3PO_4 - Phosphate	3.3	pounds
C. Na OH - Caustic	9.1	pounds
D. Liquimine VI	4.6	pounds

IV. OIL:

A. Fuel Oil used (Auxiliary Boilers)	13,303	gallons
B. Fuel Oil purchased for Building 721	--0--	gallons

Comments: * #3 Boiler Blowdown Valves are leaking, causing higher than normal numbers. Part are on order.

R W Hargrave
Signature

9/10/91
Date

RWH/esj 8/07/90

cc: G.R. Yerbich
E.A. Clifton

WASTE MANAGEMENT DATA
PLANT SERVICES, ANL-WEST

Form WM-1 (Rev. #6)

Month of September, 1991

I. NON-RADIOACTIVE LIQUIDS:

A. Industrial Waste	312,416	gallons
B. Sanitary Waste	315,830	gallons
C. Production Well Volume	8,787,000	gallons
D. Boiler Blowdown Volume	3,600*	gallons

II. RADIOACTIVE LIQUIDS:

A. Total volume processed in RLWTF, Building 798	1,825	gallons
A.1 RLWTF, Batch No. 252	1,000	gallons
A.2 RLWTF, Batch No. 253	450	gallons
A.3 RLWTF, Batch No. 254	375	gallons
A.4 RLWTF, Batch No. -	-	gallons
A.5 RLWTF, Batch No. -	-	gallons

III. CHEMICALS:

A. Na SO_3 - Sulfite	3.8	pounds
B. Na_3PO_4 - Phosphate	4.0	pounds
C. Na OH - Caustic	8.7	pounds
D. Liquimine VI	5.5	pounds

IV. OIL:

A. Fuel Oil used (Auxiliary Boilers)	32,682	gallons
B. Fuel Oil purchased for Building 721	-	gallons

Comments: *High readings due to draining of Boilers for annual inspections.

michael Swanich
Signature

10/01/91
Date

RWH/esj 8/07/90

cc: G. R. Yerbich
E. A. Clifton

PLANT SERVICES, ANL-WEST

Form WM-1 (Rev. #6)

Month of October, 1991

I. NON-RADIOACTIVE LIQUIDS:

A. Industrial Waste	274,944 gallons
B. Sanitary Waste	195,523 gallons
C. Production Well Volume	12,750,000 gallons
D. Boiler Blowdown Volume	600 gallons

II. RADIOACTIVE LIQUIDS:

A. Total volume processed in RLWTF, Building 798	-0- gallons
A.1 RLWTF, Batch No. ---	--- gallons
A.2 RLWTF, Batch No. ---	--- gallons
A.3 RLWTF, Batch No. ---	--- gallons
A.4 RLWTF, Batch No. ---	--- gallons
A.5 RLWTF, Batch No. ---	--- gallons

III. CHEMICALS:

A. Na SO_3 - Sulfite	0.7 pounds
B. Na_3PO_4 - Phosphate	0.8 pounds
C. Na OH - Caustic	3.8 pounds
D. Liquimine VI	3.1 pounds

IV. OIL:

A. Fuel Oil used (Auxiliary Boilers)	12,371 gallons
B. Fuel Oil purchased for Building 721	--- gallons

Comments:

Michael Gramich
Signature

11/06/91
Date

RWH esj 8/07/90

PLANT SERVICES, ANL-WEST

Form WM-1 (Rev. #6)

Month of November, 19 91

I. NON-RADIOACTIVE LIQUIDS:

A. Industrial Waste	271,648	gallons
B. Sanitary Waste	323,464	gallons
C. Production Well Volume	4,497,000	gallons
D. Boiler Blowdown Volume	600	gallons

II. RADIOACTIVE LIQUIDS:

A. Total volume processed in RLWTF, Building 798	-0-	gallons
A.1 RLWTF, Batch No. ---	-----	gallons
A.2 RLWTF, Batch No. ---	-----	gallons
A.3 RLWTF, Batch No. ---	-----	gallons
A.4 RLWTF, Batch No. ---	-----	gallons
A.5 RLWTF, Batch No. ---	-----	gallons

III. CHEMICALS:

A. Na SO_3 - Sulfite	1.4	pounds
B. Na_3PO_4 - Phosphate	2.3	pounds
C. Na OH - Caustic	6.3	pounds
D. Liquimine VI	7.1	pounds

IV. OIL:

A. Fuel Oil used (Auxiliary Boilers)	82,288	gallons
B. Fuel Oil purchased for Building 721	-0-	gallons

Comments: _____

M Swanich
Signature

12/12/91
Date

RWH/esj 8/07/90

[redacted]

WASTE MANAGEMENT DATA
PLANT SERVICES, AML-WEST

Form WM-1 (Rev. #6)

Month of December, 19 91

I. **NON-RADIOACTIVE LIQUIDS:**

A. Industrial Waste	271,744	gallons
B. Sanitary Waste	189,198	gallons
C. Production Well Volume	12,762,000	gallons
D. Boiler Blowdown Volume	300	gallons

II. **RADIOACTIVE LIQUIDS:**

A. Total volume processed in RLWTF, Building 798	-0-	gallons
A.1 RLWTF, Batch No. ---	---	gallons
A.2 RLWTF, Batch No. ---	---	gallons
A.3 RLWTF, Batch No. ---	---	gallons
A.4 RLWTF, Batch No. ---	---	gallons
A.5 RLWTF, Batch No. ---	---	gallons

III. **CHEMICALS:**

A. Na SO_3 - Sulfite	0.5	pounds
B. Na_3PO_4 - Phosphate	-0-	pounds
C. Na OH - Caustic	0.75	pounds
D. Liquimine VI	3.25	pounds

IV. **OIL:**

A. Fuel Oil used (Auxiliary Boilers)	14,657	gallons
B. Fuel Oil purchased for Building 721	425	gallons

Comments: *Due to error in reporting, 250 gal. of this total should have been reported for November, 1991.

M Sramek
Signature

1/13/92
Date

RWH/esj 8/07/90

REFERENCE 13

INEL Groundwater Monitoring Plan
(selected pages)

7. The boilers are blown down only when test results indicate that it is necessary.

In addition to the above, all suspect wastewater (suspect in that a possibility for contamination exis') is analyzed for the suspected constituents. If the possibility exists for the wastewater to be radioactive contaminated, the suspect wastewater is monitored for gross alpha, gross beta, tritium, gamma-emitting isotopes, and pH. If wastewate: is suspected to contain other hazardous substances (e.g. heavy metals), the wastewater is sampled for the suspected hazardous substance [for example see iii(2) and iv(2) above].

In addition to sampling done by the facilities, the ANL-W Environment and Waste Management (EWM) section collects monthly samples of IWP water during the ice-free months of April through October. The samples are analyzed for alpha, beta, and gamma contamination, tritium, cadmium, silver, zinc, sodium, phosphate, sulfate, chloride, chromium, and chrome +6 content and pH. These samples are not required for compliance purposes, they serve merely as indicators of IWP status. EWM also collects biannual samples which are analyzed for gamma and low-level plutonium content. Under direction of DOE-CH, EWM collects an annual IWP water sample which is analyzed for the TCLP constituents. Procedures for the sampling and handling of these EWM IWP samples can be found in Chapter 24, Section IX of the ANL-W ESH Manual.

b) Main Cooling Tower Blowdown Ditch

When routine water analyses of the main cooling tower indicate that the conductivity of the cooling water is 4.5 times the conductivity of the makeup water (4.5 cycles of concentration), system blowdown is started. The cycles of concentration are normally maintained between 4.5 and : ' :h reduces the blowdown rate and the required amount of chemical additions to the system. Var ... chemicals are used in the cooling tower systems to prevent build up of unwanted contaminants. These chemicals are derived from the processes describe above. The blowdown from the system drains to th: industrial waste pond through a series of unlined ditches (Figure 2-1). These ditches continually have water in them, with flows increasing during EBR-II reactor runs, which utilize the main cooling tower.

c) EBR-II Leach Pit

The leach pit, located southwest of EBRII (Figure 2-1) , is an unlined, underground basin, covered with reinforced concrete. An inlet pipe, located below ground level, discharged radioactive and mixed hazardous waste into the pit. The leach pit was used between 1959 and 1973, and once in 1975.

d) TREAT Industrial Ditch

The TREAT industrial ditch is a natural swale, approximately 190 feet long, running east from the facility, outside the security fence. Water discharged to this ditch comes from various heat exchanger cooling coils and water system drains. Although discharges to this ditch are not large they are continuous.

e) Sanitary Lagoons

The two sanitary lagoons in operation at ANL-W are sampled on a monthly basis, during the ice-free months April through October. The samples collected are analyzed for the following:

(i) Primary Sanitary Lagoon - alpha, beta, and gamma contamination, tritium and cadmium content and pH.

(ii) Secondary Sanitary Lagoon - BOD, DO, Total Suspended Solids, and pH. The results from these samples are compared with the results obtained from identical samples taken in the sewage lift station to evaluate the efficiency of the sewage lagoon's operation.

Biannual samples are also collected in the secondary lagoon and are analyzed for gamma and low-level plutonium content. Procedures for sanitary lagoon sample collection and handling can be found in Chapter 25, Section IX of the ANL-W ESH Manual.

REFERENCE 14

Memo of Conversation
Jennifer Fedder with Bill Stevens, 9/15/92

DATE: September 15, 1992

MEMO OF CONVERSATION

TO:	FILE, J. Fedder
FROM:	Jennifer Fedder
PERSON CONTACTED:	Bill Stevens Bruce Kienlen
ORGANIZATION:	ANL-W, ENV. & Waste MGT.
DAY & DATE CONTACTED:	Tuesday, September 15, 1992
TIME CONTACTED:	930
TYPE OF CONTACT:	I met with him. **I met with him.** He met with me.
SUBJECT OF DISCUSSION:	History of the Sanitary Sewage Lagoons.

SUMMARY

I met with Bill Stevens to discuss the history of the Sanitary Sewage Lagoons. He was not very familiar with the sewage lagoons, however he knew Bruce Kienlen, a former construction manager at ANL-W, was knowledgeable concerning the sewage lagoons. **We called Bruce Kienlen** to ask him some questions. Bruce relayed the following information to us: He confirmed that there was a bentonite liner approximately 1/8"-1/4" thick. He also mentioned that the discharge pumped out to the lagoons was monitored for radioactive releases at the Sanitary Waste Lift Station. Bruce also explained that the process of what went into the lagoons was fairly uncontrolled and that each individual building manager was responsible for what was dumped in the sanitary drains that led to the sanitary waste lift station and eventually the sewage lagoons.

REFERENCE 15

ANL-W Pond 779 Seepage Test
D.R. Braun, November 1992

Report No. EGG-FE-10499
Project File No. 015578

ANL-W 779 POND SEEPAGE TEST

D. R. Braun

November 1992

Idaho National Engineering Laboratory
EG&G Idaho, Inc.
Idaho Falls, Idaho 83415

Prepared for the
U.S. Department of Energy
Office of Environmental Restoration and Waste Management
Under DOE Idaho Field Office
Contract DE-AC07-761D01570

ABSTRACT

A seepage test was performed for two Argonne National Laboratory - West (ANL-W) sanitary wastewater treatment ponds, Facility 779. The test period was August 28 to September 14, 1992. The southwest pond seepage rate is estimated to be 0.20 inch per day based upon the field data collected between August 31 and September 10, 1992. The north pond seepage rate is estimated to be 0.02 inch per day based upon the field data collected between August 31 and September 14, 1992.

ACRONYMS

ANL-W	Argonne National Laboratory - West
INEL	Idaho National Engineering Laboratory
NOAA	National Oceanic & Atmospheric Administration
PTI	Protection Technology Idaho

CONTENTS

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ACRONYMS iii
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INFLUENT 2
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SEEPAGE 3
CONCLUSION 4
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Appendix B-ANL-W 779 Seepage Calculations B-1

SEEPAGE TEST

INTRODUCTION

The ANL-W 779 sanitary wastewater treatment ponds are located on the Idaho National Engineering Laboratory (INEL), north of the Argonne National Laboratory - West (ANL-W) site. Seepage rates were measured to determine if the ponds are a wastewater land application facility. The common industry standard for wastewater land application facilities is a field-measured seepage rate of one quarter inch per day or greater.

The southwest pond receives ANL-W wastewater and has gently sloping sides covered with rounded cobbles and a bentonite liner bottom (ANL-W Letter of October 12, 1992). This is a small pond and the wastewater surface area was approximately 0.6 acres during the test period.

The north pond receives wastewater from the southwest pond under normal operating conditions. The north pond has synthetically lined sides covered with rounded cobbles and a bentonite liner bottom (ANL-W Letter of October 12, 1992). This larger pond had a wastewater surface area of approximately 1.5 acres during the test period.

The two tested ponds have been in use for several years. A third pond was not tested, has not been in use since 1983, and is now used for emergency overflow only (ANL-W Letter of October 12, 1992). Drawing IPE-75C-1 shows the location and configuration of the ponds.

PROCEDURE

The test procedure was based upon the guidelines provided by the Idaho Division of Environmental Quality. The guidelines for evaluating seepage rates are presented in Appendix A. The seepage test deviated from the guidelines in the following areas.

The stilling well for the southwest pond was located in the transfer structure and the stilling well for the north pond was located near the south end of the pond. The guidelines recommend locating stilling wells in the center of ponds.

The southwest pond received influent during the test period. The guidelines recommend blocking influent flows.

Multiple personnel were utilized to perform the test. The guidelines recommend that one individual be responsible for all measurements.

DATA COLLECTION

Data collection began August 28 and concluded September 14, 1992, for a total of 16 days. Water surface measurements were recorded each Monday, Wednesday, and Friday morning, with the exception of Labor Day week when measurements were taken on Tuesday and Thursday mornings. Pump operating times were reported by ANL-W personnel. Precipitation was recorded by EG&G Idaho, PTI, and ANL-W personnel. Air temperature was monitored continuously and reported by NOAA personnel.

INFLUENT

During the test period, production of wastewater could not be avoided and the wastewater could not be diverted. However, transfer of wastewater between the ponds was discontinued. The southwest pond received influent and had no effluent. The north pond had no influent or effluent.

The southwest pond received wastewater from ANL-W during the test period. Two pumps are used by the wastewater system. Pump meter readings were not recorded, but estimates of pump operating durations were provided. The discharge rate of each pump was reported to be 50 gallons per minute. The southwest pond influent was computed using the estimated operating time and the pump discharge rate.

EVAPORATION AND PRECIPITATION

The pond evaporation rate was estimated by correlation with a measured evaporation rate in a large pan. The Class A evaporation pan was located on a berm of the southwest pond and the water surface was measured using a hook gage. The change in water surface was the net pan evaporation rate. A rain gage was used to measure the precipitation. The rain gage was attached to a post of the fence surrounding the ponds. The air temperature was recorded and the mean air temperature was calculated. A coefficient was selected based upon mean air temperature. The coefficient was applied to the net pan evaporation, less the precipitation, and the net pond evaporation rate was estimated.

SEEPAGE

The water surface of the two ponds was measured using two stilling wells and a hook gage. The stilling well for the southwest pond was located inside the transfer structure between the southwest and the north ponds. The stilling well for the north pond was a stand-alone stilling well which was placed in the north pond near the south end. The change in each pond water surface was equated to the net flow, net evaporation, and seepage. The seepage rate for each pond was calculated by solving the equation. The calculations are presented in Appendix B.

CONCLUSION

The mean seepage rate for the southwest pond is based upon four tests conducted from August 31 to September 10, 1992. The mean seepage rate for the north pond is based upon five tests conducted from August 31 to September 14, 1992. The test period from August 28 to 31, 1992, was not utilized. A measurement error may have occurred that resulted in an unreasonable pan evaporation rate of 1.1 inch per day for the period. The test period from September 10 to 14, 1992, was not utilized for the southwest pond. Pump operating time estimates were not sufficient to estimate the influent for the period.

The mean seepage rate for the southwest pond is estimated to be 0.20 inch per day. The seepage rates have a standard deviation of 0.11 inch per day. The 95% confidence interval of the mean seepage rate has an upper limit of 0.37 inches per day and a lower limit of 0.03 inch per day.

The mean seepage rate for the north pond is estimated to be 0.02 inch per day. The seepage rates have a standard deviation of 0.09 inch per day. The 95% confidence interval of the mean seepage rate has an upper limit of 0.13 inch per day and a lower limit of -0.10 inch per day.

The calculations are presented in Appendix B which contains an Engineering Design File (EDF) prepared to document this test. The EDF contains a graph of the test results, mean seepage rate, and confidence interval for each pond. The mean field-tested seepage rate of each pond is less than the industry standard wastewater land application rate.

APPENDIX A

IDAHO DIVISION OF ENVIRONMENTAL QUALITY

GUIDELINES FOR EVALUATING SEEPAGE RATES

IDAHO DEPARTMENT
OF HEALTH AND WELFARE

DIVISION OF
ENVIRONMENTAL QUALITY

Post Office Box 1626, Twin Falls, ID 83303-1626, (208) 734-9520

Cecil D. Andrus, Governor Richard P. Donovan, Director

September 4, 1991

WATER QUALITY PROGRAM GUIDANCE
No. MFC-8

SUBJECT

Procedure for evaluating wastewater treatment lagoon seepage rates.

PURPOSE

To establish a uniform standard procedure by which new and existing wastewater treatment lagoons can be evaluated to determine status of compliance with State seepage rate requirements.

DISCUSSION

Wastewater treatment lagoons constructed in the State of Idaho are required to meet a site-specific seepage rate as prescribed by the Department of Health and Welfare, Division of Environmental Quality. In the past, measurements to determine compliance with the required seepage rate have been performed utilizing a wide variety of instruments and procedures. Adoption of a standard testing procedure will ensure consistent seepage measurement techniques.

POLICY

1. Division of Environmental Quality staff will provide seepage rate allowances to the entity proposing to construct wastewater treatment lagoons.

2. All wastewater treatment lagoon plans and specifications submitted to the Division of Environmental Quality for review and approval must contain the following standard procedure.

3. Seepage test data must be submitted for review and approval.

_____
Originator

_____
Manager, Municipal Facilities Construction

_____
Chief, Water Quality Bureau

SEEPAGE TESTING PROCEDURE

Lagoons to be tested should be filled and maintained at design operational depth for at least two weeks prior to the beginning of the test period to allow for initial saturation (saturation period not required for synthetic lined lagoons). Measurements are to be taken at least every three (3) days over a period of fifteen (15) days (0,3,6,9,12,15) or until a consistent pattern is evident. One individual is to be responsible for all measurements and the measurements should be taken at the same hour of each test day.

Equipment

1. Precipitation gauge
2. Temperature recorder
3. Class A evaporation pan and stilling well
4. Hook gauge with Vernier scale accurate to 0.001 ft.
5. Appropriate length of 6 inch PVC pipe (Class 150 for stability) with suitable anchor support base for use as lagoon stilling well
6. Platform with support or boat for access to lagoon stilling well
7. Any necessary flow monitoring equipment.

Evaporation/Precipitation

A precipitation gauge is to be set up and monitored daily. The evaporation pan should be located on a level area as close to the lagoon as possible. If necessary, shims should be used to level the pan. The obvious concern is to try to duplicate lagoon exposure as nearly as possible (sun, wind, rain, etc.). The stilling well should be anchored in the pan with a rock or two and not moved once the test period begins. Initial water level in the pan should be about two (2) inches below the lip. Air temperature is continuously monitored to obtain the mean air temperature during the test period. The pan evaporation is multiplied by the pan coefficient (Table 1) to obtain the lagoon evaporation.

Lagoon Seal

The lagoon stilling well should be installed as near to the center of the cell as possible. The stilling well must be installed at 90 degrees to the water surface for accurate measurements. Access to the stilling well is by boat or by installing a temporary platform. (DO NOT impinge upon the stilling well). Mark a spot on the top of the stilling well to be used as a position indicator for the hook gauge. All measurements must be taken with the hook gauge in the same position.

Hook gauge readings shall be repeated a minimum of seven (7) times and numerically averaged.

Influent/effluent flows should be blocked to avoid unnecessary complications due to flow measurement errors.

General Notes

1. A water source will be necessary for both the lagoon and the evaporation pan.

2. When constructing new lagoons, it may be more practical to install a permanent stilling well before filling the lagoon rather than to use a temporary set-up.

3. A construction level will help in setting up the equipment properly.

4. On cloudy days, a flashlight may be helpful in seeing the hook gauge inside the stilling well.

Definitions

S_r is the seepage rate in inches per day.

S_2 is the seepage rate in gallons per acre per day.

E_{s1} is the pond surface elevation, day 1 in inches.

E_{sn} is the pond surface elevation, day n in inches.

ES is the pond surface elevation change in inches ($E_{s1} - E_{sn}$). Positive if the n day surface is lower than day 1; negative if the n day surface is higher than day 1.

I is the net pond evaporation which equals the net corrected pan evaporation in inches (may be a positive or negative number).

Q is the net effluent flow. May be positive (effluent > than influent flow) or negative (effluent < than influent flow). Value is zero if influent and effluent flows are blocked.

n is time in days.

P is pan coefficient from Table 1.

E_{pan1} is the evaporation pan surface, day 1 in inches

$E_{pan\ n}$ is the evaporation pan surface, day n in inches.

Calculations

Equation 1: $S_r = \frac{ES - I - Q}{n}$

Equation 2: $S_2 = S_r \frac{(in)(ft)(\text{lagoon surface area } ft^2)(7.48 \text{ gals.})}{(day)(12 \text{ in})(ft^3)}$
Lagoon surface area in acres

Equation 3: $ES = E_{s1} - E_{sn}$

Equation 4: $I = P[\text{precipitation} + E_{pan1} - E_{pann}] - \text{precipitation}$

Equation 5: $Q = \frac{(\text{eff. flow} - \text{influent flow in gals.})(ft^3)(12in)}{(\text{lagoon surface area } ft^2)(7.48 \text{ gals.})(ft.)}$

Table 1

PAN COEFFICIENT

MEAN TEMP. °F	COEFFICIENT
30	1.2
35	0.953
40	0.907
45	0.860
50	0.814
55	0.767
60	0.721
65	0.674
70	0.628
75	0.581
80	0.536
85	0.488

Pan Evaporation

$$I = P[\text{recipitation} + E_{pan\,1} - E_{pan\,n}] - \text{precipitation}$$

NOTE: Solving for I in the above equation assumes that the precipitation event was short duration. If a precipitation event during a seepage test is of extended duration P should be multiplied by the factor:

$$\frac{\text{n hours - precipitation hours}}{\text{n hours}}$$

SPECIFICATIONS INSERT

Lagoon Liner - Liner integrity of each individual cell shall be evaluated in the following manner:

a. Evaporation - Shall be measured utilizing a Class A evaporation pan and stilling well arrangement. Measurements accurate to 0.012 inch (0.001 foot) shall be taken six (6) times over a period of fifteen (15) days (day 0,3,6,12,15). The pan coefficient for comparison is dependent on the mean air temperature (°F) over the test period and shall be taken from Table 1.

b. Precipitation/Air Temperature - Precipitation shall be measured using a standard precipitation gauge accurate to the nearest 0.01 inch. Measurements shall be recorded following each precipitation event. Air temperature (°F) shall be continuously monitored and recorded.

c. Lagoon - New Cells - Shall be filled and maintained at design operating level for at least two weeks prior to testing (not required for synthetic liners). During the test period, influent/effluent flows shall be blocked. A level, fixed stilling well located as near to the center of the lagoon as possible shall be used at the point for measurement. Measurements accurate to 0.012 inch (0.001 foot) shall be taken six (6) times over a period of fifteen (15) days (day 0,3,6,9,12,15).

Lagoon - Existing Cells - Influent/effluent flows shall be blocked and the above procedure followed.

Definitions

S_r is the seepage rate in inches per day.

S_2 is the seepage rate in gallons per acre per day.

E_{s1} is the pond surface elevation, day 1 in inches.

E_{sn} is the pond surface elevation, day n in inches.

ES is the pond surface elevation change in inches ($E_{s1} - E_{sn}$). Positive if the n day surface is lower than day 1; negative if the n day surface is higher than day 1.

I is the net pond evaporation which equals the net corrected pan evaporation in inches (may be a positive or negative number).

Q is the net effluent flow. May be positive (effluent > than influent flow) or negative (effluent < than influent flow). Value is zero if influent and effluent flows are blocked.

n is time in days.

P is pan coefficient from Table 1.

E_{pan1} is the evaporation pan surface, day 1 in inches

$E_{pan\ n}$ is the evaporation pan surface, day n in inches.

Calculations

Equation 1: $S_r = \frac{ES - I - Q}{n}$

Equation 2: $S_2 = S_r \frac{(in)(ft)(\text{lagoon surface area } ft^2)(7.48 \text{ gals.})}{(day)(12 \text{ in})(ft^3)}$
Lagoon surface area in acres

Equation 3: $ES = E_{s1} - E_{sn}$

Equation 4: $I = P[\text{precipitation} + E_{pan1} - E_{pann}] - \text{precipitation}$

Equation 5: $Q = \frac{(\text{eff. flow - influent flow in gals.})(ft^3)(12in)}{(\text{lagoon surface area } ft^2)(7.48 \text{ gals.})(ft.)}$

APPENDIX B

ANL-W 779 SEEPAGE CALCULATIONS

(EDF ANL779-DRB-01)

EG&G Idaho, Inc
FORM EG&G-2631 (Rev. 12-88)

Project File Number 015578

EDF Serial Number ANL779-DRB-01

Functional File Number

ENGINEERING DESIGN FILE

Project/Task ANL-W 779 POND SEEPAGE TEST

Subtask ESTIMATE POND SEEPAGE RATE

EDF Page 1 of 1

Subject: PROCESS FIELD TEST DATA

Abstract:

The following calculations pertain to the seepage rate of the ANL-W 779 wastewater ponds. A field test began August 28 and concluded September 14, 1992. The estimated seepage rate for the southwest pond is 0.20 inch per day and based upon field data collected between August 31 and September 10, 1992. The estimated seepage rate for the north pond is 0.02 inch per day based upon field data collected between August 31 and September 14, 1992.

References:

Idaho Division of Environmental Quality Guidelines for Evaluating Seepage Rates.

Probability and Statistics for Engineering and the Sciences, Jay L. Devore, 1982, Brooks/Cole Publishing Company.

Attachments:

Field Data Sheets
Temperture Record Sheet
Memo of Conversation - Pump Record Sheet
Seepage Calculations Speadsheet
Seepage Sample Calculations
Statistical Analysis and Graph
Drawing IPE-75C-1

Author Dept. E540

PROFESSIONAL ENGINEER REGISTERED 6580 11-13-92 STATE OF IDAHO DoANNA R. BRAUN

Distribution (complete package): D. R. Braun, C. J. Martin, Project File No. 015578

Distribution (cover sheet only): N. K. Rogers, S. L. Austad

Reviewed Date 11-16-92

Approved Date 11/16/92

POND SEEPAGE FIELD DATA

ARGONNE NATIONAL LABORATORY - WEST

IDAHO NATIONAL ENGINEERING LABORATORY

Project File No. 015578
Field Engineer: H. W. Clifford, EG&G Idaho, E220
Civil Engineer: D. R. Braun, EG&G Idaho, E540

PAN

Day/Date	Time a.m.	First Reading (feet)	Last Reading (feet)
00/F/ 8/28/92	_____	XXX	2.21
03/M/ 8/31/92	_____	_____	1.924
05/W/ 9/02/92	_____	_____	1.880
07/F/ 9/04/92	_____	_____	1.863
11/T/ 9/08/92	_____	_____	1.808
13/T/ 9/10/92	_____	_____	1.760
16/M/ 9/14/92	_____	_____	XXX 1.668

POND SEEPAGE FIELD DATA

ARGONNE NATIONAL LABORATORY - WEST

IDAHO NATIONAL ENGINEERING LABORATORY

Structure: Southwest Sanitary Wastewater Treatment Pond
Project File No. 015578
Field Engineer: H. W. Clifford, EG&G Idaho, E220
Civil Engineer: D. R. Braun, EG&G Idaho, E540

SOUTHWEST POND

Day/Date	Readings, (feet) 1	2	3	4	5	6	7
00/ 8/28	0.093	0.091	0.091	0.091	0.093	0.092	0.093
03/ 8/31	0.236	0.237	0.239	0.237	0.237	0.236	0.238
05/ 9/02	0.317	0.317	0.318	0.319	0.318	0.316	0.317
07/ 9/04	0.438	0.442	0.436	0.438	0.436	0.438	0.436
11/ 9/08	0.455	0.458	0.456	0.456	0.458	0.458	0.456
13/ 9/10	0.576	0.560	0.562	0.562	0.564	0.562	0.564
16/ 9/14	0.774	0.785	0.778	0.776	0.778	0.776	0.778

POND SEEPAGE FIELD DATA

ARGONNE NATIONAL LABORATORY - WEST

IDAHO NATIONAL ENGINEERING LABORATORY

Structure: North Sanitary Wastewater Treatment Pond
Project File No. 015578
Field Engineer: H. W. Clifford, EG&G Idaho, E220
Civil Engineer: D. R. Braun, EG&G Idaho, E540

NORTH POND

Day/Date	Readings, (feet) 1	2	3	4	5	6	7
00/ 8/28	1.398	1.397	1.398	1.397	1.398	1.399	1.398
03/ 8/31	1.358	1.358	1.356	1.356	1.358	1.359	1.357
05/ 9/02	1.352	1.352	1.354	1.353	1.354	1.351	1.351
07/ 9/04	1.332	1.330	1.332	1.332	1.332	1.330	1.332
11/ 9/08	1.283	1.287	1.286	1.284	1.284	1.286	1.284
13/ 9/10	1.226	1.226	1.228	1.226	1.228	1.228	1.226
16/ 9/14	1.165	1.166	1.168	1.166	1.168	1.165	1.166

POND SEEPAGE DATA

ARGONNE NATIONAL LABORATORY - WEST

IDAHO NATIONAL ENGINEERING LABORATORY

Project File No. 015574
Field Engineer: H. W. Clifford, EG&G Idaho, E220
Civil Engineer: D. R. Braun, EG&G Idaho, E540

PRECIPITATION GAGE

Day/Date	Reading (inches)	Day/Date	Reading (inches)	Day/Date	Reading (inches)
00/ 8/28	xxx	07/ 9/4	0.10	14/ 9/11	
01/ 8/29		08/ 9/5	0.10	15/ 9/12	0
02/ 8/30		09/ 9/6	0.20	16/ 9/13	0
03/ 8/31	0	10/ 9/7	0.20	17/ 9/14	0
04/ 9/1	0.22	11/ 9/8	0		
05/ 9/2	0.25	12/ 9/9			
06/ 9/3	0	13/ 9/10	0		

Daily Mean Temperatures for EBR2 (10m level)

Prepared by Neil Hukari (Phone: 526-2744, INEL Mail Stop 2600)

U. S. Department of Commerce
National Oceanic and Atmospheric Administration
Environmental Research Laboratories
Air Resources Laboratory
Field Research Division
1750 Foote Drive
Idaho Falls, ID 83402

Date	10m level EBR2 mean temperature (deg F.)	Number observations (pcnt available)	Notes
28 Aug 1992	68.5	240 (100.0)	
29 Aug 1992	63.8	240 (100.0)	
30 Aug 1992	64.4	240 (100.0)	
31 Aug 1992	56.9	240 (100.0)	
1 Sep 1992	55.7	240 (100.0)	
2 Sep 1992	62.0	240 (100.0)	3 estimated observations
3 Sep 1992	62.0	240 (100.0)	2 estimated observations
4 Sep 1992	54.9	240 (100.0)	7 estimated observations
5 Sep 1992	52.0	240 (100.0)	5 estimated observations
6 Sep 1992	50.4	240 (100.0)	3 estimated observations
7 Sep 1992	46.4	240 (100.0)	39 estimated observations
8 Sep 1992	57.3	240 (100.0)	2 estimated observations
9 Sep 1992	56.6	240 (100.0)	9 estimated observations
10 Sep 1992	59.5	240 (100.0)	8 estimated observations
11 Sep 1992	(64.8)	240 (100.0)	CFA Data; EBR2 unavailable
12 Sep 1992	(57.6)	240 (100.0)	CFA Data; EBR2 unavailable
13 Sep 1992	(48.9)	240 (100.0)	CFA Data; EBR2 unavailable

Averages are based on data set of temperature averages taken at six minute intervals.

EG&G Idaho, Inc.

FORM EG&G-0561
(Rev. 05-88)

MEMO OF CONVERSATION

PERSON CALLING: DeAnna R. Braun DATE: September 1992

REPRESENTING ORG: EG&G Idaho TIME: ____ AM: __ PM: __

PERSON CALLED: Chris J. Martin PHONE NUMBER: 533-7621

REPRESENTING CO: ANL-W

SUBJECT: ANL-W 779 POND SEEPAGE TEST - Pond Influent

Initially one pump meter was recorded. When the influent quantities were considered too low, another pump meter was identified. The following are estimates of the pumping durations. The discharge rate of the pumps is 50 gallons per minute.

DATE	PUMP (minutes)
8/28	603.4
8/29	307.6
9/1	302.8
9/2	302.8
9/3	307.6
9/4	583.9
9/8	284.0
9/9	1338.8
9/14	231.4

An additonal 6000 gallons to 8000 gallons was discharged on approximately 9/11.

DISTRIBUTION a: Project File No. 015578

SIGNATURE: D R Braun

POND SEEPAGE TEST (ANL-W 779)

SEEPAGE CALCULATIONS SPREADSHEET
(Lotus 1-2-3 v 2.01)

Project File No. 015578
EDF ANL779-DRB-01

DATE	PAN CHANGE (inch)	PRECIP (inch)	PAN TEMP COEF	NET POND EVAP (inch)	SW POND INFLUENT (gal)	SW POND NET FLOW (inch)	SW POND CHANGE (inch)	TIME (day)	SW POND SEEPAGE (inch/day)	N POND CHANGE (inch)	N POND SEEPAGE (inch/day)
AUG 28											
AUG 31	3.432	0	0.674	2.313	30170	-1.844	-1.740	3	-0.736	0.492	-0.607
SEPT 2	0.528	0.45	0.767	0.300	30520	-1.866	-0.960	2	0.303	0.060	-0.120
SEPT 4	0.204	0.1	0.721	0.119	30520	-1.866	-1.452	2	0.147	0.252	0.066
SEPT 8	0.660	0.5	0.814	0.444	29195	-1.785	-0.228	4	0.278	0.552	0.027
SEPT 10	0.576	0	0.767	0.442	30520	-1.866	-1.284	2	0.070	0.696	0.127
SEPT 14	1.104	0	0.721	0.796	XXXX	0.000	-2.568	4	-0.841	0.732	-0.016

NOTES

INFLUENT VALUES ARE ESTIMATES BASED UPON ESTIMATED PUMPING DURATIONS.

SIGN CONVENTION FOR WATER SURFACE: RISE = - DROP = +

THE PAN MEASUREMENT TAKEN ON AUGUST 28 MUST HAVE BEEN IN ERROR.
THE RESULTING PAN CHANGE, 1.1 INCH PER DAY, IS NOT REASONABLE FOR THE CLIMATE.
THIS MEASUREMENT INFLUENCES THE CALCULATED SEEPAGE RATE FOR BOTH PONDS.

INFORMATION PROVIDED FOR THE PERIOD SEPT 10 - 14 IS NOT SUFFICIENT FOR ESTIMATING SOUTHWEST POND INFLUENT. THIS INFORMATION INFLUENCES THE CALCULATED SEEPAGE RATE FOR THE SOUTHWEST POND ONLY.

FOR THE SOUTHWEST POND, THE RESULTS OBTAINED FOR AUG 31 - SEPT 10 WILL BE UTILIZED.

FOR THE NORTH POND, THE RESULTS OBTAINED FOR AUG 31 - SEPT 14 WILL BE UTILIZED.

POND SEEPAGE TEST (ANL-W 779)

Project File No. 015578, EDF ANL779-DRB-01

SEEPAGE SAMPLE CALCULATIONS

Hand Calculations for Verification of Spreadsheet Calculations

For Test Period September 2 - 4, 1992

PAN CHANGE

From Field Data Sheet, 1.880 - 1.863 = 0.017 ft * 12inch/ft = 0.204 inch

PRECIP

From Precipitation Record Sheet, 0.1 inch

PAN TEMP COEFF

Calculate Average Temperature for Test Period, From Temperature Record Sheet, Round to Nearest 5 degree Increment, 62 degrees

Identify Corresponding Temperature Coefficient, From Idaho Guidelines for Evaluating Seepage Rates, 0.721

NET POND EVAP

Net Pond Evap = Temp Coeff(Precip + Pan Change) - Precip
= 0.721(0.1 + 0.204) - 0.1 = 0.119 inch

SOUTHWEST POND INFLUENT

From ANL-W 610.4 minutes * 50 gallons per minute = 30,520 gallons

SOUTHWEST POND NET FLOW

Pond Surface Area = 162 x 162 = 26,244 sq.ft.

Net Flow = influent/pond surface area
= (-30520 gal)(1 cu.ft./7.48 gal)(12 in/ft)/26,244 sq.ft.
= -1.866 inch

POND CHANGE

SOUTHWEST POND
From Field Data Sheet
Average of 9/02 = 0.317 ft
Average of 9/04 = 0.438 ft
Pond Change = 0.317 - 0.438 = -0.121 ft * 12 inch/ft = -1.452 inch

NORTH POND
From Field Data Sheet
Average of 9/02 = 1.352 ft
Average of 9/04 = 1.331 ft
Pond Change = 1.352 - 1.331 = 0.021 ft * 12 inch/ft = 0.252 inch

POND SEEPAGE TEST (ANL-W 779)

Project File No. 015578, EDF ANL779-DRB-01

SEEPAGE SAMPLE CALCULATIONS

TIME

Sept 2, 8:00 a.m. to Sept 4, 8:00 a.m. = 2 days

SEEPAGE RATE

SOUTHWEST POND
Pond Change = Seepage + Net Evap + Net Flow
-1.452 = Seepage + 0.119 - 1.866
Seepage = 0.295 inch

Seepage Rate = Seepage/Time
= 0.295/2 = 0.147 inch per day

NORTH POND
Pond Change = Seepage + Net Evap + Net Flow
0.252 = Seepage + 0.119 - 0
Seepage = 0.133 inch

Seepage Rate = Seepage/Time
= 0.133/2 = 0.066 inch per day

SIGN CONVENTION

Water Surface Drop = +

Water Surface Rise = -

POND SEEPAGE TEST (ANL-W 779)

Project File No. 015578, EDF ANL779-DRB-01

STATISTICAL ANALYSIS

Assumptions: The actual pond seepage rates are nearly constant for the test period. The actual pond seepage rates are greater than zero based upon the low water table in the vicinity of the ponds. The fluctuation of the test results is due to measurement error. The tests will be treated as separate, not one long test.

SOUTHWEST POND

Only the period August 31 - September 10, 1992 will be utilized.

MEAN SEEPAGE RATE

Number of Tests = n = 4

Sample Mean = x = summation of seepage rates / n

Southwest Pond Mean = (0.303 + 0.147 + 0.278 + 0.070) / 4 = 0.200 inch/day

STANDARD DEVIATION

Sample Standard Deviation = s = positive square root of sample variance

Sample Variance = (summation of (test results - sample mean)^2) / n - 1

Southwest Pond Standard Deviation = (((0.303 - 0.200)^2 + (0.147 - 0.200)^2 + (0.278 - 0.200)^2 + (0.070 - 0.200)^2) / (4 - 1))^ 1/2 = 0.110 inch/day

CONFIDENCE INTERVAL OF THE MEAN

Assumptions: The number of tests is small (less than 30). The test results represent a random sample from a normal population.

Confidence Level = 95 % (alpha = 0.05, alpha/2 = 0.025)

Number of Degrees of Freedom = n - 1 = 4 - 1 = 3

t = 3.18 (t distribution table)

Upper Limit of Confidence Interval = x + ts/n^1/2

Lower Limit of Confidence Interval = x - ts/n^1/2

Upper Limit of Southwest Pond = 0.200 + 3.18*0.110/4^1/2 = 0.37 inch/day

Lower Limit of Southwest Pond = 0.200 - 3.18*0.110/4^1/2 = 0.03 inch/day

POND SEEPAGE TEST (ANL-W 779)

Project File No. 015578, EDF ANL779-DRB-01

STATISTICAL ANALYSIS

NORTH POND

Only the period August 31 - September 14, 1992 will be utilized.

MEAN SEEPAGE RATE

Number of Tests = n = 5

Sample Mean = x = summation of seepage rates / n

North Pond Mean = (-0.120 + 0.066 + 0.027 + 0.127 + -0.016) / 5 = 0.017 inch/day

STANDARD DEVIATION

Sample Standard Deviation = s = positive square root of sample variance

Sample Variance = (summation of (test results - sample mean)^2) / n - 1

North Pond Standard Deviation = (((-0.120 - 0.017)^2 + (0.066 - 0.017)^2 + (0.027 - 0.017)^2 + (0.127 - 0.017)^2 + (-0.016 - 0.017)^2) / (5 - 1))^1/2 = 0.093 inch/day

CONFIDENCE INTERVAL OF THE MEAN

Assumptions: The number of tests is small (less than 30). The test results represent a random sample from a normal population.

Confidence Level = 95 % (alpha = 0.05, alpha/2 = 0.025)

Number of Degrees of Freedom = n - 1 = 5 - 1 = 4

t = 2.78 (t distribution table)

Upper Limit of Confidence Interval = x + ts/n^1/2

Lower Limit of Confidence Interval = x - ts/n^1/2

Upper Limit of North Pond = 0.017 + 2.78*0.093/5^1/2 = 0.13 inch/day

Lower Limit of North Pond = 0.017 - 2.78*0.093/5^1/2 = -0.10 inch/day

EG&G Idaho, Inc.

FORM EG&G-2631A (Rev 4-78)

PROJECT FILE NO 015578

EDF SERIAL NO ANL 779-DRB-01

FUNCTIONAL FILE NO

DATE MAY 92

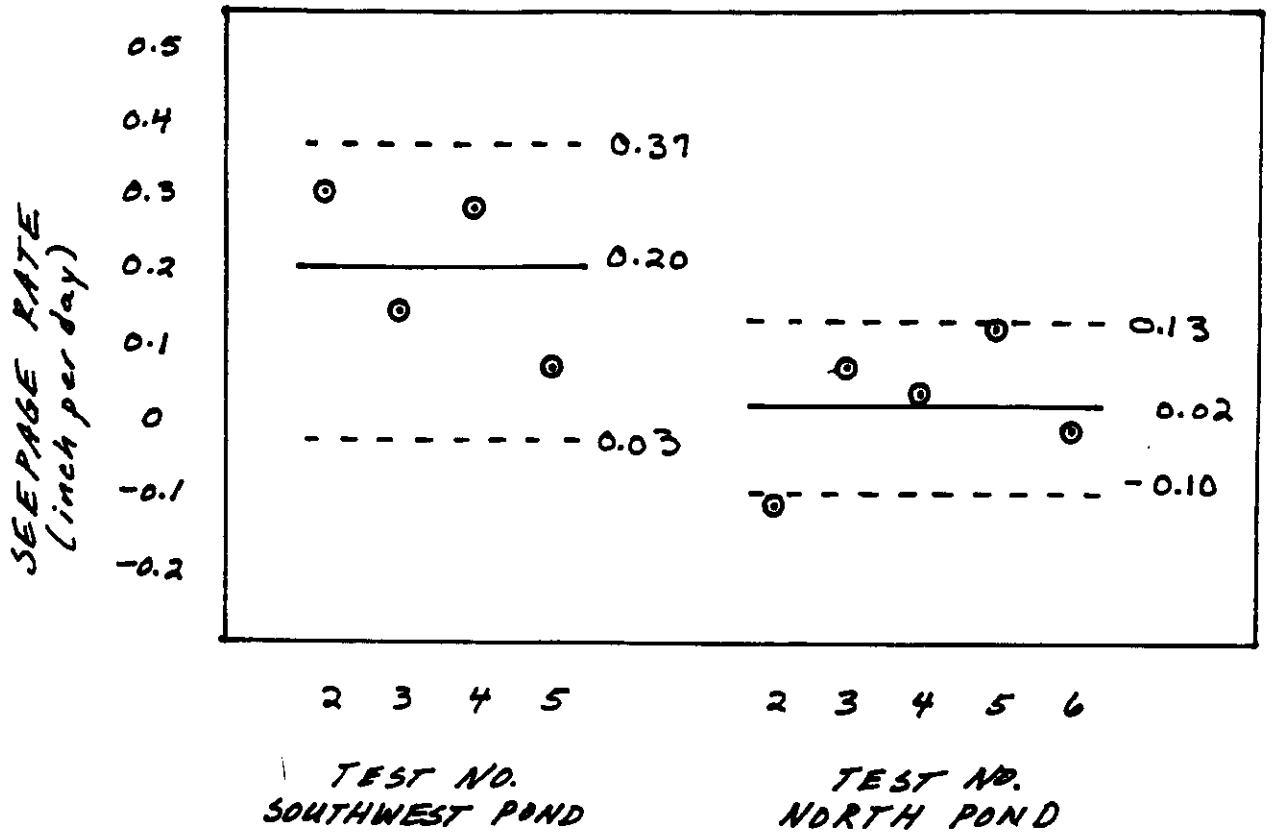
ENGINEERING DESIGN FILE

PROJECT/TASK ANL-W 779 POND SEEPAGE TEST

SUBTASK ESTIMATE POND SEEPAGE RATE

ABSTRACT

STATISTICAL ANALYSIS

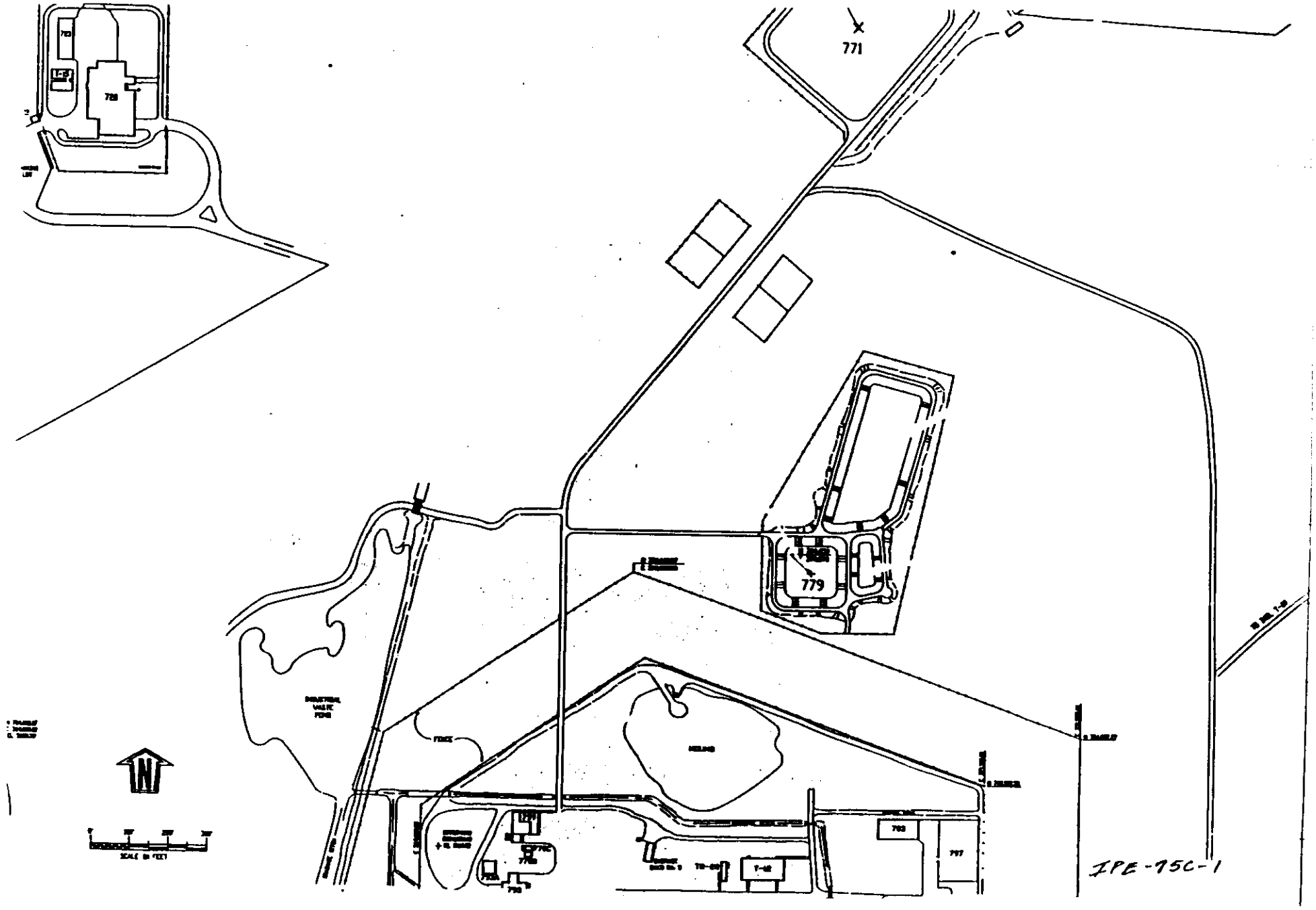


LEGEND

⊙ TEST RESULT

— MEAN

-- 95% CONFIDENCE LIMIT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779
IPE-75C-1

REFERENCE 16

Review Comment Response, 1/5/93

January 5, 1993

According to Lee Witbeck and Amy Powell, the Sanitary Sewage Lagoons are sampled for cadmium per an Environmental Survey in 1988 in which DOE-CH requested a more extensive sampling and analysis plan. Despite searching throughout the central files, I could not pinpoint a statement verifying this requirement. Nonetheless, I am confident that Mr. Witbeck and Ms. Powell's explanation is sufficient and can be confirmed if necessary.

Jennifer Fedder

Jennifer Fedder

REFERENCE 17

Environmental Sample Summary
2/3/93 and 2/5/93

dBIV Rec. No.	Anal # / Sam Date / COC# / Documentation / Misc. Analyses	Identification / Matrix / Analysis / Units	Cr	Pb	Cd	Hg	Ag	Ba	As	Se
119	64802 09/19/90 epa-7, 9/19/90	Industrial Waste Pond and Sanitary Lagoon liquid total ug/mL			<0.1					
120	64803 09/19/90 epa-7, 9/19/90	Sanitary Lagoon liquid total ug/mL	<0.5		<0.1		<0.1			
372	65661 04/17/91 epa-10, 5/10/91	Industrial Waste Pond and Sanitary Lagoon liquid total ug/mL			<0.5					
373	65662 04/17/91 epa-10, 5/10/91	Industrial Waste Pond and Sanitary Lagoon liquid total ug/mL			<0.2					
374	65663 04/17/91 epa-10, 5/10/91	Industrial Waste Pond and Sanitary Lagoon liquid total ug/mL			<0.2					
375	65664 04/17/91 epa-10, 5/10/91 Cr+6 < 0.2 ug/mL	Industrial Waste Pond and Sanitary Lagoon liquid total ug/mL	<0.5		<0.2		<0.1			
376	65665 04/17/91 epa-10, 5/10/91 Cr+6 < 0.2	Industrial Waste Pond and Sanitary Lagoon liquid total ug/mL	<0.5		<0.2		<0.1			
377	65666 04/17/91 epa-10, 5/10/91 Cr+6 < 0.2 ug/mL	Industrial Waste Pond and Sanitary Lagoon liquid total ug/mL	<0.5		<0.2		<0.1			
378	65667 04/17/91 Cr+6 < 0.2 ug/mL	Industrial Waste Pond and Sanitary Lagoon liquid total ug/mL	<0.5		<0.2		<0.1			
448	65740 05/15/91 417 epa-10, 7/7/91	Trip Blank, IWP, Sanitary Lagoon - AL#65740-AL#65998 water total ug/mL	<0.5	<0.5	<0.02		<0.1			

dBIV Rec. No.	Anal # / COC#: / Misc. Analyses	Sam Date / Documentation	Identification / Matrix	Analysis	Units	Cr	Pb	Cd	Hg	Ag	Ba	As	Se
471	66079	09/21/91	Industrial Waste Pond and Sanitary Lagoon										
		1304	liquid	total	ug/mL								
		epa-10, 10/2/91											
		#66080 and #66081 same "less than" values				<0.5		<0.2		<0.1			
472	66228	/ /	Industrial Waste Pond / Sanitary Lagoon										
		1313	liquid	total	ug/mL								
		epa-10, 10/2/91											
		#66229 and #66230 same "less than" values				<0.5		<0.2		<0.1			
486	66337	10/16/91	66337 (Trip Blank) 66338 (IWP) 66339 (Sanitary Lagoon)										
		1323	Liquid	Total	ug/ml								
		EPA-11, 11/07/91											
		Cr+6: all<0.2				<0.5	<0.5	<0.2		<0.1			
615	67056	04/15/92	INDUSTRIAL WASTE POND AND SANITARY LAGOON SAMPLES										
		1402	WATER	TOTAL	ug/ml								
		EPA-12, 5/20/92											
						<0.5		<0.2		<0.1			
616	67057	04/15/92	INDUSTRIAL WASTE POND AND SANITARY LAGOON SAMPLES										
		1402	WATER	TOTAL	ug/ml								
		EPA-12, 5/20/92											
						N/A		<0.2		N/A			
617	67058	04/15/92	INDUSTRIAL WASTE POND AND SANITARY LAGOON SAMPLES										
		1402	WATER	TOTAL	ug/ml								
		EPA-12, 5/20/92											
						N/A		<0.2		N/A			
618	67059	04/15/92	INDUSTRIAL WASTE POND AND SANITARY LAGOON SAMPLES										
		1402	WATER	TOTAL	ug/ml								
		EPA-12, 5/20/92											
						<0.5		<0.2		<0.1			
619	67060	04/15/92	INDUSTRIAL WASTE POND AND SANITARY LAGOON SAMPLES										
		1402	WATER	TOTAL	ug/ml								
		EPA-12, 5/20/92											
						<0.5		<0.2		<0.1			
620	67061	04/15/92	INDUSTRIAL WASTE POND AND SANITARY LAGOON SAMPLES										
		1402	WATER	TOTAL	ug/ml								
		EPA-12, 5/20/92											
						<0.5		<0.2		<0.1			
621	67062	04/15/92	INDUSTRIAL WASTE POND AND SANITARY LAGOON SAMPLES										
		1402	WATER	TOTAL	ug/ml								
		EPA-12, 5/20/92											
						<0.5		<0.2		<0.1			

dBIV Rec. No.	Anal # / Sam Date / COC# / Documentation / Misc. Analyses	Identification / Matrix / Analysis	Units	Cr	Pb	Cd	Hg	Ag	Ba	As	Se
664	67207 05/28/92 AL SHEET EPA-12	SANITARY LAGOON SURF H2O TOTAL	ug/ml	<0.2		<0.2		<0.1			

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Environmental Sample Summary 02/05/93 Page No. 1

dBIV Rec. No.	Anal # / Sam Date / COC# / Documentation / Misc. Analyses	Identification / Matrix / Analysis / Units	Cr	Pb	Cd	Hg	Ag	Ba	As	Se
105	64634 07/18/90 epa-7, 7/18/90 Cr+6 <0.2	Water from Industrial Waste Pond for July liquid total ug/mL	<0.5				<0.1			
112	64719 08/15/90 epa-7, 8/15/90 Cr+6 <0.2	Industrial Waste Pond liquid total ug/mL	<0.5				<0.1			
119	64802 09/19/90 epa-7, 9/19/90	Industrial Waste Pond and Sanitary Lagoon liquid total ug/mL			<0.1					
140	64915 10/17/90 epa-8, 10/17/90	Industrial Waste Pond water total ug/mL	<0.5		<0.1		<0.1			
141	64916 10/17/90 epa-8, 10/17/90	Trip blank, Industrial Waste Pond water total ug/mL	<0.5		<0.1		<0.1			
372	65661 04/17/91 epa-10, 5/10/91	Industrial Waste Pond and Sanitary Lagoon liquid total ug/mL			<0.5					
373	65662 04/17/91 epa-10, 5/10/91	Industrial Waste Pond and Sanitary Lagoon liquid total ug/mL			<0.2					
374	65663 04/17/91 epa-10, 5/10/91	Industrial Waste Pond and Sanitary Lagoon liquid total ug/mL			<0.2					
375	65664 04/17/91 epa-10, 5/10/91 Cr+6 < 0.2 ug/mL	Industrial Waste Pond and Sanitary Lagoon liquid total ug/mL	<0.5		<0.2		<0.1			
376	65665 04/17/91 epa-10, 5/10/91 Cr+6 < 0.2	Industrial Waste Pond and Sanitary Lagoon liquid total ug/mL	<0.5		<0.2		<0.1			

dBIV Rec. No.	Anal # / Sam Date / COC# / Documentation / Misc. Analyses	Identification / Matrix / Analysis / Units	Cr	Pb	Cd	Hg	Ag	Ba	As	Se
377	65666 04/17/91	Industrial Waste Pond and Sanitary Lagoon liquid total ug/mL								
	epa-10, 5/10/91 Cr+6 < 0.2 ug/mL		<0.5		<0.2		<0.1			
378	65667 04/17/91	Industrial Waste Pond and Sanitary Lagoon liquid total ug/mL								
	Cr+6 < 0.2 ug/mL		<0.5		<0.2		<0.1			
448	65740 05/15/91 417	Trip Blank, IWP, Sanitary Lagoon - AL#65740-AL#65998 water total ug/mL								
	epa-10, 7/7/91		<0.5	<0.5	<0.02		<0.1			
471	66079 09/21/91 1304	Industrial Waste Pond and Sanitary Lagoon liquid total ug/mL								
	epa-10, 10/2/91 #66080 and #66081 same "less than" values		<0.5		<0.2		<0.1			
472	66228 / / 1313	Industrial Waste Pond / Sanitary Lagoon liquid total ug/mL								
	epa-10, 10/2/91 #66229 and #66230 same "less than" values		<0.5		<0.2		<0.1			
486	66337 10/16/91 1323	66337 (Trip Blank) 66338 (IWP) 66339 (Sanitary Lagoon) Liquid Total ug/ml								
	EPA-11, 11/07/91 Cr+6: all<0.2		<0.5	<0.5	<0.2		<0.1			
615	67056 04/15/92 1402	INDUSTRIAL WASTE POND AND SANITARY LAGOON SAMPLES WATER TOTAL ug/ml								
	EPA-12, 5/20/92		<0.5		<0.2		<0.1			
616	67057 04/15/92 1402	INDUSTRIAL WASTE POND AND SANITARY LAGOON SAMPLES WATER TOTAL ug/ml								
	EPA-12, 5/20/92		N/A		<0.2		N/A			
617	67058 04/15/92 1402	INDUSTRIAL WASTE POND AND SANITARY LAGOON SAMPLES WATER TOTAL ug/ml								
	EPA-12, 5/20/92		N/A		<0.2		N/A			
618	67059 04/15/92 1402	INDUSTRIAL WASTE POND AND SANITARY LAGOON SAMPLES WATER TOTAL ug/ml								
	EPA-12, 5/20/92		<0.5		<0.2		<0.1			

dBIV Rec. No.	Anal # / Sam Date / COC# / Documentation / Misc. Analyses	Identification / Matrix	Analysis	Units	Cr	Pb	Cd	Hg	Ag	Ba	As	Se
619	67060 04/15/92 1402 EPA-12, 5/20/92	INDUSTRIAL WASTE POND AND SANITARY LAGOON SAMPLES WATER	TOTAL	ug/ml	<0.5		<0.2		<0.1			
620	67061 04/15/92 1402 EPA-12, 5/20/92	INDUSTRIAL WASTE POND AND SANITARY LAGOON SAMPLES WATER	TOTAL	ug/ml	<0.5		<0.2		<0.1			
621	67062 04/15/92 1402 EPA-12, 5/20/92	INDUSTRIAL WASTE POND AND SANITARY LAGOON SAMPLES WATER	TOTAL	ug/ml	<0.5		<0.2		<0.1			

REFERENCE 18

Memo of Conversation
Ed Kennedy with Elon Wood Jr.
2/5/93

Memo of Conversation

To:	File, Sanitary Lagoon
From:	Ed Kennedy
Person Contacted:	Elon Wood Jr.
Organization:	Fuels and Engineering
Date:	February 5, 1993 2:30 PM
Subject:	Sanitary and Industrial Waste Discharges from Fuel Assembly and Storage Building (FASB)

I met with Elon Wood Jr. to discuss the history of the Fuel Assembly and Storage Building (FASB) with respect to the potential discharge of photochemical or other potentially hazardous substances into the sanitary waste systems. Elon Wood Jr. was a former manager of FASB and was knowledgeable in the operation of the facility. Elon was asked if there existed a disposal system for any chemical wastes within the FASB facility. He believed that industrial wastes were discharged through the utility system which may have been connected with the sanitary waste system. He offered to review the construction drawings of the facility and would return my call later that day.

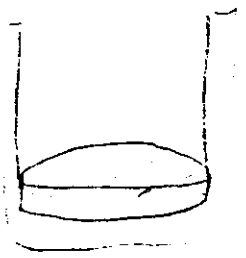
At approximately 2:15 PM Elon appeared at my office with a set of drawings depicting the industrial and sanitary piping systems for FASB. Upon review it was determined that the facility did contain a chemical waste system independent of the sanitary waste system. However, Elon recalled that during the period of 1975 through 1981, a photoprocessing bench was utilized to develop film from an electron microscope and that the resultant photochemicals were periodically discharged into the janitorial basin in the adjacent room. Upon further review of the drawings it was found that the janitorial basin discharged directly into the sanitary waste system.

Elon recalled that the photo processing bench was instituted as a result of relocating an electron microscope to the FASB facility in 1975. The photoprocessing bench was utilized to process the film from the microscope. As of 1981, the practice of processing film at the FASB facility was discontinued. Elon believed that a container of the developing solution was put into chemical storage and that the amount of film processed could be obtained from records. Elon volunteered to perform a material balance and would provide me with an estimate of the amount of photochemical discharge that may have occurred.

REFERENCE 19

Silver Concentration Calculations
(J. Fedder, 3/18/93)

Sump



1) Assume 6 inches of sludge in sump.
2) Assume all silver remained in sludge in sump.
3) Assume sludge density $\rho = 1.5\ g/mL$

Sump diameter = 6 ft

$V_{sludge} = \pi(3ft)^2(.5ft) = 14.1ft^3 = 400,319.99mL$

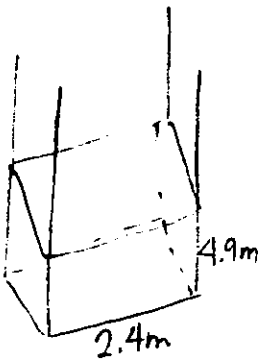
therefore $m_{sludge} = \rho V = 1.5\frac{g}{mL} \times 400319.99mL$

$m_{sludge} = 600,479.99\ g$

∴ actual mass of silver diverted to SWLS sump = 1.32 troy oz. = 41.1g (see Kodac note)

$\therefore \frac{41.1g\ of\ silver}{600,479.99g\ of\ sludge} = 6.84 \times 10^{-5} =$ **68 ppm by weight**

Soil



1) Assume volume of soil is $(2.4m)^2(4.9m) = 28.2m^3$
$= 28224000\ mL$

$\rho_{soil} = 1.5\ g/mL$

therefore $m_{soil} = \rho V = (1.5g)(28224000mL)$

$m_{soil} = 42,336,000g$

and $\frac{41.1g\ of\ silver}{42,336,000g\ of\ soil} = 9.7 \times 10^{-7} =$ **.9 ppm by weight**

⇒ Based on risk calculations for silver, calculated by Bob Nitschke, the minimum soil concentration would have to be 1350 ppm to be of any concern. Both of the above calculated concentrations are much less.

[illegible] has been very helpful in arriving at a figure of 3.7 Troy oz of Hg. per 1000 sq. ft of plates.

We have developed 2565 4x5 in plates @ about 1.32 Troy oz. were probably poured into the sanitary sewer between 1976-84.

REFERENCE 20

Track 1 Risk Evaluation for Industrial Waste Lift Station, 2/23/93

INEL
Idaho National Engineering Laboratory

February 23, 1993

Mr. Edward Kennedy
Argonne National Laboratory
P.O. Box 2528
Idaho Falls, ID 83403-2528

TRACK 1 RISK EVALUATION FOR INDUSTRIAL WASTE LIFT STATION - CAL-7-93

Dear Mr. Kennedy:

Attached is the Track 1 risk evaluation for the Argonne National Laboratory-West Industrial Waste Lift Station per your request of Robert L. Nitschke on February 17, 1993. If you have any questions, please do not hesitate to call me at 526-9202.

Sincerely,

Cindy A. Loehr
Chemical & Radiological
Risk Assessment

td

Attachment:
As Stated

cc: R. L. Nitschke, MS 3960
Central Files, MS 1651
C. A. Loehr File

TRACK 1 RISK EVALUATION SUMMARY
ANL-W INDUSTRIAL WASTE LIFT STATION

A Track 1 risk assessment was conducted to establish risk-based soil screening concentrations for an Argonne National Laboratory-West (ANL-W) Track 1 unit called the Industrial Waste Lift Station. Track 1 risk assessment guidance[1], which provides methodology for assessment of low probability hazard sites at the INEL, is used for the evaluation. The single contaminant evaluated at the site is silver.

Exposure Scenarios and Pathways

The exposure scenarios considered are 25 years for an occupational worker at the site in the current time frame and a 30 year resident at the site. Four potential exposure pathways are considered as applicable: soil ingestion, inhalation of fugitive dust, inhalation of volatiles, and groundwater ingestion. For the groundwater pathway, which is considered for the residential scenario, no time constraints apply; peak groundwater concentrations are used for estimating associated risk-based soil screening concentrations.

Toxicity and Exposure Assessment Parameters

The calculation of soil screening concentrations is based on a target hazard quotient of 1.0 (based on noncarcinogenic effects, since silver is not classifiable as to human carcinogenicity). EPA-approved reference doses used in the evaluation are from the EPA on-line database IRIS. No credit is taken for chemical degradation in determining the risk-based soil concentrations. The toxicity values and physical properties used in this study are provided in Table 1. Site dimensions used in the risk assessment are 2.4 m x 2.4 m with a 4.9 m depth of contamination.

Groundwater transport parameters used for determining risk-based soil concentrations for the groundwater ingestion pathway, given in Table 2, are those specified in Reference 1 unless otherwise noted. A conservative estimate for solubility is used. Version 1.5 of the code GWSCREEN[2] is used for groundwater calculations.

Risk-Based Soil Concentrations

Risk-based soil screening concentrations for silver are given in Table 3. The concentrations are given for the exposure pathways considered for both an occupational scenario and a residential

Table 1. Contaminant-specific factors used in risk assessment.

Contaminant	SF Oral (per mg/kg/day)	RfD Oral (mg/kg /day)	SF Inhalation (per mg/kg/day)	RfD Inhalation (mg/kg /day)	Kd (cu.cm/g)
Silver		5.00E-03			9.00E+01

SF = Slope Factor
RfD = Reference Dose
Kd= Soil-water partition coefficient, from INEL Track 1 risk assessment guidance.

Table 2. Groundwater transport inputs used for groundwater ingestion risk-based soil concentration calculations.

Aquifer:	
Pore velocity	570 m/y[a]
Longitudinal dispersivity	1E-03 m
Transverse dispersivity	5E-04 m
Length of well screen	15 m
Dry bulk density	1.9 g/ml
Porosity	0.1
Kd	90
Unsaturated zone:	
Net infiltration	1 m/y
Volumetric water content	0.09
Dry bulk density	1.9 g/ml
Depth to groundwater (1/3 actual)	63.4 m
Kd	90
Soil zone:	
Soil density	1.5 g/ml
Volumetric water content	0.35
Length of source parallel to flow	2.4 m
Width of source perpendicular to flow	2.4 m
Thickness of contaminated zone	4.9 m
Solubility limit	1E6 mg/L
Kd	90
Receptor distance downgradient	0 m
Receptor distance perpendicular to flow	0 m

a. Obtained from *Track 2 Sites: Guidance for Assessing Low Probability Hazard Sites at INEL*. DOE/ID-10389, Revision 3, July 1992.

Table 3. Screening criteria summary table.
Site: Argonne Industrial Waste Lift Station

Contaminant	Occupational Scenario										
	Soil Ingestion			Inhalation of Dust			Inhalation of Volatiles		Groundwater Ingestion		External Exposure
	SC at HQ=1	SC at 1E-06 risk	SC at 1E-06 risk from radionuclides	SC at HQ=1	SC at 1E-06 risk	SC at 1E-06 risk from radionuclides	SC at HQ=1	SC at 1E-06 risk	SC at HQ=1	SC at 1E-06 risk	SC at 1E-06 risk
Silver	1.00E+04		NA			NA	NA	NA	NA	NA	NA

NA = Not applicable
HQ = Hazard quotient
SC = Soil concentration
Note: Concentrations given in mg/kg for nonradioactive contaminants and in pCi/g for radioactive contaminants.
Where concentration is blank, no approved toxicity values exist.

Table 3. Screening criteria summary table (continued).
Site: Argonne Industrial Waste Lift Station

Contaminant	Residential Scenario												Minimum SC
	Soil Ingestion			Inhalation of Dust			Inhalation of Volatiles		Groundwater Ingestion			External Exposure	
	SC at HQ=1	SC at 1E-06 risk	SC at 1E-06 risk from radionuclides	SC at HQ=1	SC at 1E-06 risk	SC at 1E-06 risk from radionuclides	SC at HQ=1	SC at 1E-06 risk	SC at HQ=1	SC at 1E-06 risk	SC at 1E-06 risk from radionuclides	SC at 1E-06 risk	
Silver	1.35E+03		NA			NA	NA	NA	1.19E+04		NA	NA	1.35E+03

** = Decays away prior to reaching groundwater.
NA = Not applicable
HQ = Hazard quotient
SC = Soil concentration
Note: Concentrations given in mg/kg for nonradioactive contaminants and in pCi/g for radioactive contaminants.
Where concentration is blank, no approved toxicity values exist.

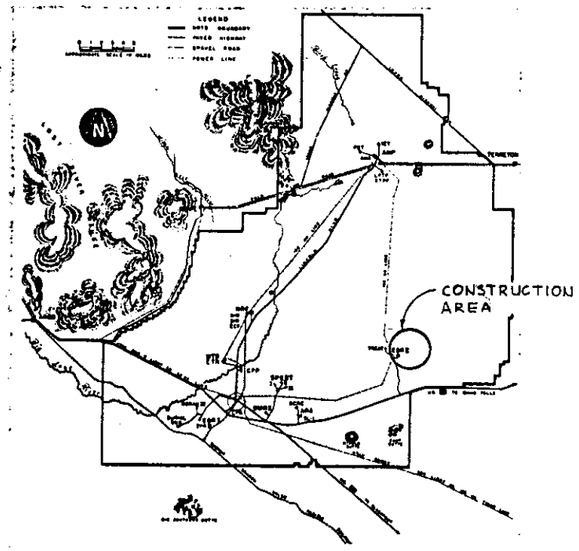
REFERENCES

1. DOE, *Track 1 Sites: Guidance for Assessing Low Probability Hazard Sites at INEL*, DOE/ID-10340(92), Revision 1, July 1992.

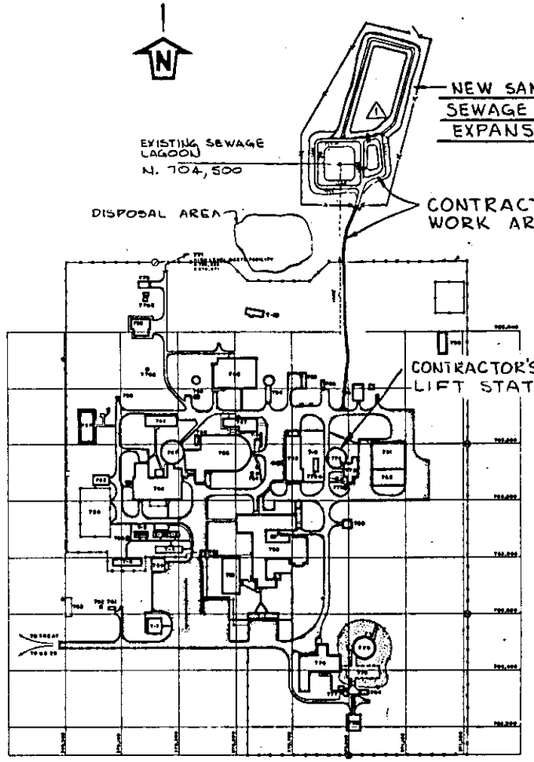
2. A.S. Rood, *GWSCREEN: A Semi- Analytical Model for Assessment of the Groundwater Pathway from Surface or Buried Contamination: Theory and User's Manual*, EGG-GEO-10158, March 1992.

REFERENCE 21

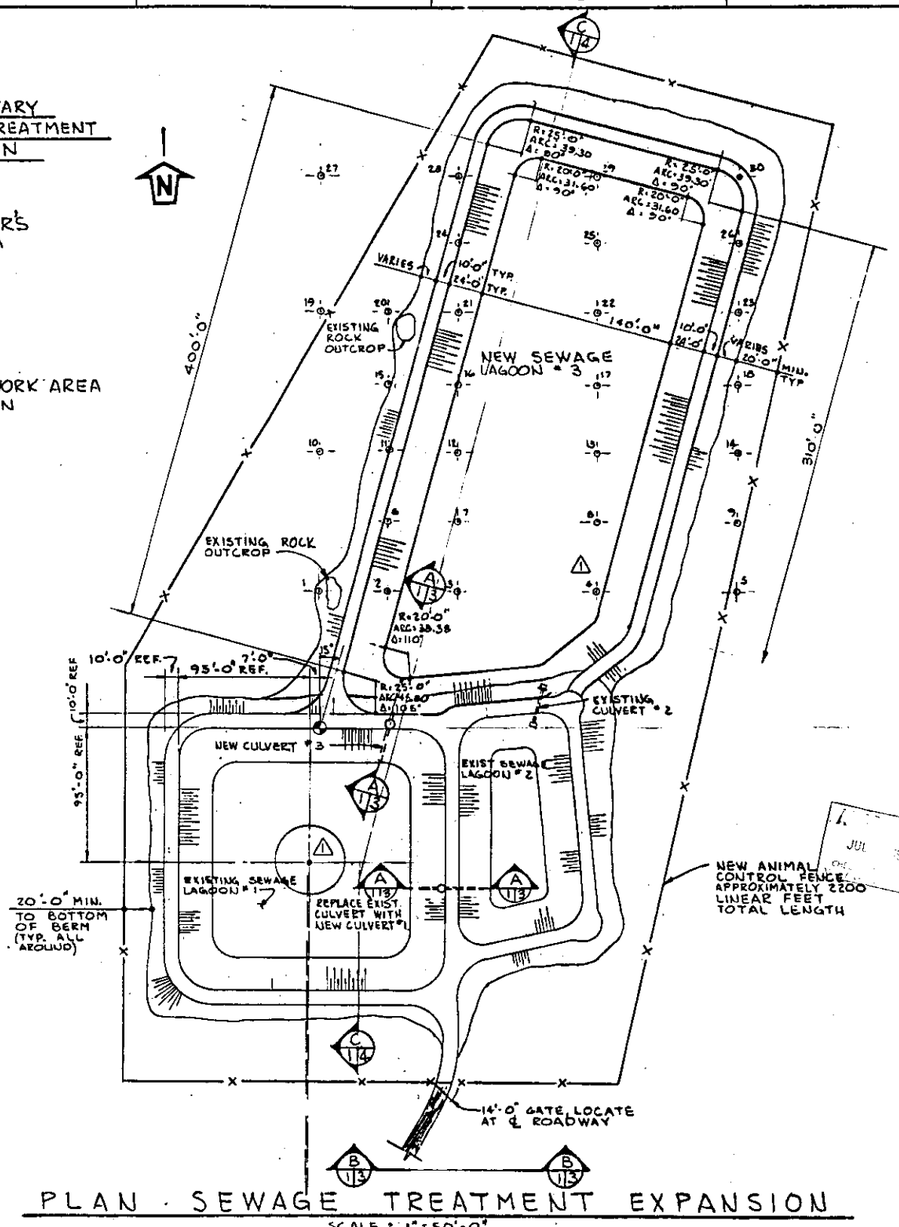
Engineering Drawings:
W7790-0103-DD-01 (pgs. 1-4 of 4)
IPE-779-1 (pgs. 4, 5 of 9)



NATIONAL REACTOR TESTING STATION



PLAN—ARGONNE WEST

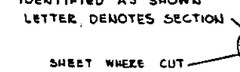


PLAN · SEWAGE TREATMENT EXPANSION

SCALE : 1"=50'-0"

GENERAL NOTE :

1. SECTIONS & DETAILS ON THESE DRAWINGS ARE IDENTIFIED AS SHOWN



2. MAKE & MODEL NUMBERS SHOWN ARE THOSE ON WHICH THE DESIGN IS BASED NOT TO ELIMINATE APPROVED EQUALS.

PROBE HOLE LOG

HOLE NO.	GROUND ELEVATION	ROCK ELEVATION
1	5118.95	5116.35
2	5117.90	5113.90
3	5117.50	5114.50
4	5118.35	5114.30
5	5119.25	5115.25
6	5118.60	5116.35
7	5117.25	5113.85
8	5117.95	5114.35
9	5118.95	5114.95
10	5118.95	5116.70
11	5118.30	5114.30
12	5117.65	5114.45
13	5118.30	5116.50
14	5119.50	5115.50
15	5117.90	5114.90
16	5118.00	5114.00
17	5117.70	5114.50
18	5119.65	5117.85
19	5117.40	5113.40
20	5117.75	5115.25
21	5117.30	5113.65
22	5117.30	5114.10
23	5119.25	5115.25
24	5117.15	5115.00
25	5117.10	5114.00
26	5115.40	5119.40
27	5115.90	5112.60
28	5116.30	5113.80
29	5117.10	5115.10
30	5118.80	5116.05

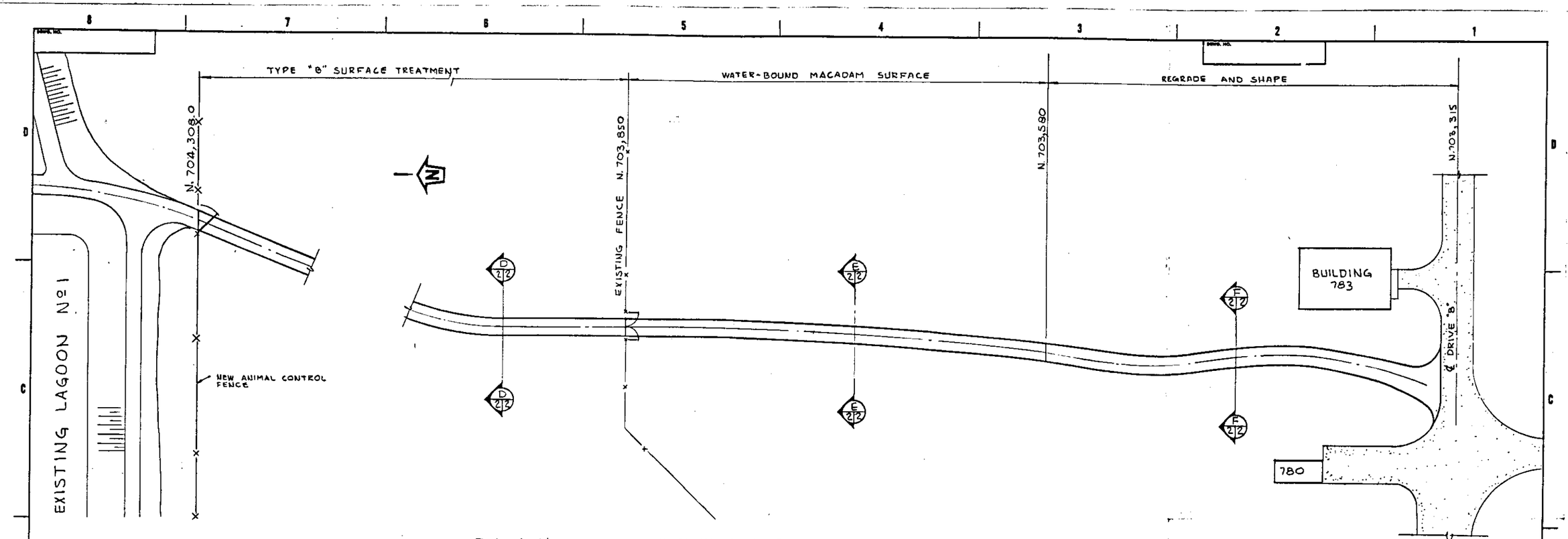
DRAWING CONSISTING OF 4 SHEETS

APPR'D	DATE	APPR'D	DATE
RALPH P. POHTO	7-31-74	R. J. TEUNIS	7-31-74
W.C. PERSKY	7-31-74		
C.C. WATSON	7-31-74		

MICRO-FILM STAMP: G-6-75(0) 7-25-75(1)

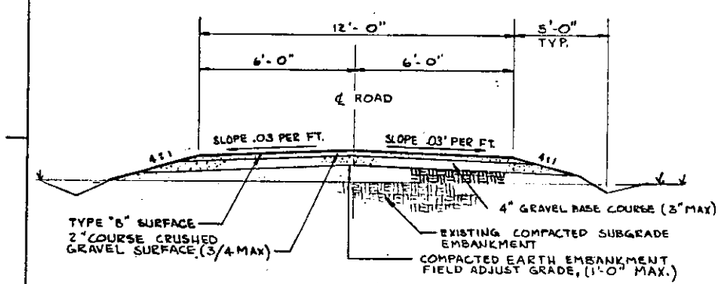
APPROVED (CONST. R.P. HEARN	DATE 7/31/74	SERVICE REQ NO. 80732/62492	ARGONNE NATIONAL LABORATORY		
STAFF APPROVAL	7/31/74	CHECKED J. LEWIS	7/31/74		
AS PER REPRESENTATIVE E.J. TEUNIS	—	DRAWN BY G. HURLEY	8/20/74	SANITARY SEWAGE TREATMENT EXPANSION—FACILITY 779 PLANS & PROBE HOLE LOG.	
TOLERANCES, UNLESS OTHERWISE NOTED: FRACTIONAL ± ; DECIMAL ± .01; ANGULAR ± 1°		SURFACES TO HAVE "V" 125 MICRO-INCH FINISH, REMOVE ALL BURRS		ARGONNE WEST	N.R.T.S.
1 GB	AS PER D.C.N. W7790-001	7/31/74	L	DATE 6-3-74	SHEET NO. 1 OF 4	W7790-0103-DD-01

JUL 1975



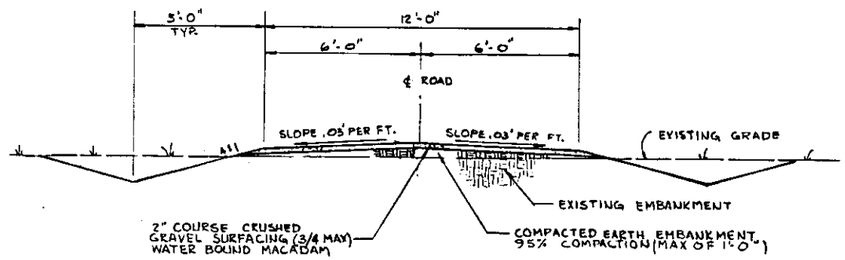
PLAN — SEWAGE LAGOON ROAD
MAINTAIN EXISTING HORIZONTAL ALIGNMENT

SCALE : 1" = 30'-0"



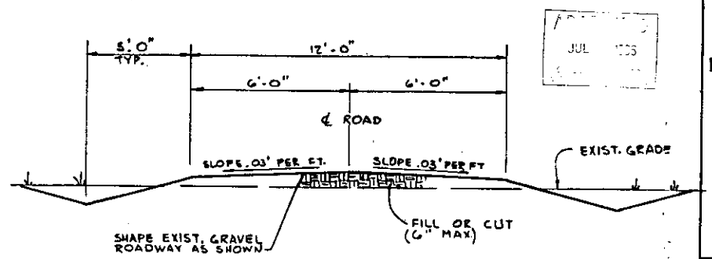
SECTION D 2/2

SCALE : 3/8" = 1'-0"



SECTION E 2/2

SCALE : 3/8" = 1'-0"



SECTION F 2/2

SCALE : 3/8" = 1'-0"

G-6-75(0)
7-25-75(1)

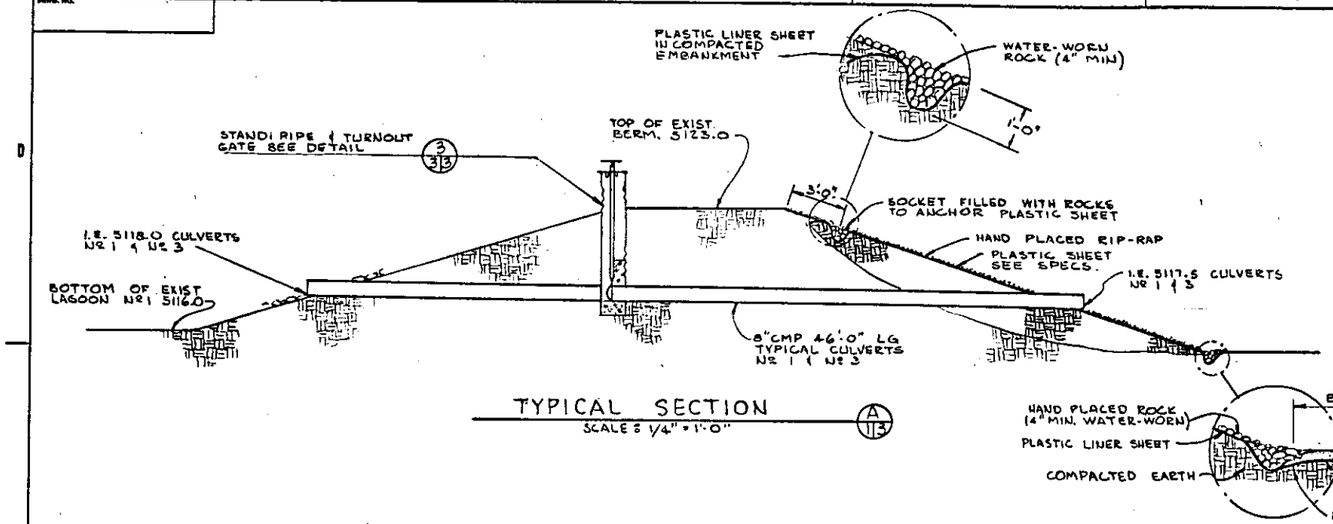
APPROVED CONST.	DATE	SERVICE REQ. NO.
R. P. HEARN	7/11/74	80725/80692
DESIGNED	CHECKED	
R. J. TEUNIS	R.J.T.	7/11/74
REPRESENTATIVE	DRAWN BY	
R. J. TEUNIS	G. HURLEY	7/4/74

ARGONNE NATIONAL LABORATORY

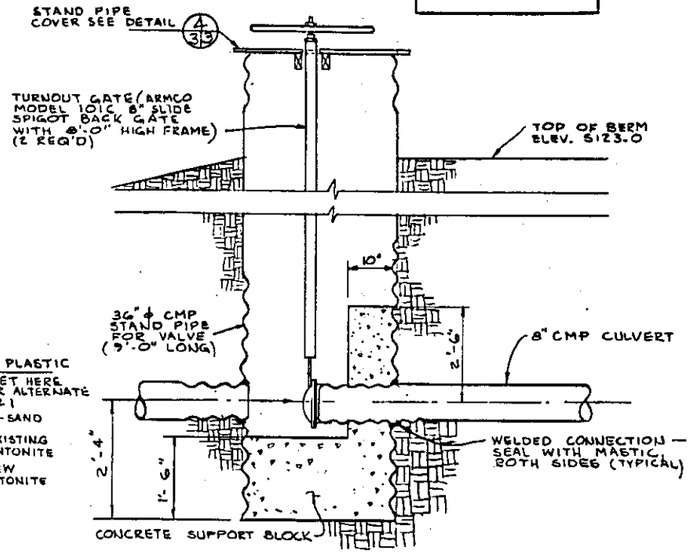
SANITARY SEWAGE TREATMENT EXPANSION — FACILITY 779
ROADWORK PLAN & SECTIONS
ARGONNE WEST

DATE: 6-3-74 SHEET NO. 2 OF 4

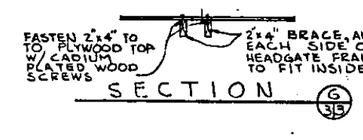
DRAWING NO. W7790-0103-DD-01



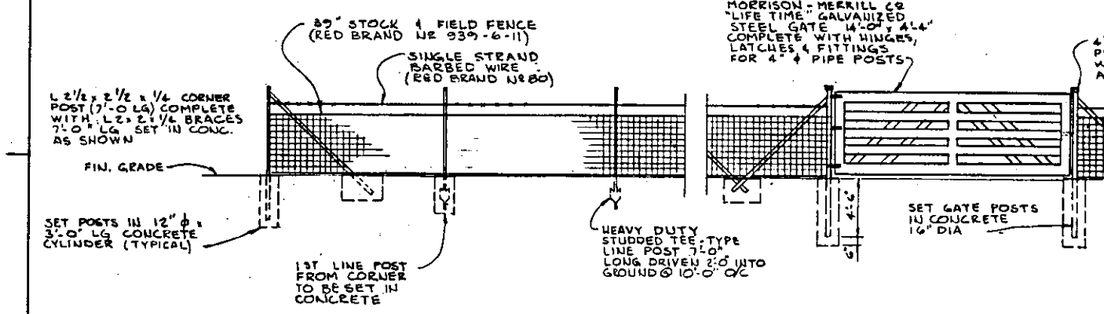
TYPICAL SECTION
SCALE: 1/4" = 1'-0" A 1/3



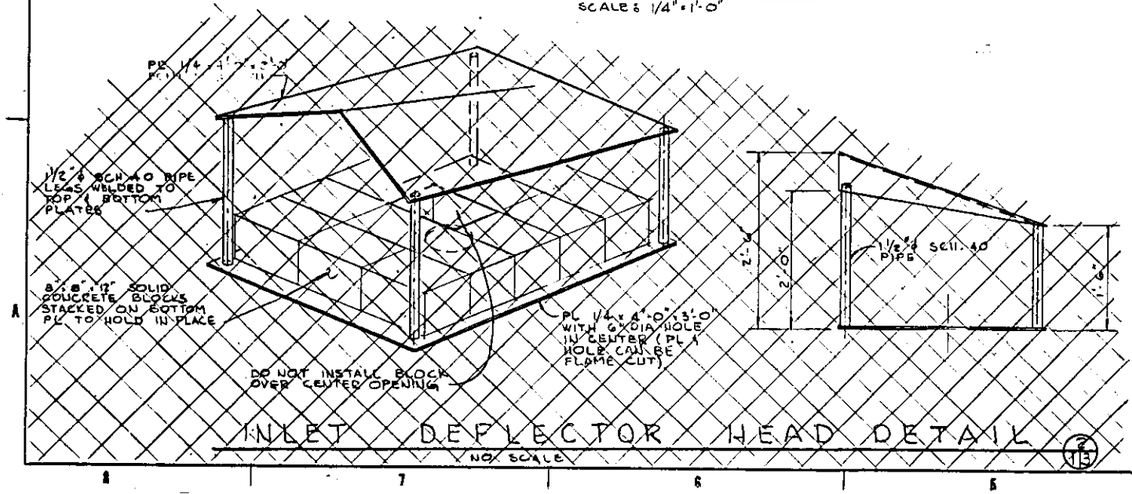
DETAIL
SCALE: 3/4" = 1'-0" 3 3/3



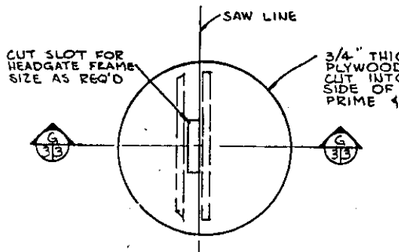
SECTION 6 3/3



ELEVATION
SHOWING TYPICAL FENCE CONSTRUCTION
SCALE: 1/4" = 1'-0" B 1/3



INLET DEFLECTOR HEAD DETAIL
NO SCALE 2 1/3

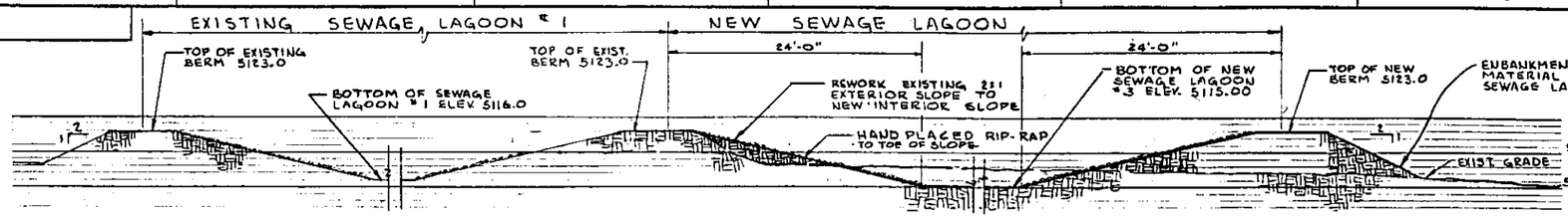


PLAN
DETAIL
SCALE: 3/4" = 1'-0" 2 REQ'D 4 3/3

MICRO-FILM STAMP
6-6-75(0)
7-25-75(1)

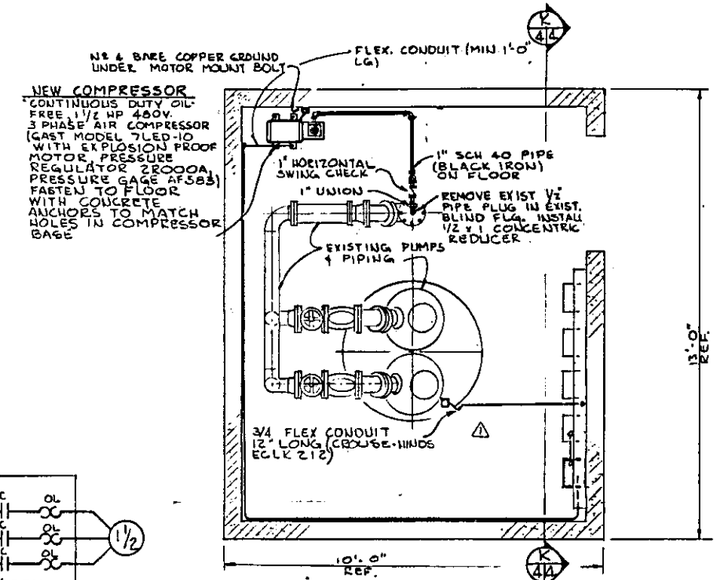
APPROVED CONST. R.P. HEATH	DATE 7/11/75	SERVICE NO'S 80733/63693	ARGONNE NATIONAL LABORATORY
STAFF APPROVAL	7/30/75	CHECKED R.E. J.T. EVERS	7/30/75
DESIGNATIONS R.J. TEUNIS	—	DRAWN BY G. HURLEY	5-29-75
		DATE 6-3-74	SHEET NO 3 OF 4

SANITARY SEWAGE TREATMENT EXPANSION — FACILITY 779
MISC. SECTIONS & DETAILS
ARGONNE WEST U.R.T.S.
W7790-0103-DD-01 REV. 1



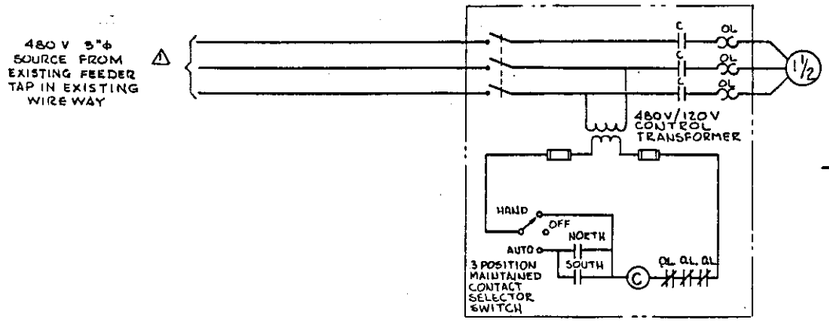
PROFILE

SCALE: 1" = 10'-0" VERTICAL

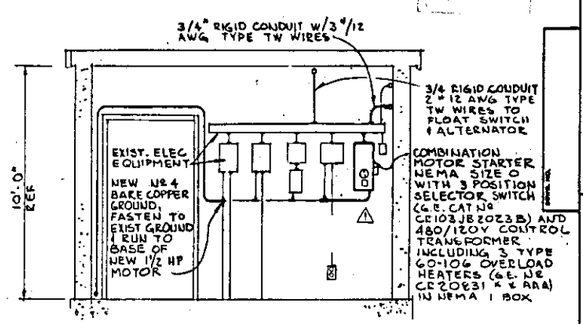


WORK PLAN
EXISTING LIFT STATION

SCALE: 1/2" = 1'-0"



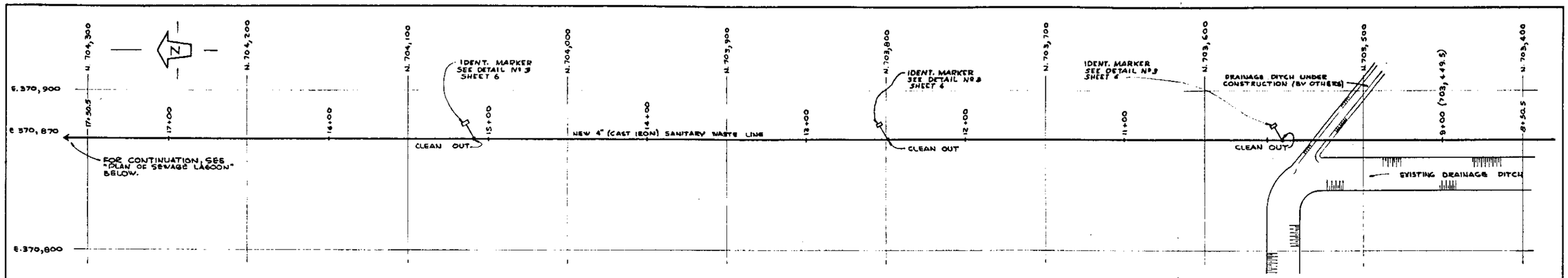
COMPRESSOR
SCHEMATIC DIAGRAM



SECTION

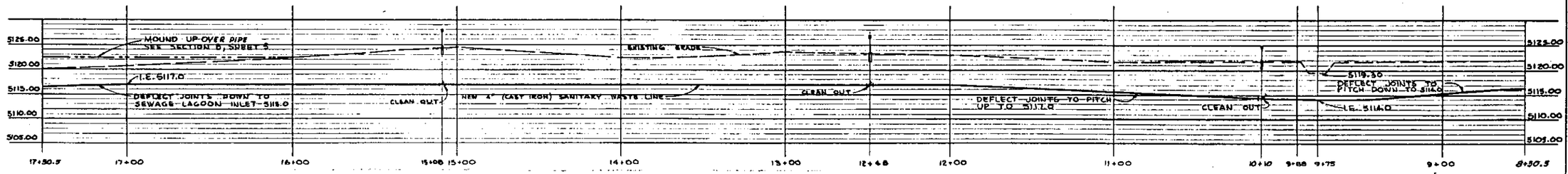
SCALE: 3/8" = 1'-0"

MICRO-FILM STAMP: G-6-75(0) 7-25-75(1)	APPROVED CONST. R.P. HEATH 7/31/74	SERVICE REQ NO. 80733/63692	ARGONNE NATIONAL LABORATORY
	CHECKED J. LEWIS 7/24/74		SANITARY SEWAGE TREATMENT EXPANSION — FACILITY 779
	REPRESENTATIVE R.J. TRUNK	DRAWN BY G. HURLEY 7/23/74	LAGOON DETAIL & LIFT STATION PLAN
	TOLERANCES, UNLESS OTHERWISE NOTED: FRACTIONAL ± 1/64, DECIMAL ± .005, ANGLES ± 1°; SURFACES TO HAVE 125 MICRO-INCHES FINISH, REMOVE ALL BURRS	DATE 6-3-74	SHEET NO 4 OF 4
			ARGONNE WEST N.R.T.S. W7790-0103-DD-01 1 REV



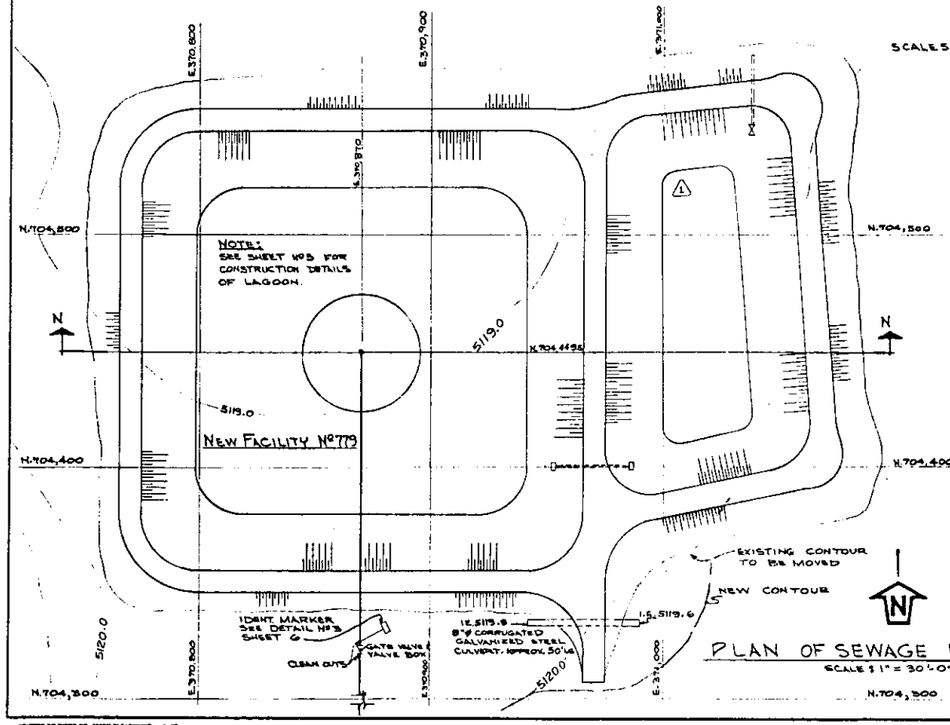
PLAN OF SEWER LINE (CONTINUED)

SCALE: 1" = 30'-0"



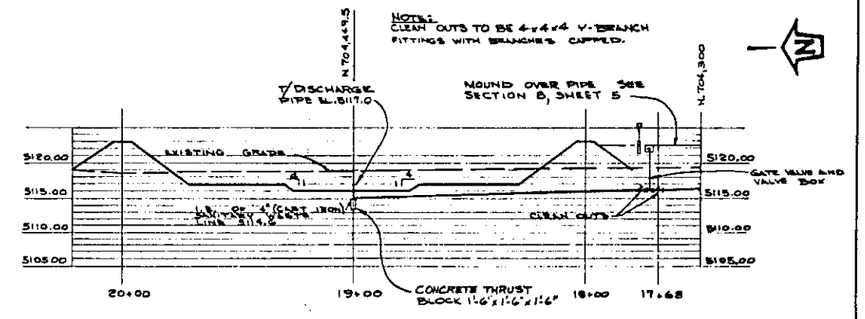
PROFILE

SCALES: 1" = 10'-0" (VERT.) - 1" = 30'-0" (HORIZ.)



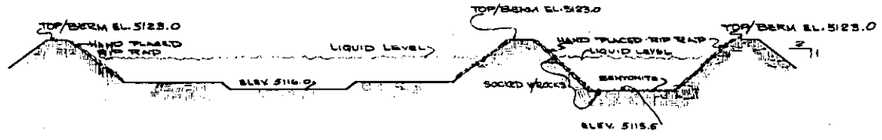
PLAN OF SEWAGE LAGOON

SCALE: 1" = 30'-0"



SEWAGE LAGOON PROF[illegible]

SCALES: 1"=10'-0" (VERT.) - 1"=30'-0" (HORIZ.)



SECTION - N

⚠ SCALE: 1"=10'-0" (VERT.) 1"=30'-0" (HORIZ.)

7-28-75(4)

MICRO-FILM = 5-15-74(1)

SYM.	REVISIONS	DATE	BY
⚠	ADDITION TO LAGOON	4-28-71	FKM

ARGONNE NATIONAL LABORATORY

FOR OFFICIAL USE ONLY

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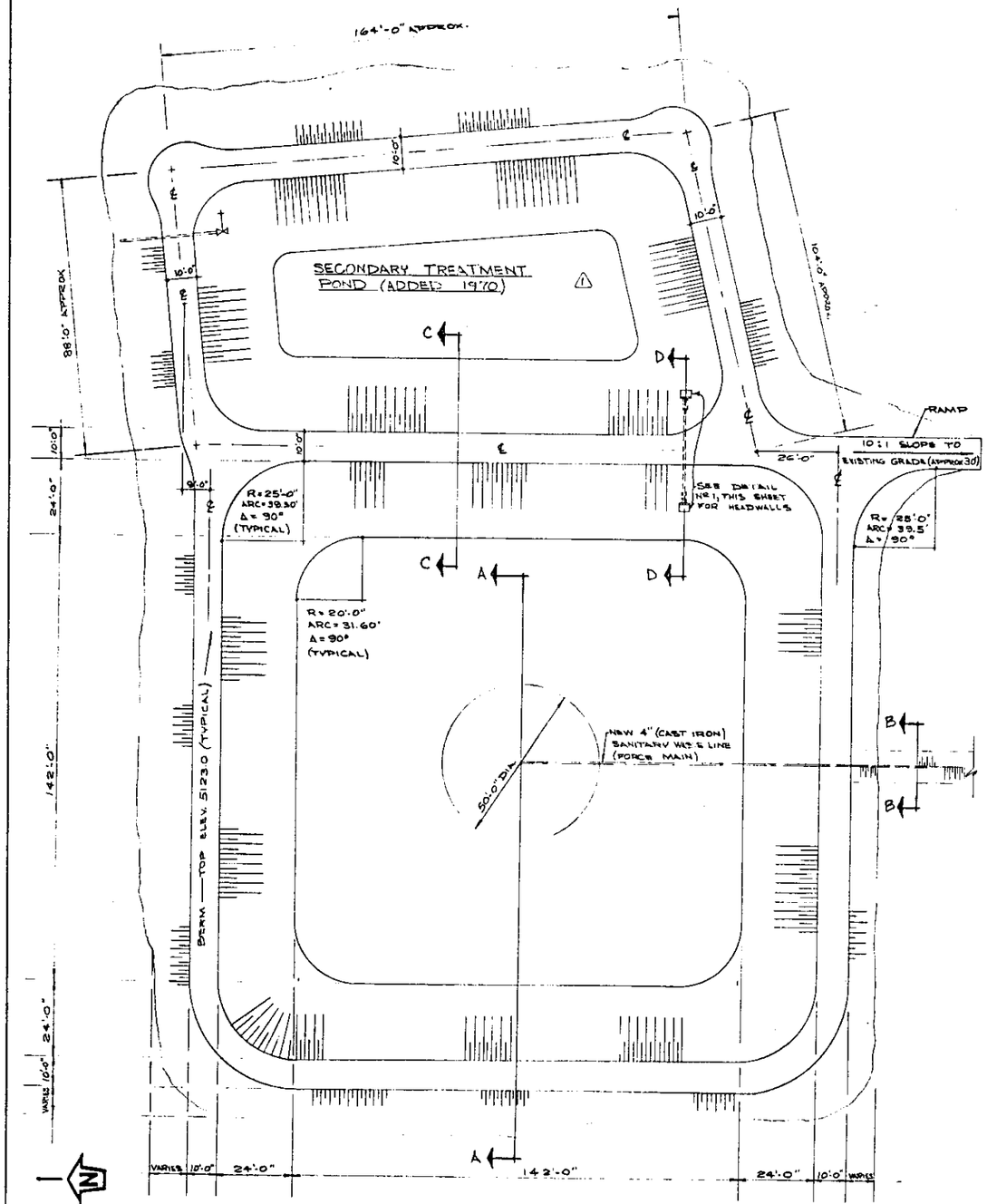
SANITARY & INDUSTRIAL WASTE DISPOSAL SYSTEM NEW FACILITIES Nº 778 & 779

PARTIAL PLAN & PROFILE (Nº 2)

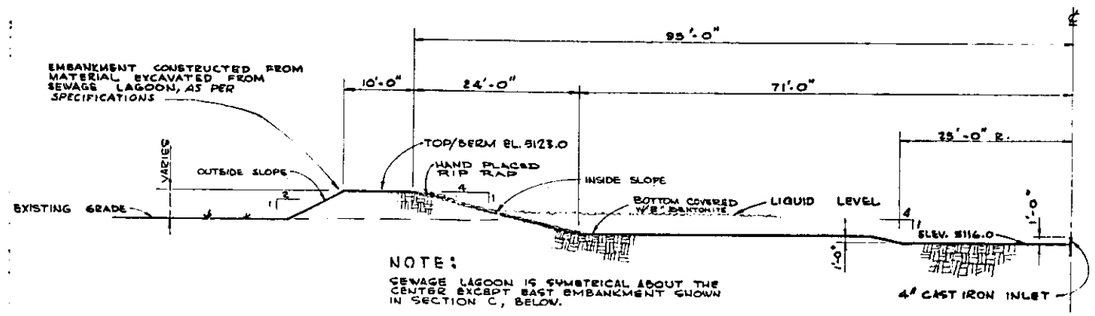
EAST AREA — NRTS

ENG. & W. O. No.	DRAWN BY	CHECKED BY	APPROVAL BY	DATE
80052	GMH	[illegible]	H.A. FLAUGHER	9-2-65

IDAHO PLANT ENGINEERING	DRAWING NUMBER	SHEET	DATE
IPE-779-1		4 OF 9	7-20-65



PLAN — SEWAGE LAGOON
NEW FACILITY Nº 779
SCALE: 1" = 20'-0"

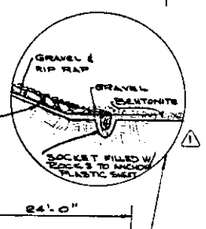


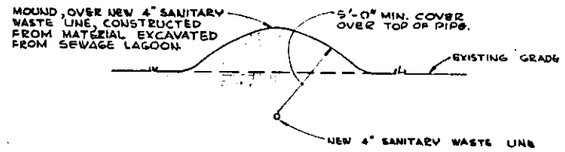
NOTE:
CEWAGE LAGOON IS SYMETRICAL ABOUT THE CENTER EXCEPT EAST EMBANKMENT SHOWN IN SECTION C, BELOW.

S E C T I O N — A
SCALE: 1" = 10'-0"

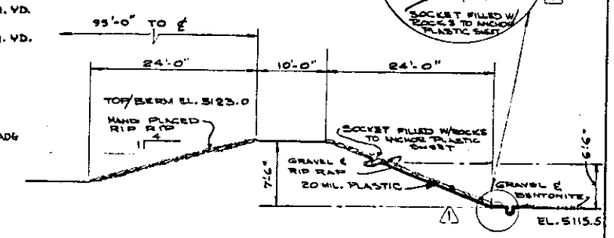
NOTE:
PRIME TOP AND BOTH SLOPES OF ENTIRE EMBANKMENT AND BOTTOM OF ENTIRE LAGOON WITH "PENSPRIME" AS FOLLOWS:

EMBANKMENT OUTSIDE SLOPES: 0.5 GALLONS/SQ. YD.
LAGOON BOTTOM, INSIDE SLOPES, TOP OF BERM AND RAMP'S 1.0 GALLONS/SQ. YD.

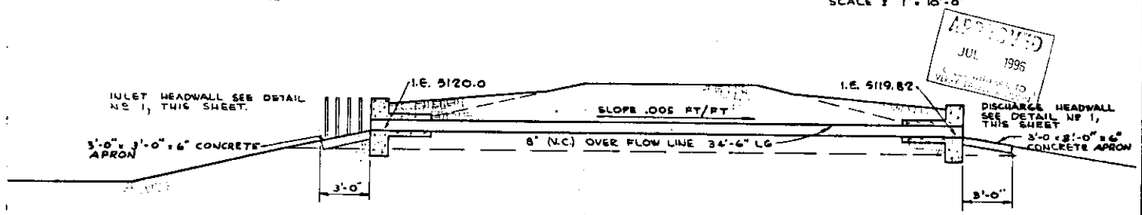




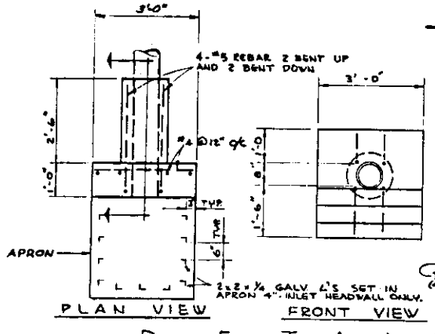
SECTION B
SCALE: 1/4" = 1'-0"

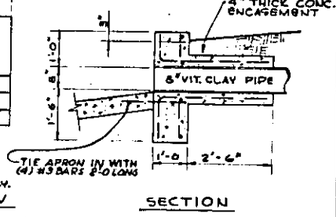


SECTION C
SCALE: 1" = 10'-0"



S E C T I O N — D
SCALE: 1/4" = 1'-0"





D E T A I L
SCALE: 1/2" = 1'-0"

MICRO-FILM
5-15-74(1)
7-28-75(4)

1	ADDITION TO LAGOON	4-28-75	PEM
DWG.	REVISIONS	DATE	BY

ARGONNE NATIONAL LABORATORY
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SANITARY & INDUSTRIAL WASTE DISPOSAL SYSTEM NEW FACILITIES Nº 778 & 779
SEWAGE LAGOON LAYOUT & DETAILS
EAST AREA

REQ. & W. O. NO.	DRAWN BY	CHECKED BY	APPROVED BY	DATE
80052	GMW			7-20-65
10 AND PLANT ENGINEERING	DRAWING NUMBER	SHEET	DATE	
IPE-779-1		5 of 9	7-20-65	

NRTS