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RPP-RPT-25530, Rev. 0

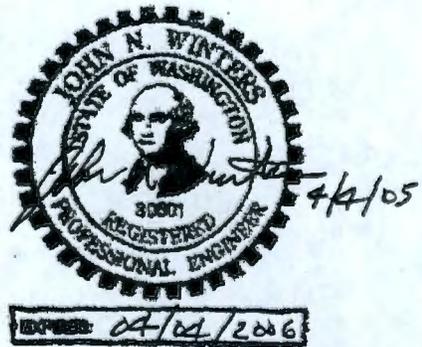
# Operations and Maintenance Manual for the Integrated Disposal Facility (IDF) Temporary Sewage Holding Tank

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## 1.0 INTRODUCTION

This operations and maintenance (O&M) manual is for the Integrated Disposal Facility (IDF) mobile restroom trailer temporary sewage holding tank. This manual provides detailed information for the O&M of the sanitary wastewater holding system located at the IDF construction facilities. The operations, including type and frequency of required maintenance, and system failure response procedures are discussed in the following sections.

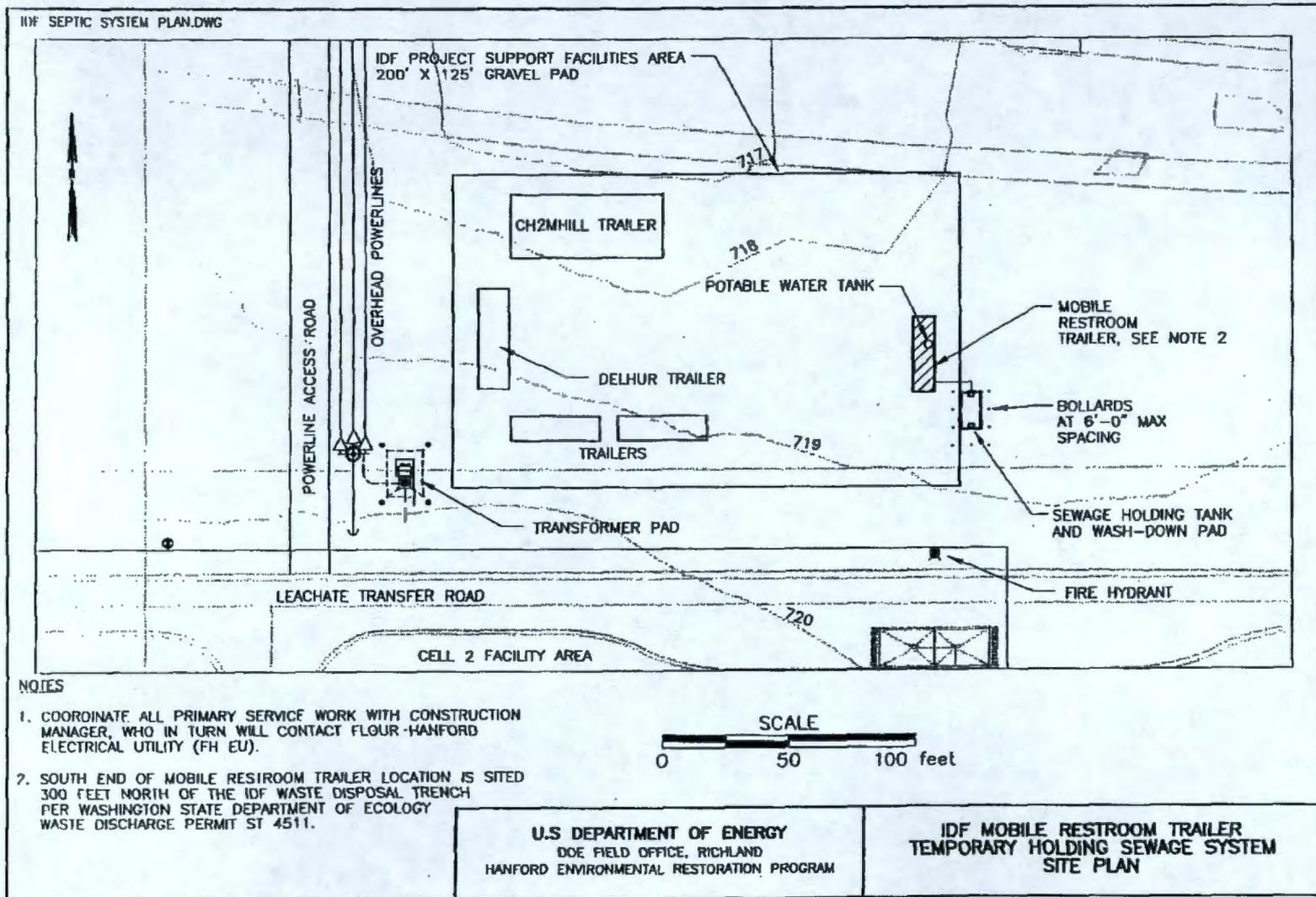
## 2.0 SYSTEM DESCRIPTION

The system consists of a temporary, nominal capacity, 1,500 gallon, below-grade temporary sewage holding tank, a dual alarm for normal operating volume (NOV) and reserve storage volume (RSV), and associated components required to provide a functional system. The holding tank is one-piece, pre-cast concrete and, to prevent leaks, has no joints or seams. According to the "Holding Tank Temporary Sewage System Calculation" (Appendix A), the maximum daily design flow of sewage is 178.4 gallons. The facility will have a self-contained, above-grade potable water holding tank with a nominal capacity of 300 gallons. The holding tank is located within the restroom trailer, as depicted in Figure 1.

## 3.0 SYSTEM OPERATION

An accumulation of more than 890 gallons of sewage in the tank will produce an alarm signal, indicating that the NOV has been exceeded. A local audible alarm will sound, and the NOV annunciator light-emitting diode (LED) on the control panel (located on exterior wall of the mobile restroom trailer) will light. Continued filling of the tank will activate a second alarm if 1,430 gallons is reached, indicating that the RSV capacity has been reached/exceeded. A local audible alarm will sound, and the RSV annunciator LED on the control panel will illuminate. When the second alarm activates, a reserve capacity of approximately 70 gallons remains in the tank to prevent overflow. For average conditions, this equates to less than 1/2 day of capacity.

Figure 1. IDF Mobile Restroom Facilities – Site Map.



10221-1-0000, for Integrated Disposal Facility (IDF) Temporary Sewage Holding Tank  
April 2005

### 3.1 STANDARD OPERATING CONDITIONS

Sewage enters the holding tank through the 4-in drain from the trailer. The pumping frequency will be subject to restroom occupation. For design purposes (full occupancy), pumping was assumed to occur every 7 days (5 working days). The date and volume pumped (records provided routinely by the pumper [e.g., monthly]) are to be recorded on the operation and inspection log (Figure 2). This pumping frequency will typically maintain the tank level below the NOV alarm set point.

### 3.2 NONSTANDARD OPERATING CONDITIONS

An accumulation of more than 890 gallons of sewage in the tank will cause the float alarm to sound and illuminate the NOV LED, indicating that the NOV has been exceeded. The tank has the capacity for an additional 540 gallons, which will allow time for pumping to occur.

Activation of the float alarm may be caused by several events, including delay in sewage tank content removal, facility overuse, or alarm malfunction. The following steps will be followed upon activation of the float alarm:

1. Silence the audible alarm.
2. If the level in the holding tank has reached or exceeded the RSV level (as signified by second alarm level light), restrict access to the restroom trailer to prevent overflow. Direct trailer personnel to use alternative facilities.
3. Contact the Facility Administrator, Building Warden, or designee, who will coordinate the proper response action.
4. Note the cause of the alarm and the response action taken on the inspection and operation log.
5. After the holding tank has been pumped, reset the alarm(s) on the control panel and verify that the alarm light is de-energized.



## 4.0 PERIODIC INSPECTION

Both systems components shall be inspected every 6 months to ensure that the overall system functions as designed. The inspection shall be recorded on the inspection and operation log.

If malfunctions in either system are observed during inspection, contact the Facility Administrator, Building Warden, or designee for resolution. Note any conditions requiring action and any maintenance conducted on the inspection and operation log.

An example of the inspection and operation log is included in Figure 2. This log may be modified to incorporate operational considerations, as appropriate.

Regular inspection of key system components is necessary to ensure the system integrity of the system's design life. The periodic inspections shall be recorded on the inspection and operation logs.

### 4.1 ALARM PANEL – FLOAT SWITCH OPERATION

Manually activate the lower float switch to a level above the NOV set point to verify proper alarm system function. Manually activate the upper float to a level above the RSV set point to verify the alarm system function.

### 4.2 HOLDING TANK – MANHOLE AND PUMPING PORT ACCESS COVER SEALING SURFACE

Visually inspect the manhole and pumping port access cover sealing surfaces for damage or foreign material that could affect seal function.

## 5.0 SEWAGE PUMPING AND DISPOSAL

Both sewage holding tanks shall be pumped on a regularly scheduled basis by a licensed sewage pumping contractor. The frequency of pumping is dependent on use of the facility. The pumping contractor is responsible for hauling the sewage to a treatment or disposal facility, approved in accordance with applicable local and/or state regulations. A copy of the service contract shall be maintained at the facility. The contract may be provided to Washington State Department of Health upon request.

## 6.0 RECORDKEEPING/ANNUAL REPORTING

An annual report for both holding tank systems must be submitted to the Washington State Department of Health, as specified by the annual onsite sewage system permit to operate. The report will consist of the inspection and operations log for these systems. The report may be submitted through the U.S. Department of Energy, Richland Operations Office.

Records will be maintained of logs, routine maintenance, repairs, pumping, inspection records, etc., for the system.

**APPENDIX A**  
**HOLDING TANK**  
**TEMPORARY SEWAGE SYSTEM CALCULATION**

Title: IDF Holding Tank Sewage System Calculation Identifier: N/A Rev: 0  
 Originator: CA Bentz *CB* Date: 3/1/05  
 Checker: JN Winters *JNW* DC Comstock *DCC* Date: 3/31/05  
*4/12/05*

Subcontractor Calculation Review Checklist

The subject document has been reviewed by the undersigned.  
 The checker reviewed and verified the following items as applicable.

Documents Reviewed: RPP-RPT-25529 and RPP-RPT-25530

Analysis Performed By: CA Bentz *CB*

- Design Input
- Basic Assumptions
- Approach/Design Methodology
- Consistency with item or document supported by the calculation
- Conclusion/Results Interpretation

*David Comstock *DCC* 4/12/05*

Checker (printed name, signature, and date) John Winters *JNW* 4/12/05  
Date

Organizational Manager (printed name, signature and date) SL Boy *Steve Boy* 4/13/05

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Title: IDF Holding Tank Sewage System Calculation Identifier: N/A Rev: 0  
 Originator: CA Bentz *CB* Date: 3/1/05  
 Checker: JN Winters *me* DC Comstock *DC* Date: 3/31/05  
*4/12/05*

Calculation Review Checklist

Calculation Reviewed: IDF Holding Tank Sewage System Calculation

Scope of Review: RPP-RPT-25529 and RPP-RPT-25530  
 (e.g., document section or portion of calculation)

Engineer/Analyst: NOTE: David Comstock as the responsible Engineer has signed as checker *DC*  
 Date: 4/14/05 *on this document*

Organizational Mgr: *Steve B...* Date: 4/13/05  
*S.L. Grey*

This document consists of 7 pages and the following attachments (if applicable):

	Pages	Description
Calculation	1 through 7	Calculation Description and Results
	Total: 7	

- |                                     |                          |                                     |   |
|-------------------------------------|--------------------------|-------------------------------------|---|
| Yes                                 | No                       | NA*                                 |   |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | 1. Analytical and technical approaches and results are reasonable and appropriate.  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | 2. Necessary assumptions are reasonable, explicitly stated, and supported.  |
| <input type="checkbox"/>            | <input type="checkbox"/> | <input checked="" type="checkbox"/> | 3. Ensure calculations that use software include a paper printout, microfiche, CD ROM, or other electronic file of the input data and identification to the computer codes and versions used, or provide alternate documentation to uniquely and clearly identify the exact coding and execution process. |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | 4. Input data were checked for consistency with original source information.  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | 5. For both qualitative and quantitative data, uncertainties are recognized and discussed.  |
| <input checked="" type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>            | 6. Mathematical derivations were checked including dimensional consistency of results.  |

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Title: IDF Holding Tank Sewage System Calculation Identifier: N/A Rev: 0Originator: CA Bentz *CB* Date: 3/1/05Checker: JN Winters *JNW* DC Comstock *DCC* Date: 3/31/05  
5/29/05

7. Calculations are sufficiently detailed such that a technically qualified person can understand the analysis without requiring outside information.
8. Software verification and validation are addressed adequately.
9. Limits/criteria/guidelines applied to the analysis results are appropriate and referenced. Limits/criteria/guidelines were checked against references.
10. Conclusions are consistent with analytical results and applicable limits.
11. Results and conclusions address all points in the purpose.
12. Referenced documents are retrievable or otherwise available.
13. The version or revision of each reference is cited.
14. The document was prepared in accordance with Attachment A, "Calculation Format and Preparation Instructions."
15. All checker comments have been dispositioned and the design media matches the calculations.

David Comstock *DCC* 5/29/05  
 Checker (Printed Name and Signature) Date

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Title: IDF Holding Tank Sewage System Calculation Identifier: N/A Rev: 0  
 Originator: CA Bentz *CB* Date: 3/1/05  
 Checker: JN Winters *JW* DCC *DCC* PLC *PLC* Date: 3/31/05  
*4/12/05*

**1. Title and Identifier**

Title: IDF Holding Tank Sewage System Calculation  
 Identifier:

**2. Objective/Purpose**

Determine the technical basis for sizing the Holding Tank Sewage System for the mobile restroom trailer.

**3. Input Data**

Design occupancy will be for a total of 20 people including craft and/or office workers.

Using the State of Washington's maximum of 1.6 gallon/flush for toilets and 3.8 liters (1.0 gallon) flush for urinals. Assume a worst case of 1.6 gallon/flush for both toilets and urinals.

A 300 gallon potable water tank will be provided for restroom hand washing and other sanitary water needs. The faucets will be rated at 2.5 gallons per minute. For this analysis we have assumed that the typical time spent washing hands is approximately 15 seconds per individual per restroom visit. This occurs an estimated every 2 hours per individual so that an individual will visit the lavatory trailer 4 times per work shift.

**4. Assumptions**

The input data does not include any portable restroom facilities use, which would decrease the system loading to the holding tank.

**5. Method of Analysis**

Number of people = 20  
 Visits per day = 4  
 Volume/flush = 1.6 gallons  
 Faucet Rating = 2.5 gallons per minute  
 Time/Wash = 15 seconds  
 Volume/Wash = 0.63 gallons

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Title: IDF Holding Tank Sewage System Calculation Identifier: N/A Rev: 0  
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 Checker: JN Winters *JW* D. Constock *DC* 4/12/05 Date: 3/31/05

### Option #1 (3 Day Pump Frequency Operation)

Daily Sewage Flow (DSF) = Flush + Hand Wash Flows  
 (People x Visits x Flush) = 128 gallons

(People x Visits x Wash) = 50.4 gallons  
 DSF = 178.4 gallons per day

Pump Service Frequency (PSF)  
 PSF = 3 working days for Option #1

Normal Operations Volume (NOV) = (DSF x PSF) = 535.2 gallons

Reserve Storage Volume\* (RSV) = 3 x DSF = 535.2 gallons  
 \* Required per WAC guidelines

Total Liquid Volume Capacity (TLVC)  
 (NOV + RSV) = 1070.4 gallons for Option #1

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*4/1/05*

**Option #2 (5 Day Pump Frequency Operation)**

Daily Sewage Flow (DSF) = Flush + Hand Wash Flows

(People x Visits x Flush) = 128 gallons

(People x Visits x Wash) = 50.4 gallons

DSF = 178.4 gallons per day

Pump Service Frequency (PSF)

PSF = 5 working days for Option #2

Normal Operations Volume (NOV) = (DSF x PSF) = 892 gallons

Reserve Storage Volume\* (RSV) = 3 x DSF = 535.2 gallons

\* Required per WAC guidelines

Total Liquid Volume Capacity (TLVC)

(NOV + RSV) = 1427.2 gallons for Option #2

**6. Results**

It is determined that the Holding Tank Sewage System will store the weekly Normal Operation Volume and the Reserve Storage Volume equal to (Option # 1, 1070.4 gallons of liquid) and (Option #2, 1427.2 gallons of liquid). This liquid will be pumped on a weekly basis.

**7. Conclusions**

A state approved 1,200 gallon tank would be required for Option #1 while a 1,500 gallon tank would be required for Option #2.

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Checker: JN Winters *JW* DCCamstuck *DC* Date: 3/31/05  
1/12/05

8. References

Modern Building Systems, Inc. 8'x30' Mobile Restroom Drawing 2004-KM-49, Sheet 19. Used for plumbing fixture flow rates.

Holding Tank Sewage Systems.  
Recommended Standards and Guidelines for Performance, Application, Design and Operation & Maintenance. Washington State Department of Health.  
Effective date: April 5<sup>th</sup>, 1999.