

APPENDIX C - PLUGGING AND ABANDONMENT PLANS

Upon completion of injection activities, a well will be plugged and abandoned according to the following plans and to State and Federal regulations to ensure protection of Underground Sources of Drinking Water (USDW).





United States Environmental Protection Agency
Washington, DC 20460

PLUGGING AND ABANDONMENT PLAN

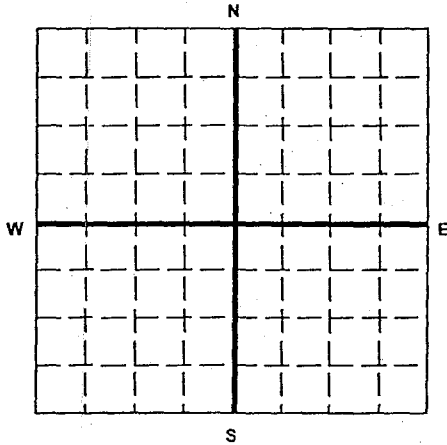
Name and Address of Facility

Lahaina Wastewater Reclamation Facility
3300 Honoapiilani Hwy., Lahaina, HI 96791

Name and Address of Owner/Operator

County of Maui - Department of Public Works and Envir. Mgmt.
200 S. High Street, Wailuku, HI 96793

Locate Well and Outline Unit on Section Plat - 640 Acres



State County Permit Number

Surface Location Description
 1/4 of 1/4 of 1/4 of 1/4 of Section Township Range

Locate well in two directions from nearest lines of quarter section and drilling unit

Surface Location ft. frm (N/S) Line of quarter section
 and ft. from (E/W) Line of quarter section.

TYPE OF AUTHORIZATION

Individual Permit
 Area Permit
 Rule

Number of Wells

Lease Name

WELL ACTIVITY

CLASS I
 CLASS II
 Brine Disposal
 Enhanced Recovery
 Hydrocarbon Storage
 CLASS III

Well Number

CASING AND TUBING RECORD AFTER PLUGGING

SIZE	WT (LB/FT)	TO BE PUT IN WELL (FT)	TO BE LEFT IN WELL (FT)	HOLE SIZE
20	135	88	81	24
14	85	115	115	18

METHOD OF EMPLACEMENT OF CEMENT PLUGS

- The Balance Method
 The Dump Bailer Method
 The Two-Plug Method
 Other

CEMENTING TO PLUG AND ABANDON DATA:

	PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7
Size of Hole or Pipe in which Plug Will Be Placed (inche)	14 / 20	20					
Depth to Bottom of Tubing or Drill Pipe (ft)	200	84					
Sacks of Cement To Be Used (each plug)							
Slurry Volume To Be Pumped (cu. ft.)	54	27					
Calculated Top of Plug (ft.)	73	4					
Measured Top of Plug (if tagged ft.)							
Slurry Wt. (Lb./Gal.)	16	16					
Type Cement or Other Material (Class III)	4000 psi	4000 psi					

LIST ALL OPEN HOLE AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED (if any)

From	To	From	To
205'	90' will be filled with 3/4" gravel		
73'	16' will be filled with sand		

Estimated Cost to Plug Wells

\$7,500

Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)

Name and Official Title (Please type or print)

Signature

Date Signed



United States Environmental Protection Agency
Washington, DC 20460

PLUGGING AND ABANDONMENT PLAN

Name and Address of Facility Lahaina Wastewater Reclamation Facility 3300 Honoapiilani Hwy., Lahaina, HI 96791	Name and Address of Owner/Operator County of Maui - Department of Public Works and Envir. Mgmt. 200 S. High Street, Wailuku, HI 96793
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Locate Well and Outline Unit on Section Plat - 640 Acres 	State Hawaii	County Maui	Permit Number _____
Surface Location Description _____ 1/4 of _____ 1/4 of _____ 1/4 of _____ 1/4 of Section _____ Township _____ Range n/a			
Locate well in two directions from nearest lines of quarter section and drilling unit Surface Location _____ ft. frm (N/S) _____ Line of quarter section and _____ ft. from (E/W) _____ Line of quarter section.			
TYPE OF AUTHORIZATION <input checked="" type="checkbox"/> Individual Permit <input type="checkbox"/> Area Permit <input type="checkbox"/> Rule Number of Wells <u>1</u>		WELL ACTIVITY <input type="checkbox"/> CLASS I <input type="checkbox"/> CLASS II <input type="checkbox"/> Brine Disposal <input type="checkbox"/> Enhanced Recovery <input type="checkbox"/> Hydrocarbon Storage <input type="checkbox"/> CLASS III	
Lease Name _____		Well Number <u>2</u>	

CASING AND TUBING RECORD AFTER PLUGGING					METHOD OF EMPLACEMENT OF CEMENT PLUGS	
SIZE	WT (LB/FT)	TO BE PUT IN WELL (FT)	TO BE LEFT IN WELL (FT)	HOLE SIZE		
20	135	88	81	24	<input type="checkbox"/> The Balance Method <input type="checkbox"/> The Dump Bailer Method <input checked="" type="checkbox"/> The Two-Plug Method <input type="checkbox"/> Other	

CEMENTING TO PLUG AND ABANDON DATA:							
	PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7
Size of Hole or Pipe in which Plug Will Be Placed (inches)	18 / 20	20					
Depth to Bottom of Tubing or Drill Pipe (ft)	180	85					
Sacks of Cement To Be Used (each plug)							
Slurry Volume To Be Pumped (cu. ft.)	54	27					
Calculated Top of Plug (ft.)	73	4					
Measured Top of Plug (if tagged ft.)							
Slurry Wt. (Lb./Gal.)	16	16					
Type Cement or Other Material (Class III)	4000 psi	4000 psi					

LIST ALL OPEN HOLE AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED (if any)			
From	To	From	To
180	100' will be filled with 3/4" gravel		
73	16' will be filled with sand		

Estimated Cost to Plug Wells
\$7,600

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Locate Well and Outline Unit on Section Plat - 640 Acres 	State Hawaii	County Maui	Permit Number _____
	Surface Location Description _____ 1/4 of _____ 1/4 of _____ 1/4 of _____ 1/4 of Section _____ Township _____ Range _____ n/a		
	Locate well in two directions from nearest lines of quarter section and drilling unit Surface Location _____ ft. frm (N/S) _____ Line of quarter section and _____ ft. from (E/W) _____ Line of quarter section.		
	TYPE OF AUTHORIZATION <input checked="" type="checkbox"/> Individual Permit <input type="checkbox"/> Area Permit <input type="checkbox"/> Rule Number of Wells <input type="text" value="1"/>		WELL ACTIVITY <input type="checkbox"/> CLASS I <input type="checkbox"/> CLASS II <input type="checkbox"/> Brine Disposal <input type="checkbox"/> Enhanced Recovery <input type="checkbox"/> Hydrocarbon Storage <input type="checkbox"/> CLASS III
Lease Name _____		Well Number <input type="text" value="3"/>	

CASING AND TUBING RECORD AFTER PLUGGING					METHOD OF EMPLACEMENT OF CEMENT PLUGS	
SIZE	WT (LB/FT)	TO BE PUT IN WELL (FT)	TO BE LEFT IN WELL (FT)	HOLE SIZE		
20	135	108	101	24	<input type="checkbox"/> The Balance Method <input type="checkbox"/> The Dump Bailer Method <input checked="" type="checkbox"/> The Two-Plug Method <input type="checkbox"/> Other	

CEMENTING TO PLUG AND ABANDON DATA:		PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7
Size of Hole or Pipe in which Plug Will Be Placed (inches)	18 / 20	20						
Depth to Bottom of Tubing or Drill Pipe (ft)	225	105						
Sacks of Cement To Be Used (each plug)								
Slurry Volume To Be Pumped (cu. ft.)	54	27						
Calculated Top of Plug (ft.)	93	4						
Measured Top of Plug (if tagged ft.)								
Slurry Wt. (Lb./Gal.)	16	16						
Type Cement or Other Material (Class III)	4000 psi	4000 psi						

LIST ALL OPEN HOLE AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED (if any)			
From	To	From	To
225	120' will be filled with 3/4" gravel		
93	16' will be filled with sand		

Estimated Cost to Plug Wells
\$7,850

Certification

I certify under the penalty of law that I have personally examined and am familiar with the information submitted in this document and all attachments and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment. (Ref. 40 CFR 144.32)

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Locate Well and Outline Unit on Section Plat - 640 Acres 	State Hawaii	County Maui	Permit Number _____
	Surface Location Description <input type="checkbox"/> 1/4 of <input type="checkbox"/> 1/4 of <input type="checkbox"/> 1/4 of <input type="checkbox"/> 1/4 of Section <input type="checkbox"/> Township <input type="checkbox"/> Range <input type="checkbox"/> n/a		
	Locate well in two directions from nearest lines of quarter section and drilling unit Surface Location <input type="checkbox"/> ft. frm (N/S) <input type="checkbox"/> Line of quarter section and <input type="checkbox"/> ft. from (E/W) <input type="checkbox"/> Line of quarter section.		
TYPE OF AUTHORIZATION <input checked="" type="checkbox"/> Individual Permit <input type="checkbox"/> Area Permit <input type="checkbox"/> Rule Number of Wells <input type="text" value="1"/>		WELL ACTIVITY <input type="checkbox"/> CLASS I <input type="checkbox"/> CLASS II <input type="checkbox"/> Brine Disposal <input type="checkbox"/> Enhanced Recovery <input type="checkbox"/> Hydrocarbon Storage <input type="checkbox"/> CLASS III	
Lease Name _____		Well Number <input type="text" value="4"/>	

CASING AND TUBING RECORD AFTER PLUGGING					METHOD OF EMPLACEMENT OF CEMENT PLUGS	
SIZE	WT (LB/FT)	TO BE PUT IN WELL (FT)	TO BE LEFT IN WELL (FT)	HOLE SIZE		
20	135	108	101	24	<input type="checkbox"/> The Balance Method	
14	85	150	150	18	<input type="checkbox"/> The Dump Bailer Method	
					<input checked="" type="checkbox"/> The Two-Plug Method	
					<input type="checkbox"/> Other	

CEMENTING TO PLUG AND ABANDON DATA:		PLUG #1	PLUG #2	PLUG #3	PLUG #4	PLUG #5	PLUG #6	PLUG #7
Size of Hole or Pipe in which Plug Will Be Placed (inche		14 / 20	20					
Depth to Bottom of Tubing or Drill Pipe (ft)		255	105					
Sacks of Cement To Be Used (each plug)								
Slurry Volume To Be Pumped (cu. ft.)		54	27					
Calculated Top of Plug (ft.)		93	4					
Measured Top of Plug (if tagged ft.)								
Slurry Wt. (Lb./Gal.)		16	16					
Type Cement or Other Material (Class III)		4000 psi	4000 psi					

LIST ALL OPEN HOLE AND/OR PERFORATED INTERVALS AND INTERVALS WHERE CASING WILL BE VARIED (if any)			
From	To	From	To
255	130' will be filled with 3/4" gravel.		
93	16' will be filled with sand		

Estimated Cost to Plug Wells
\$7,700

Certification

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Preliminary

Lahaina Injection Well Abandonment Plan

Method of Abandoning Well

- 1 Measure Depth of Well
- 2 All casing shall remain with the exception of the stick up and to a depth of 4 feet below finish ground level.
- 3 Remove air surge line
- 4 Inflow pipe shall be exposed, cut and plugged
- 5 Fill all open hole with 3/4" gravel
Place two cubic yards of concrete at transition from open hole to solid casing
or
Fill perforated casing with 3/4" gravel
Place two cubic yards of concrete at transition from perforated casing to solid casing.
- 6 Fill solid casing with sand to a point about 16 feet below finish ground (approximately 4 feet below inflow pipe)
- 7 Remove Casing stickup and additional 4 feet below ground surface
- 8 Seal remaining casing with concrete (Approximately 1 C.Y.)

Note:

Monitor and record depth and volume of material placement

Verify that no sluffing of material occurs (48 hours) before placing one layer of material over another.

File required reports with EPA, State DOH and DNLR

Cost Estimate

Item	Unit Cost	Well 1	Well 2	Well 3	Well 4
Mobilization	\$2,500	\$2,500	\$2,500	\$2,500	\$2,500
3/4" gravel (C.Y.)	\$75	\$266	\$391	\$514	\$370
Concrete (C.Y.)	\$150	\$450	\$450	\$450	\$450
Sand (C.Y.)	\$60	\$268	\$273	\$370	\$370
Monitoring etc.	\$2,000	\$2,000	\$2,000	\$2,000	\$2,000
Well Head Removal etc.	\$1,500	\$1,500	\$1,500	\$1,500	\$1,500
Backfill/grading	\$500	\$500	\$500	\$500	\$500
Total		\$7,484	\$7,614	\$7,834	\$7,690

Lahaina Injection Well Abandonment Plan

Well Characteristics

	Well 1	Well 2	Well 3	Well 4
Casing Stickup (ft.)	4	3	3	3
Open Hole diameter (in.)	0	18	18	0
Open Hole height (ft.)	0	95	120	0
Perforated Casing diameter (in.)	14	0	0	14
Perforated Casing height (ft.)	115	0	0	150
Solid Casing diameter (in.)	20	20	20	20
Solid Casing height (ft.)	88	88	108	108
Well Depth	200	180	225	255

Plug Locations

Depth to top of Plug 2	4	4	4	4
Depth to inflow pipe	11	11.5	12	12
Depth to bottom of plug 2	16	16	16	16
Depth to top of Plug 1	73	73	93	93
Depth to bottom of solid casing	85	85	105	105
Depth to bottom of Plug 1	110	100	120	130
Bottom depth	200	180	225	255

Fill Volume for one lineal foot

Volume of Solid Casing (ft ³)	2.18	2.18	2.18	2.18
Volume of Perforated Casing (ft ³)	1.07	0.00	0.00	1.07
Volume of Open Hole (ft ³)	0.00	1.77	1.77	0.00

CEMENT PLUGS

Solid Casing Plug length (2 C.Y.)	24.75	24.75	24.75	24.75
Perforated Casing Plug length (1 C.Y.)	25.26	0.00	0.00	25.26
Open Hole Plug Length (1 C.Y.)	0.00	15.28	15.28	0.00

OTHER MATERIALS

Solid Casing Sand Length (ft.)	55.25	56.25	76.25	76.25
Perforated Casing Gravel length (ft.)	89.74	0.00	0.00	124.74
Open Hole Gravel Length (ft.)	0.00	79.72	104.72	0.00

Total Length Filled	195.00	176.00	221.00	251.00
Stick up and casing removal	8.00	7.00	7.00	7.00
Total Well Depth	203.00	183.00	228.00	258.00

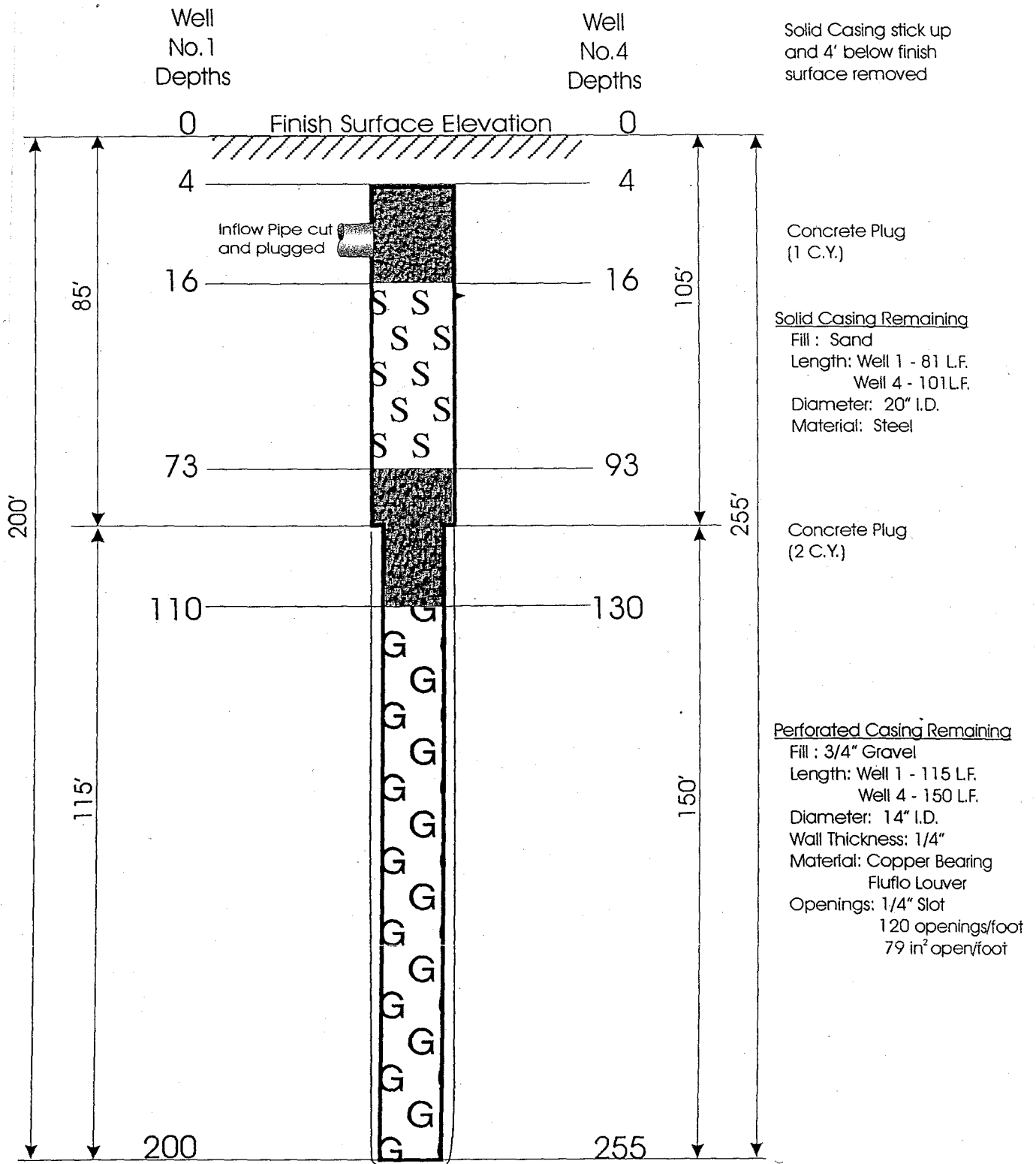
1 C.Y. of material will fill:

Solid Casing length (ft.)	12.38	12.38	12.38	12.38
Perforated Casing length (ft.)	25.26	0.00	0.00	25.26
Open Hole length (ft.)	0.00	15.28	15.28	0.00

Fill Material Required

Volume of Concrete Required (C.Y.)	3.00	3.00	3.00	3.00
Volume of Sand Required (C.Y.)	4.46	4.54	6.16	6.16
Volume of Gravel Required (C.Y.)	3.55	5.22	6.85	4.94

Lahaina Wastewater Reclamation Facility Well Abandonment Plan Injection Well No.'s 1 and 4



Lahaina Wastewater Reclamation Facility Well Abandonment Plan Injection Well No.'s 2 and 3

