JUN 02 1997

ENGINEERING DATA TRANSMITTAL

Page 1 of 1

1. EDT

621240

2. To: (Receiving Organization) FDNW Specialty Engineering	3. From: (Originating Organization) Fluor Daniel Northwest Specialty Engineering	4. Related EDT No.: N/A
5. Proj./Prog./Dept./Div.: TANK FARM Project	6. Design Authority/ Design Agent/Cog. Engr.: G. W. Ryan	7. Purchase Order No.: N/A
8. Originator Remarks: The attached SD documents the originator's analysis only. it shall not be used as the final or sole document for affecting changes to an authorization basis or safety basis for a facility or activity.		9. Equip./Component No.: N/A
		10. System/Bldg./Facility: N/A
11. Receiver Remarks: 11A. Design Baseline Document? ☐ Yes ☒ No		12. Major Assm. Dwg. No.: N/A
		13. Permit/Permit Application No.: N/A
		14. Required Response Date: N/A

15. DATA TRANSMITTED					(F)	(G)	(H)	(I)
(A) Item No.	(B) Document/Drawing No.	(C) Sheet No.	(D) Rev. No.	(E) Title or Description of Data Transmitted	Approval Design- ator	Reason for Trans- mittal	Origin- ator Dispo- sition	Receiv- er Dispo- sition
1	HNF-SD-WM-CN-112, Rev.0	N/A	0	EFFECTS OF A SPRAY LEAK INSIDE THE 204-AR WASTE UNLOADING FACILITY	N/A	1/2		

16. KEY											
Approval Designator (F)		Reason for Transmittal (G)				Disposition (H) & (I)					
E, S, Q, D or N/A (see WHC-CM-3-5, Sec.12.7)		1. Approval 2. Release 3. Information		4. Review 5. Post-Review 6. Dist. (Receipt Acknow. Required)		1. Approved 2. Approved w/comment 3. Disapproved w/comment		4. Reviewed no/comment 5. Reviewed w/comment 6. Receipt acknowledged			
17. SIGNATURE/DISTRIBUTION (See Approval Designator for required signatures)											
(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN	(G) Reason	(H) Disp.	(J) Name	(K) Signature	(L) Date	(M) MSIN
1	1	Cog.Eng.: G. W. Ryan	<i>GWR</i>	5/21/97	A3-37						
1	1	Cog. Mgr.: B. E. Hey	<i>BEH</i>	5/23/97	A3-34						
1	1	Peer Rev. D. A. Hime	<i>DAH</i>	5/23/97	A3-34						
18. Signature of EDT Originator <i>Chin-Ping Huang</i> 5/23/97		19. Design Authority/ Authorized Representative Date for Receiving Organization <i>GWR</i> 5/27/97		20. Design Authority/ Cognizant Manager Date <i>BEH</i> 5/28/97		21. DOE APPROVAL (if required) Ctrl. No. ☐ Approved ☐ Approved w/comments ☐ Disapproved w/comments					

80-7400-172-2 (05/96) GEF07

80-7400-172-1

EFFECTS OF A SPRAY LEAK INSIDE THE 204-AR WASTE UNLOADING FACILITY

C. H. HUANG

Fluor Daniel Northwest, Inc., Richland, WA 99352
U.S. Department of Energy Contract DE-AC06-96RL13200 *2/ya*

EDT/ECN: 621240 UC: 610
Org Code: 403 Charge Code: E61385
B&R Code: EW3120071 Total Pages: 12

Key Words: spray, aerosol, TWRS, aging waste, jumper, crack

Abstract: This document provides the radiological and toxicological consequence analyses for a spray leak inside the 204-AR Waste Unloading Facility. The Aging Waste liquids are considered in the analyses.

TRADEMARK DISCLAIMER. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise, does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof or its contractors or subcontractors.

Printed in the United States of America. To obtain copies of this document, contact: WMC/BCS Document Control Services, P.O. Box 1970, Mailstop H6-08, Richland WA 99352, Phone (509) 372-2420; Fax (509) 376-4989.

James Bishop
Release Approval

6-3-97
Date

Approved for Public Release

**EFFECTS OF A SPRAY LEAK INSIDE
THE 204-AR WASTE UNLOADING FACILITY**

C. H. Huang
May 19, 1997

1.0 INTRODUCTION

The purpose of this document is to investigate the effects of a spray leak inside the 204-AR Waste Unloading Facility. This analysis will provide information to be used in the revision of the Tank Waste Remediation System (TWRS) Final Safety Analysis Report (FSAR).

The scope of work is to assess the impacts of the radiological and toxicological consequences if the 204-AR Waste Unloading Facility door remains open during a spray leak accident.

The dimensions of the roll-up door on the Unloading room are 3.7 m by 5.5 m (12'x18').

The 204-AR Waste Unloading Facility is a reinforced concrete structure approximately 20 m (64 ft) long by 12 m (40 ft) wide by 7.77 m (25.5 ft) high.

Aging waste liquids are considered in this analysis.

2.0 METHODOLOGY AND ASSUMPTIONS

2.1 AEROSOL RELEASE RATE

For convenience and for ease of computations, first a unit volumetric outflow rate of air from an open door is used for the dose calculation. Then the actual outflow will be used to calculate the dose rate. A unit volumetric air outflow rate is defined as

$$\text{Volumetric air outflow rate} = 1 \text{ m}^3/\text{s}$$

The maximum aerosol loading of air under relatively quiescent non-transient conditions is 100 mg/m³ (ANSI 1980). Thus, the aerosol release rate for a unit volumetric air outflow rate is as follows:

$$\begin{aligned}\text{Aerosol release rate} &= (\text{aerosol concentration}) \times (\text{volumetric air outflow rate}) \\ &= 0.1 \text{ g/m}^3 \times 1 \text{ m}^3/\text{s} \\ &= 0.1 \text{ g/s}\end{aligned}$$

The above calculation shows that the aerosol release rate for the volumetric air outflow rate of 1 m³/s is 0.1 g/s.

If we consider the supernate liquid only, and assume that the density of the liquid is 1.1 g/cm^3 (Van Keuren et al., 1996), then we have the volumetric release rate for the supernate liquid as

$$\begin{aligned}
 &\text{Volumetric liquid release rate} \\
 &= 0.1 \text{ (g/s) } / 1.1 \text{ (g/cm}^3\text{)} \\
 &= 9.09 \times 10^{-2} \text{ cm}^3/\text{s} \\
 &= 9.09 \times 10^{-5} \text{ L/s.} \\
 &= 3.27 \times 10^{-1} \text{ L/hr}
 \end{aligned}$$

The liquid spray leak is assumed to occur because a crack has developed in the liquid transfer line or in the jumper. Since the flow in the transfer line toward the leak has a very low velocity, the material leaked from the transfer line is assumed to come from the liquid remaining in the line. In a case study, for the backflow pressure of 250 psig (Himes 1997), the respirable leak rate is 3.19 g/s. At this respirable leak rate, the aerosol will quickly fill the room and the aerosol concentration exiting the doorway will reach the quiescent non-transient concentration of 100 mg/m^3 .

2.2 METHOD OF DOSE CALCULATIONS

The atmospheric dispersion coefficients and unit doses can be used to determine the effective dose equivalent and the committed dose to the limiting organ. This is typically done using the following equation:

For onsite and offsite inhalation doses:

$$D \text{ (Sv)} = Q \text{ (l)} \times \frac{X}{Q} \text{ (s/m}^3\text{)} \times \text{BR (m}^3/\text{s)} \times (\text{ULD}_{\text{inh}} \text{ (Sv/l)}) \quad (1)$$

And for offsite ingestion doses:

$$D_{\text{ing}} = (Q)(X/Q)(\text{ULD}_{\text{ing}}) \quad (2)$$

where

- D_{inh} = Inhalation dose (Sv or rem)
- D_{ing} = Ingestion dose (Sv or rem)
- Q = Quantity of respirable radioactive material released (L)
- X/Q = Atmospheric dispersion coefficient (s/m^3)
- BR = $3.3 \text{ E-4 m}^3/\text{s}$ standard man acute breathing rate
 $2.7 \text{ E-4 m}^3/\text{s}$ for the chronic (24 hours) breathing rate
- ULD_{inh} = Inhalation unit liter dose (Sv/L)
- ULD_{ing} = Ingestion unit liter dose ($\text{Sv.m}^3/\text{s.L}$)

2.3 ATMOSPHERIC DISPERSION COEFFICIENTS (X/Q)

The atmospheric dispersion coefficient X/Qs for onsite and offsite receptors for the release durations of 1 hr, 12 hr and 24 hr from the tank farm are shown in Table 1. The effect of particle deposition has been taken into account in the calculations of X/Q as shown in Table 1. These values of X/Q are needed to calculate the doses using Eq.(1) or Eq.(2).

Table 1. Atmospheric Dispersion Coefficients (X/Q) With Deposition Effects (Himes 1997)

Receptor	Release Duration	X/Q with deposition (s/m ³)
Onsite	1 hr	2.91 E-02
	12 hr	5.15 E-03
Offsite	1 hr	1.61 E-05
	24 hr	2.75 E-06

2.4 UNIT LITER DOSE

Unit liter doses (ULD) for Aging Waste Facility (AFW) liquids developed in WHC-SD-WM-SARR-037 (Cowley 1996) are shown in Table 2.

Table 2. Unit Liter Doses (ULD) for AWF Waste

Waste Component	Inhalation ULD (Sv/L)	Ingestion ULD (Sv.m ³ /s.L)
Aging Waste Facility Liquids	1.4 E+03	9.2E-02

2.5 UNIT RELEASE DOSE CALCULATIONS

The X/Q value for the onsite receptor at 100 m is 2.91×10^{-2} s/m³ and the inhalation unit liter dose for the Aging Waste liquids is 1.4×10^3 Sv/L. Therefore, the inhaled doses are calculated for the onsite receptor as follows:

a. Onsite

1-hr release:

$$\begin{aligned}
 D_{inh} &= (3.27 \times 10^{-1} \text{ L/hr} \times 1 \text{ hr})(2.91 \times 10^{-2} \text{ s/m}^3)(3.3 \times 10^{-4} \text{ m}^3/\text{s}) \\
 &\quad (1.4 \times 10^3 \text{ Sv/L}) \\
 &= 4.40 \times 10^{-3} \text{ Sv} \\
 &= 4.40 \times 10^{-1} \text{ rem}
 \end{aligned}$$

12-hour release:

$$\begin{aligned}
 D_{inh} &= (3.27 \times 10^{-1} \text{ L/hr} \times 12 \text{ hr})(5.15 \times 10^{-3} \text{ s/m}^3)(3.3 \times 10^{-4} \text{ m}^3/\text{s}) \\
 &\quad (1.4 \times 10^3 \text{ Sv/L}) \\
 &= 9.34 \times 10^{-3} \text{ Sv} \\
 &= 9.34 \times 10^{-1} \text{ rem}
 \end{aligned}$$

In the above dose calculations, the volumetric air outflow rate of $1 \text{ m}^3/\text{s}$ is assumed. The inhalation doses for the onsite receptor at 100 m due to the release from the Aging Waste supernate liquid are 0.44 rem for a release duration of one hour and 0.934 rem for the release duration of 12 hours.

b. Offsite

1-hr release:

$$\begin{aligned}
 D_{inh} &= (3.27 \times 10^{-1} \text{ L/hr} \times 1 \text{ hr})(1.61 \times 10^{-5} \text{ s/m}^3)(3.3 \times 10^{-4} \text{ m}^3/\text{s}) \\
 &\quad (1.4 \times 10^3 \text{ Sv/L}) \\
 &= 2.43 \times 10^{-6} \text{ Sv} \\
 &= 2.43 \times 10^{-4} \text{ rem}
 \end{aligned}$$

$$\begin{aligned}
 D_{ing} &= (3.27 \times 10^{-1} \text{ L/hr} \times 1 \text{ hr})(1.61 \times 10^{-5} \text{ s/m}^3)(9.2 \times 10^{-2} \text{ Sv} \cdot \text{m}^3/\text{s} \cdot \text{L}) \\
 &= 4.84 \times 10^{-7} \text{ Sv} \\
 &= 4.84 \times 10^{-5} \text{ rem}
 \end{aligned}$$

24-hr release:

$$\begin{aligned}
 D_{inh} &= (3.27 \times 10^{-1} \text{ L/hr} \times 24 \text{ hr}) (2.75 \times 10^{-6} \text{ s/m}^3) (2.7 \times 10^{-4} \text{ m}^3/\text{s}) \\
 &\quad (1.4 \times 10^3 \text{ Sv/L}) \\
 &= 8.16 \times 10^{-6} \text{ Sv} \\
 &= 8.16 \times 10^{-4} \text{ rem}
 \end{aligned}$$

$$\begin{aligned}
 D_{ing} &= (3.27 \times 10^{-1} \text{ L/hr} \times 24 \text{ hr}) (2.75 \times 10^{-6} \text{ s/m}^3) (9.2 \times 10^{-2} \text{ Sv.m}^3/\text{s.L}) \\
 &= 1.99 \times 10^{-6} \text{ Sv} \\
 &= 1.99 \times 10^{-4} \text{ rem}
 \end{aligned}$$

3.0 VOLUMETRIC AIR OUTFLOW RATE

It is assumed that the wind is blowing toward the roll-up door with a speed $u = 1 \text{ m/s}$ at a 45 degree angle from the plane of the door. The results for the calculated doses are not highly sensitive to the wind speed because the increase in the wind speed will increase the amount of aerosol release but decrease the atmospheric dispersion coefficient (X/Q) by the same proportion.

The area of the roll-up door is:

$$\begin{aligned}
 \text{Area} &= 3.7 \text{ m} \times 5.5 \text{ m} \\
 &= 20.35 \text{ m}^2
 \end{aligned}$$

Thus, the area of the door facing directly to the wind is:

$$\begin{aligned}
 \text{Area} &= (\text{area of the door}) (\sin (\pi/4)) \\
 &= 20.35 \text{ m}^2 \times 0.707 \\
 &= 14.38 \text{ m}^2
 \end{aligned}$$

Based on the mass balance (the continuity of the mass), the inflow is equal to the outflow. Thus, the volumetric air outflow rate through the projected area of 14.38 m^2 of the door opening is:

$$\begin{aligned}
 \text{Volumetric air outflow rate} &= (\text{wind speed})(\text{area})/2 \\
 &= 1 \text{ m/s} \times 14.38 \text{ m}^2/2 \\
 &= 7.19 \text{ m}^3/\text{s}
 \end{aligned}$$

The above calculated volumetric air outflow rate of $7.19 \text{ m}^3/\text{s}$ is an upper bound. That is the maximum efficiency of air exchange rate. If we assume

that the wind blows toward the door from the right hand side, the air circulation inside the building will be in the clockwise direction. This air current will push the air out of the building to the outside in the opposite direction of the inflow. The efficiency factor for the air outflow due to the process of air mixing could be as high as 50 percent because of the generation of eddies and the vortex inside the building. If we assume that the efficiency factor of the air mixing is 50 percent, then the effective volumetric outflow rate of air fully loaded with aerosol is:

Volumetric air outflow rate

$$= 7.19 \text{ m}^3/\text{s} \times 0.5$$

$$= 3.60 \text{ m}^3/\text{s}$$

For worst case we assume that the exhaust fan with the filter system in place is not running. If the exhaust system is without filter, then the condition of the exhaust fan being shut down is not the worst case.

4.0 DOSE CALCULATIONS

4.1 RADIOLOGICAL CONSEQUENCES

The inhaled dose can be calculated with the actual flow rate of $3.60 \text{ m}^3/\text{s}$ in the following manner:

a. Onsite

1-hour release:

$$\begin{aligned} D_{\text{inh}} &= 4.40 \times 10^{-1} \text{ (rem/m}^3/\text{s)} \times 3.60 \text{ (m}^3/\text{s)} \\ &= 1.58 \text{ rem} \end{aligned}$$

12-hour release:

$$\begin{aligned} D_{\text{inh}} &= 9.34 \times 10^{-1} \text{ (rem/m}^3/\text{s)} \times 3.60 \text{ (m}^3/\text{s)} \\ &= 3.36 \text{ rem} \end{aligned}$$

b. Offsite

1-hour release:

$$\begin{aligned} D_{\text{inh}} &= 2.43 \times 10^{-4} \text{ (rem/m}^3/\text{s)} \times 3.60 \text{ (m}^3/\text{s)} \\ &= 8.75 \times 10^{-4} \text{ rem} \end{aligned}$$

$$\begin{aligned} D_{\text{ing}} &= 4.84 \times 10^{-5} \text{ (rem/m}^3/\text{s)} \times 3.60 \text{ (m}^3/\text{s)} \\ &= 1.74 \times 10^{-4} \text{ rem} \end{aligned}$$

$$\begin{aligned}
 D_{\text{total}} &= D_{\text{inh}} + D_{\text{ing}} \\
 &= 8.75 \times 10^{-4} \text{ rem} + 1.74 \times 10^{-4} \text{ rem} \\
 &= 1.05 \times 10^{-3} \text{ rem}
 \end{aligned}$$

24-hour release:

$$\begin{aligned}
 D_{\text{inh}} &= 8.16 \times 10^{-4} (\text{rem}/\text{m}^3/\text{s}) \times 3.60 (\text{m}^3/\text{s}) \\
 &= 2.94 \times 10^{-3} \text{ rem}
 \end{aligned}$$

$$\begin{aligned}
 D_{\text{ing}} &= 1.99 \times 10^{-4} (\text{rem}/\text{m}^3/\text{s}) \times 3.60 (\text{m}^3/\text{s}) \\
 &= 7.16 \times 10^{-4} \text{ rem}
 \end{aligned}$$

$$\begin{aligned}
 D_{\text{total}} &= D_{\text{inh}} + D_{\text{ing}} \\
 &= 2.94 \times 10^{-3} \text{ rem} + 7.16 \times 10^{-4} \text{ rem} \\
 &= 3.66 \times 10^{-3} \text{ rem}
 \end{aligned}$$

4.2 TOXICOLOGICAL CONSEQUENCES

The toxicological sum of fractions is simply the appropriate unit release sum of fractions given in Table 3 times the respirable aerosol release rate. The respirable aerosol release rate is :

$$\begin{aligned}
 \text{RF} &= 9.09 \times 10^{-5} \text{ L/s per m}^3/\text{s air flow} \times 3.60 \text{ m}^3/\text{s} \\
 &= 3.27 \times 10^{-4} \text{ L/s}
 \end{aligned}$$

Table 3. Unit Release Rate Toxicological Sum of Fractions for Liquids at Aging Waste Facility (Himes 1997).

Receptor	Waste Component	Sum of Fractions (s/L) With Deposition
Onsite	Aging Waste Facility Liquids	8.5 E+3
Offsite	Aging Waste Facility Liquids	4.8 E+0

a. Onsite sum of fractions

$$\begin{aligned}\text{Sum of fractions} &= (8.5 \times 10^3 \text{ s/L}) (3.27 \times 10^{-4} \text{ L/s}) \\ &= 2.78\end{aligned}$$

b. Offsite sum of fractions

$$\begin{aligned}\text{Sum of fractions} &= (4.8 \text{ s/L}) (3.27 \times 10^{-4} \text{ L/s}) \\ &= 1.57 \times 10^{-3}\end{aligned}$$

5.0 CONCLUSION

The results of the liquid spray leak at the 204-AR Waste Unloading Facility are summarized in Table 4. It is assumed that the onsite and offsite exposures are 12 hr (one shift) and 24 hr, respectively.

Table 4. Consequences of AWF Liquid Spray Leak

Hazard	Receptor	Dose Exposure	Evaluation Guideline (Anticipated)
Radiological	Onsite	33.6 mSv	5 mSv
	Offsite	3.66 E-02 mSv	1 mSv
Toxicological	Onsite	2.78	1
	Offsite	1.57 E-03	1

The frequency for the accident scenario considered here has been designated as anticipated with a frequency range of $1 - 10^2/\text{y}$. As can be seen from Table 4, the onsite radiological and toxicological doses exceed the risk guidelines. However, the offsite radiological and toxicological doses are within the risk guidelines.

In this analysis, some assumptions were made such as the wind speed of 1 m/s, the direction of wind speed at 45 degree angle from the plane of the door, and the efficiency factor of 0.5 for the air outflow due to the process of air mixing. However, a change in these assumptions would have no impact on the conclusions of the analysis.

REFERENCES

- ANSI N46.1 1980, *American National Standard - Guidance for Defining Safety Related Features of Nuclear Fuel Cycle Facilities*, American Nuclear Society, La Grange Park, Illinois.
- Cowley, W. L., 1996, *Development of Radiological Concentrations and Unit Liter Doses for TWRS FSAR Radiological Consequence Calculations*, WHC-SD-WM-SARR-037.
- Himes, D. A., 1997, *Refined Radiological and Toxicological Consequences of Bounding Spray Leak Accidents in Tank Farm Waste Transfer Pits*, HNF-SD-WM-CN-096 Rev. 0.
- Van Keuren, J. C., J. S. Davis, and M. L. Dentler, 1996, *Toxic Chemical Considerations for Tank Farm Releases*, WHC-SD-WM-SARR-011, Rev. 2.

HNF-SD-WM-CN-112, Rev. 0
CHECKLIST FOR PEER REVIEW

Document Reviewed: "EFFECTS OF A SPRAY LEAK INSIDE THE 204-AR WASTE UNLOADING FACILITY," May 19, 1997. HNF-SD-WM-CN-112, Rev. 0.

Scope of Review: Entire Document

Yes No NA

☐	☐	☒	*	Previous reviews complete and cover analysis, up to scope of this review, with no gaps.
☒	☐	☐		Problem completely defined.
☒	☐	☐		Accident scenarios developed in a clear and logical manner.
☒	☐	☐		Necessary assumptions explicitly stated and supported.
☒	☐	☒		Computer codes and data files documented.
☒	☐	☐		Data used in calculations explicitly stated in document.
☒	☐	☐		Data checked for consistency with original source information as applicable.
☒	☐	☐		Mathematical derivations checked including dimensional consistency of results.
☒	☐	☐		Models appropriate and used within range of validity or use outside range of established validity justified.
☒	☐	☐		Hand calculations checked for errors. Spreadsheet results should be treated exactly the same as hand calculations.
☐	☐	☒		Software input correct and consistent with document reviewed.
☐	☐	☒		Software output consistent with input and with results reported in document reviewed.
☒	☐	☐		Limits/criteria/guidelines applied to analysis results are appropriate and referenced. Limits/criteria/guidelines checked against references.
☐	☐	☒		Safety margins consistent with good engineering practices.
☒	☐	☐		Conclusions consistent with analytical results and applicable limits.
☒	☐	☐		Results and conclusions address all points required in the problem statement.
☐	☐	☒		Format consistent with appropriate NRC Regulatory Guide or other standards
☐	☒	*		Review calculations, comments, and/or notes are attached.
☒	☐	☐		Document approved.

D.A. Himes
Reviewer (Printed Name and Signature)

5/23/97
Date

HEDOP REVIEW CHECKLIST

for

Radiological and Nonradiological Release Calculations

Document Reviewed: "EFFECTS OF A SPRAY LEAK INSIDE THE 204-AR WASTE UNLOADING FACILITY," May 19, 1997. *HNF-SD-WM-CN-112, Rev. 0*

Submitted by: C. H. HUANG

Date Submitted: May 19, 1997

Scope of Review: Entire Document

YES NO* N/A

☒	☐	☐	1. A detailed technical review and approval of the environmental transport and dose calculation portion of the analysis has been performed and documented.
☒	☐	☐	2. Detailed technical review(s) and approval(s) of scenario and release determinations have been performed and documented.
☐	☐	☒	3. HEDOP-approved code(s) were used.
☐	☐	☒	4. Receptor locations were selected according to HEDOP recommendations.
☒	☐	☐	5. All applicable environmental pathways and code options were included and are appropriate for the calculations.
☒	☐	☐	6. Hanford site data were used.
☐	☐	☒	7. Model adjustments external to the computer program were justified and performed correctly.
☒	☐	☐	8. The analysis is consistent with HEDOP recommendations.
☐	☐	☒	9. Supporting notes, calculations, comments, comment resolutions, or other information is attached. (Use the "Page 1 of X" page numbering format and sign and date each added page.)
☒	☐	☐	10. Approval is granted on behalf of the Hanford Environmental Dose Overview Panel.

* All "NO" responses must be explained and use of nonstandard methods justified.

D.A. Hines 5/23/97
 HEDOP-Approved Reviewer (Printed Name and Signature) Date

COMMENTS (add additional signed and dated pages if necessary):

DISTRIBUTION SHEET

To	From	Page 1 of 1
G. W. Ryan	C.H. Huang	Date 5/19/97
Project Title/Work Order		EDT No. 621240
EFFECTS OF A SPRAY LEAK INSIDE THE 204-AR WASTE UNLOADING FACILITY		ECN No. N/A

Name	MSIN	Text With All Attach.	Text Only	Attach./ Appendix Only	EDT/ECN Only
G.W. Ryan	A3-37	X			
C.H. Huang	A3-34	X			
J.C. Van Keuren	A3-34	X			
TWRS S&L PROJECT FILES (6)	A2-26	X			
Central Files	A3-88	X			