Table 1-1. Refinery Process Units and Capacity, SCYI Facility, Yabucoa, Puerto Rico.

Process Units	Capacity
Crude unit	85,000 BPD
Debutanizer	9,000 BPD
Gasoline reformer	20,000 BPD
Furfural units	8,400 BPD
Lube hydrotreater	15,600 BPD
MEK dewaxing	12,000 BPD
UV stabilization	10,200 BPD
Final lube distillation	10,200 BPD
Hydrogen unit	18MM SFD[1]
Gas oil desulfurizer	10,000 BPD
Sulfur units (2)	34 TPD[2]

BPD - Barrels per day.

TPD - Tons per day.

SFD - Standard cubic feet per day.

(1) - SFD of hydrogen gas.

(2) - TPD of sulfur for each unit

Table 1-2

Hazardous Waste Generation for Off-Site Disposal

Shell Chemical Yabucoa Inc.
Yabucoa, Puerto Rico

EPA Hazardous Waste No.	Waste Description	Generated at	Constituents of Concern/Characteristics
F037	Primary Oil/Water/Solids Separation Sludge	Process Sewer, Wastewater Treatment Tanks (W5 & W6), Oil Recycling System Tanks (103, 10, W1)	Benzene Benzo(a)pyrene Chrysene Lead Chromium
F038	Secondary Oil/Water/Solids Separation Sludge	DAF Unit, IAF Unit	Benzene Benzo(a)pyrene Chrysene Lead Chromium
K048	Dissolved Air Floatation (DAF) Unit Float	DAF Unit	Hexavalent Chromium Lead
K049	Slop Oil Emulsion Solids	Slop Oil Tanks (103, W5, W6, 10)	Hexavalent Chromium Lead
K050	Heat Exchanger Bundle Solids	Heat Exchanger Cleaning Area	Hexavalent Chromium
K051	API Separator Sludge	2-Cell and 3-Cell API Separators, East and West API Separators	Hexavalent Chromium Lead
K169	Crude Oil Tank Sediment	Crude Oil Tanks	Benzene
K171	Spent Hydrotreating Catalyst	Hydrotreater Unit	Benzene Arsenic
K172	Spent Hydrorefining Catalyst	Gas Oil Desulfurization (Hydrorefining) Unit	Benzene Arsenic

Table 1-2 (Contd.)

Hazardous Waste Generation for Off-Site Disposal

Shell Chemical Yabucoa Inc.
Yabucoa, Puerto Rico

EPA Hazardous Waste No.	Waste Description	Generated at	Constituents of Concern/Characteristics
D001	Ignitable Waste - spent solvents, spill residues, off-spec product, miscellaneous lab and process waste	Various Locations	Ignitability
D018	Toxic Waste	Refinery Area (Process Wastewater), Desalter Unit, Various Locations	Benzene
U154, D001	Methanol (Off-specification)	Laboratory	Ignitability

Table 1-3. Water Surface Elevations for Present Conditions and Preliminary Flood Protection, SCYI Facility, Yabucoa, Puerto Rico.

USSCS Section	Present Conditions, 1960 Flood[a]	Preliminary 1960 Flood[a]	Flood Protection 100-Yr Flood[a]
1[b]		1.4	1.8
2[b]		2.5	2.9
3[b]		2.7	3.1
4	3.0	3.3	3.7
5	3.8	4.1	4.6
6	4.3	4.8	5.2
7	4.7	5.1	5.5
8	6.0	6.1	6.6
9	8.3	8.1	8.4
10	10.5	10.5	10.7
11	11.8	11.9	12.1
12			14.4
13			16.0
14			16.8
15			18.7

[a] - Meters above mean sea level.

[b] - Adapted from USSCS topographics information (Table VI-1 from the TAMS Report).

Table 1-4. Average Daily Traffic Counts in Vicinity of SCYI Facility, Yabucoa, Puerto Rico.

Traffic Control Stations	Year	Average Daily Count
Highway PR-3		
Kilometer Point 94.0	1975	6,651
Kilometer Point 94.0	1977	11,356
Kilometer Point 94.0	1983	11,268
Kilometer Point 95.2	1984	13,360
Kilometer Point 97.4	1975	2,294
Kilometer Point 97.6	1977	2,232
Kilometer Point 98.6	1982	2,136
Highway PR-901		
Kilometer Point 1.4	1977	5,159
Kilometer Point 2.8	1982	1,021
Kilometer Point 4.6	1977	1,409
Kilometer Point 4.9	1984	3,450

tab1-4.tab

Table 3-1

Containment Capacity for the Concrete Slab at the Hazardous Waste Storage Area

Shell Chemical Yabucoa, Inc.
Yabucoa, Puerto Rico

Data

Outside Dimensions of the Entire Concrete Pad:	60' x 83' 6"
Outside Dimensions of Liquid Storage Area:	60' x 21'
Outside Dimensions of Solids Storage Area:	60' x 62' 6"
Thickness of the Berm:	4"
Depth of Berm:	4"
Slope of the Concrete Pad:	1%

Calculation

Liquid Storage Area:

Inside Dimensions of the Liquid Storage Area:	59' 4" x 20' 8"
Inside Area of the Concrete Pad:	1225.8 sq. ft.

Depth of Concrete Pad = Depth of the Berm + Depth due to sloping surface

Considering an average depth of 1.8 inches across the sloping surface,

Depth of Concrete: 4" + 1.8 = 5.8"
= 0.48 ft.

Containment Volume
of the Liquid Storage Area: 1225.8' x 0.48' = 588.4 cu. ft.
= 4,400 gallons

Considering a 25% volume displacement due to ramps and wooden pallets for drum storage,

Available (useable) containment volume:
0.75 x 4,400 = 3,300 gallons

Volume of the Catch Drain: = 84 gallons

Total Liquid Storage Area
Containment Volume: 3,300 + 84 = 3,384 gallons

Table 3-1 (contd.)

Containment Capacity for the Concrete Slab at the Hazardous Waste Storage Area

Shell Chemical Yabucoa, Inc.
Yabucoa, Puerto Rico

Solids Storage Area:

Inside Dimensions of the Solids Storage Area: 59' 4" x 61' 10"
Inside Area of the Concrete Pad: 3668.8 sq. ft.

Depth of Concrete Pad = Depth of the Berm + Depth due to sloping surface

Considering an average depth of 1.8 inches across the sloping surface,

Depth of Concrete:	4" + 1.8	=	5.8"
		=	0.48 ft.
Containment Volume of the Solids Storage Area:	3668.8' x 0.48'	=	1,761 cu. ft.
		=	13,173 gallons

Considering a 25% volume displacement due to ramps and chassis tires,

Available (useable) containment volume:	0.75 x 13,173	=	9,880 gallons
Volume of the Catch Drain:		=	104 gallons
Total Solids Storage Area Containment Volume:	9,880 + 104	=	9,984 gallons
Total Containment Volume of the HWSA:	3,384 + 9,984	=	**13,368 gallons**

Table 8-1

SCYI Emergency Response Personnel

SCYI POSITION	NAME	NUMBER
Site Manager	Sven Erikson	492-5307
Production	Juan A. López	499-5609
HS&E Manager	Henry F. McLeod	499-5486
Engineering Manager	Imants Freibergs	492-4316
Fire & Emergency Supervisor	Angel L. Ruiz	499-6731
Sr. Environmental Engineer	Carlos R. Martínez	495-8191
Environmental Tech. Aide	Jesús Flecha	499-8636
Environmental Specialist	Julie Rosado	499-8129
Sr. Health Safety Specialist	Rafael I. Méndez	492-4733
Warehouse Supervisor	Ada Cruz	498-8349
PSM & Training Coordinator	Esteban Lozada	492-4316
E&PS Infirmary	Dr. Andrés Fuentes	499-9216
HR Manager	Sophie Ancelín	495-9768
HR On-Call	Enid Rosa	498-9905
Sr. E/I Engineer	Julio A. Seda	492-7105
Planning & Econ. Engineer	Richard Hunter	499-5484
Sr. Process Engineer II	Eddie Rivera	499-7550
Sr. Process Engineer II	Luis A. Rosario	495-9491
Maintenance Superintendent	Rafael Perales	495-6866
Maintenance On-Call	Miriam Castro	498-4125
Shift Supervisor	Jesús Tirado	499-8214
Shift Supervisor	Mario Costa	499-9547
Shift Supervisor	Gonzalo Hernández	499-5891
Shift Supervisor	Pablo Alvarez	495-8603
Shift Supervisor	Pedro J. Laboy	492-5988
Shift Supervisor	Rafael Muñiz	493-4247
Operating Specialist	Héctor del Moral	493-5810
Operating Specialist	José del Moral	495-2075

Table 8-1 (Cont…)

SCYI Emergency Response Personnel

SCYI POSITION	NAME	NUMBER
Operating Specialist	Alfredo Alequín	495-4861
Technical Manager	Hans Rutzer	499-8141
Materials Manager	Madeline Zenquiz	497-4773
HR & Community Relations	David Amaro	492-4606
Maintenance Supervisor	Angel Díaz	492-9565
Laboratory Manager	Richard Rodríguez	492-4163
Comptroller	Nilsa Santana	499-5248
Reliability Engineer	Carmelo Silva	492-7679
Reliability Engineer	Marcos Morales	498-6338
Process Chemist	Pedro Burgos	498-8286
HS&E Coordinator	Felix Báez	493-6779
HS&E Coordinator	Victor Merced	499-9422
HS&E Coordinator	Melvin Morales	492-8180
HS&E Coordinator	Wilfredo Alicea	492-8815
Chief Inspector	Martin Pease	492-8102
Inspector On-Call	Melvin Cappa	499-9506
Information Tech. Manager	Julio R. Pérez	495-7175
Electrical Supervisor	Rubén Green	492-8451
Commercial Manager	Fernando Mateo	499-9003
Security Supervisor	Roberto Cruz	499-8045

Table 9-1. **Clean Closure Cost Estimate, Proposed SCYI Facility, Yabucoa, Puerto Rico**

	Task Description	Estimated Time & Materials	Cost	
Hazardous Waste Storage Area				
PRE-CLOSURE ACTIVITIES				
1.	Verify/Prepare Waste Inventory	10 hrs. @ $72/hr	$	720
2.	Design Closure Containment System (if necessary)	50 hrs. @ $72/hr	$	3,600
3.	Prepare Decontamination and Disposal Schedules	30 hrs. @ $72/hr	$	2,160
4.	On-Site Engineering Supervision	90 hrs. @ $72/hr (plus $6,670 subsistence)	$	13,150
5.	Decontamination of HWSA Superstructure			
	5a. Site Preparation	Lump Sum	$	1,250
	5b. Steam Cleaning	Lump Sum	$	1,920
6.	Inspection of HWSA by P.E.			
	6a. Inspection	5 hrs. @ $72/hr	$	360
	6b. Slab Preparation	Lump Sum	$	1,410
	6c. Soil Sample Collection	14hrs. @ $72/hr	$	1,008
	6d. Sample Analysis	38 Samples @ $905/sample	$	34,390
		Subtotal:	$	59,968

Table 9-1. **Clean Closure Cost Estimate, Proposed SCYI Facility, Yabucoa, Puerto Rico**

	Task Description	Estimated Time & Materials	Cost
Hazardous Waste Storage Area			
PRE-CLOSURE ACTIVITIES			
1.	Verify/Prepare Waste Inventory	10 hrs. @ $72/hr	$ 720
2.	Design Closure Containment System (if necessary)	50 hrs. @ $72/hr	$ 3,600
3.	Prepare Decontamination and Disposal Schedules	30 hrs. @ $72/hr	$ 2,160
4.	On-Site Engineering Supervision	90 hrs. @ $72/hr (plus $6,670 subsistence)	$ 13,150
		Subtotal:	$ 19,630

CLOSURE ACTIVITIES (Disposal of Containerized Wastes Contained within HWSA[a])

	Task Description	Unit	Quantity	Unit Cost ($)	Task Cost ($)
1.	Packaging, loading, material handling, and decontamination procedure for containerized wastes in HWSA[a]	Lump Sum			$ 30,000
2.	Transportation of containerized wastes[a]	Shipping Container	47	5,555	$ 261,085
3.	Offsite Disposal of containerized wastes[a,b]				
	Non-liquid	Ton	945	1,056	$ 997,920
	Liquid	Gallon	17,600	2.20	$ 38,720
4.	On-Site Engineering Supervision	1,040 hrs. @ $72/hr (plus $47,320 subsistence)			$ 122,200
				Subtotal:	$ 1,449,925
5.	Certification of Closure				
	8a. Closure Inspection	Lump Sum	1	2,000	$ 2,000
	8b. Documentation and Certification	Lump Sum	1	360	$ 360
			Task Subtotal:		$ 2,360
		Total Pre-Closure/Closure Activities:			$ 1,471,915

a Assume HWSA is at capacity (630 cy non-liquid waste and 320 55-gal. drums containing liquid hazardous waste); 320 55-gallon drums is equivalent to 87 cubic yards.

b Assumes incineration due to land ban restrictions

c cy - cubic yard

Table 9-1 (continued): **Clean Closure Cost Estimate, Proposed SCYI Facility, Yabucoa, Puerto Rico**

CLOSURE ACTIVITIES (Disposal of Containerized Wastes Contained within HWSA[a])

	Task Description	Unit	Quantity	Unit Cost ($)	Task Cost ($)
1.	Packaging, loading, material handling, and decontamination procedure for containerized wastes in HWSA[a]	Lump Sum			$ 30,000
2.	Transportation of containerized wastes[a]	Shipping Container	47	5,555	$ 261,085
3.	Offsite Disposal of containerized wastes[a,b]				
	Non-liquid	Ton	945	1,056	$ 997,920
	Liquid	Gallon	17,600	2.20	$ 38,720
4.	On-Site Engineering Supervision	1,040 hrs. @ $72/hr (plus $47,320 subsistence)			$ 122,200
				Subtotal:	$ 1,449,925
5.	Certification of Closure				
	8a. Closure Inspection	Lump Sum	1	2,000	$ 2,000
	8b. Documentation and Certification	Lump Sum	1	360	$ 360
			Subtotal:		$ 2,360
		Total Pre-Closure/Closure Activities:			$ 1,512,253
		Updated Total through March 2001:			$ 1,678,395

[a] Assume HWSA is at capacity (630 cy non-liquid waste and 320 55-gal. drums containing liquid hazardous waste); 320 55-gallon drums is equivalent to 87 cubic yards.

[b] Assumes incineration due to land ban restrictions

[c] cy - cubic yard

Table 9-2. **Worst-Case Closure Scenario, Proposed HWSA Unit Closure Cost Estimate 1998, Part B Permit Application, SCYI Facility, Yabucoa, Puerto Rico**

Task Description	Unit	Quantity	Unit Cost ($)	Task Cost ($)
Hazardous Waste Storage Area				
1. Transport and Disposal of Existing HWSA Inventory	630 cy[c] (dry) + 320 drums (liquid)			
1a. Packaging, loading material handling and labeling	Lump Sum			$ 30,000
1b. Transportation from PRSOC to disposal site	Shipping Container	47	5,555	$ 261,085
1c. Disposal [a] [b]				
non-liquid	Ton	945	1,056	$ 997,920
liquid	Gallon	12,600	2.20	$ 38,720
		Task Subtotal:		$ 1,327,725
2. Decontamination of HWSA Superstructure				
2a. Site Preparation	Lump Sum	1	1,250	$ 1,250
2b. Steam Cleaning	Lump Sum	1	1,920	$ 1,920
		Task Subtotal:		$ 3,170
3. Inspection of HWSA by P.E.				
3a. Inspection	Hour	5	72	$ 360
3b. Slab Preparation	Lump Sum	1	1,410	$ 1,410
3c. Soil Sample Collection	Hour	14	72	$ 1,008
3d. Sample Analysis	Samples	38	905	$ 34,390
		Task Subtotal:		$ 37,168
4. Demolition of the HWSA				
4a. Dismantle Building	Lump Sum	1	7,820	$ 7,820
4b. Dismantle Fence	Lump Sum	1	1,250	$ 1,250
4c. Disposal	Ton	100	5,600	$ 28,000
4d. Transport	Ton	100	290	$ 29,000
4e. Roofing Demolition	Lump Sum	1	3,800	$ 3,800
		Task Subtotal:		$ 69,870

Table 9-2 (continued): **Worst-Case Closure Scenario, Proposed HWSA Unit Closure Cost Estimate 1998, Part B Permit Application, SCYI Facility, Yabucoa, Puerto Rico**

Task Description		Unit	Quantity	Unit Cost ($)	Task Cost ($)
Hazardous Waste Storage Area (continued)					
5.	Demolition of HWSA Foundation				
5a.	6" Slab	Lump Sum	1	2,810	$ 2,810
5b.	4" Slab	Lump Sum	1	1,410	$ 1,410
5c.	Perimeter Curb	Lump Sum	1	1,410	$ 1,410
5d.	Column Footings	Lump Sum	1	2,810	$ 2,810
5e.	Load & Transport	Ton	450	252	$ 113,300
5f.	Disposal	Ton	450	275	$ 124,000
			Task Subtotal:		$ 245,740
6.	Excavation of Contaminated Soil				
6a.	Excavation & Loading	CY	400	22	$ 8,800
6b.	Transportation to Disposal Site	CY	400	390	$ 156,000
6c.	Disposal	CY	400	1,656	$ 662,400
			Task Subtotal:		$ 827,200
7.	Backfill of HWSA	CY	400	23	$ 19,200
			Task Subtotal:		$ 19,200
8.	Certification of Closure				
8a.	Closure Inspection	Lump Sum	1	2,000	$ 2,000
8b.	Documentation and Certification	Lump Sum	1	360	$ 360
			Task Subtotal:		$ 2,360
			TOTAL TASK COST:		$ 2,532,433
			Updated Total through March 2001:		$ 2,810,655

a Assume HWSA is at capacity (630 cy non-liquid hazardous waste and 320 55-gal. drums containing liquid hazardous waste); 320 55-gallon drums is equivalent to 87 cubic yards.

b Assumes incineration due to land ban restrictions

c cy - cubic yard

Table 9-3. **HWSA Unit Closure Schedule (Schedule for the year 2045), SCYI Facility, Yabucoa, Puerto Rico**

Hazardous Waste Storage Area	DAYS	
	Begin	End
Transport and Disposal of Existing HWSA Inventory	0	14
Decontamination of HWSA Superstructure	14	30
Inspection of HWSA by Professional Engineer	30	31
Demolition of the HWSA	31	45
Demolition of HWSA Foundation	45	66
Excavation of Contaminated Soil	66	210
Backfill of HWSA	210	212
Certification of Closure	212	213