

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

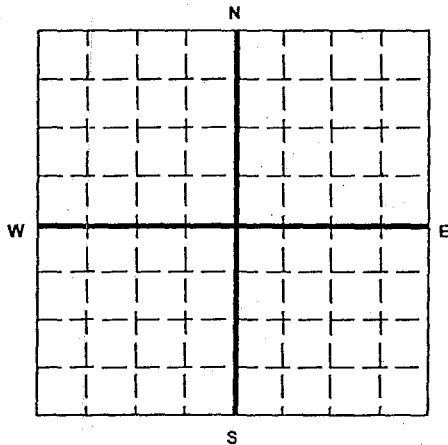
Name and Address of Facility

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

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. from (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

WELL ACTIVITY

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

Lease Name

Well Number

1

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 (inches)	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



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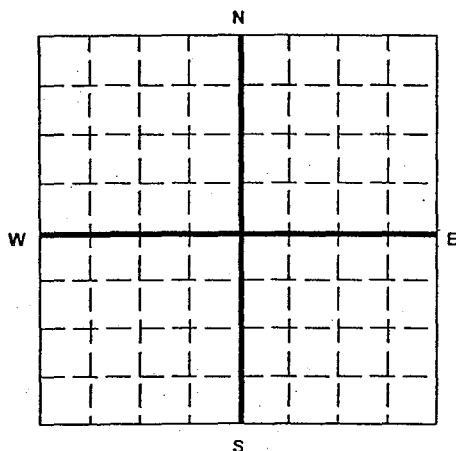
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County

Maui

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. from (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

WELL ACTIVITY

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☐ CLASS II
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☐ Hydrocarbon Storage
☐ CLASS III

Lease Name

Well Number

2

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

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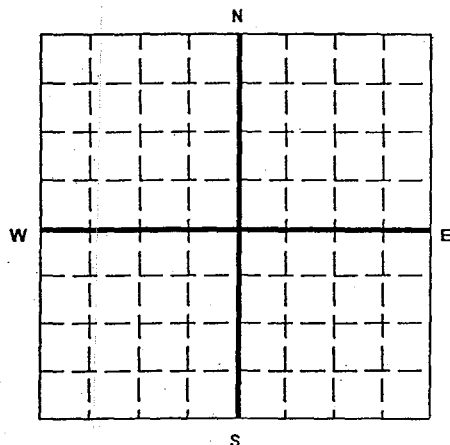
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Locate well in two directions from nearest lines of quarter section and drilling unit

Surface

Location ☐ ft. from (N/S) ☐ Line of quarter section

and ☐ ft. from (E/W) ☐ Line of quarter section.

TYPE OF AUTHORIZATION

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Number of Wells

Lease Name

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☐ 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	1135	108	101	24

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 (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

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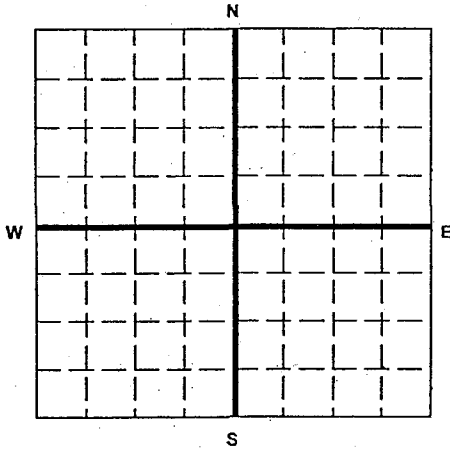
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Surface

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

WELL ACTIVITY

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

Lease Name

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	108	101	24
14	85	150	150	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 (inches)	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

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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

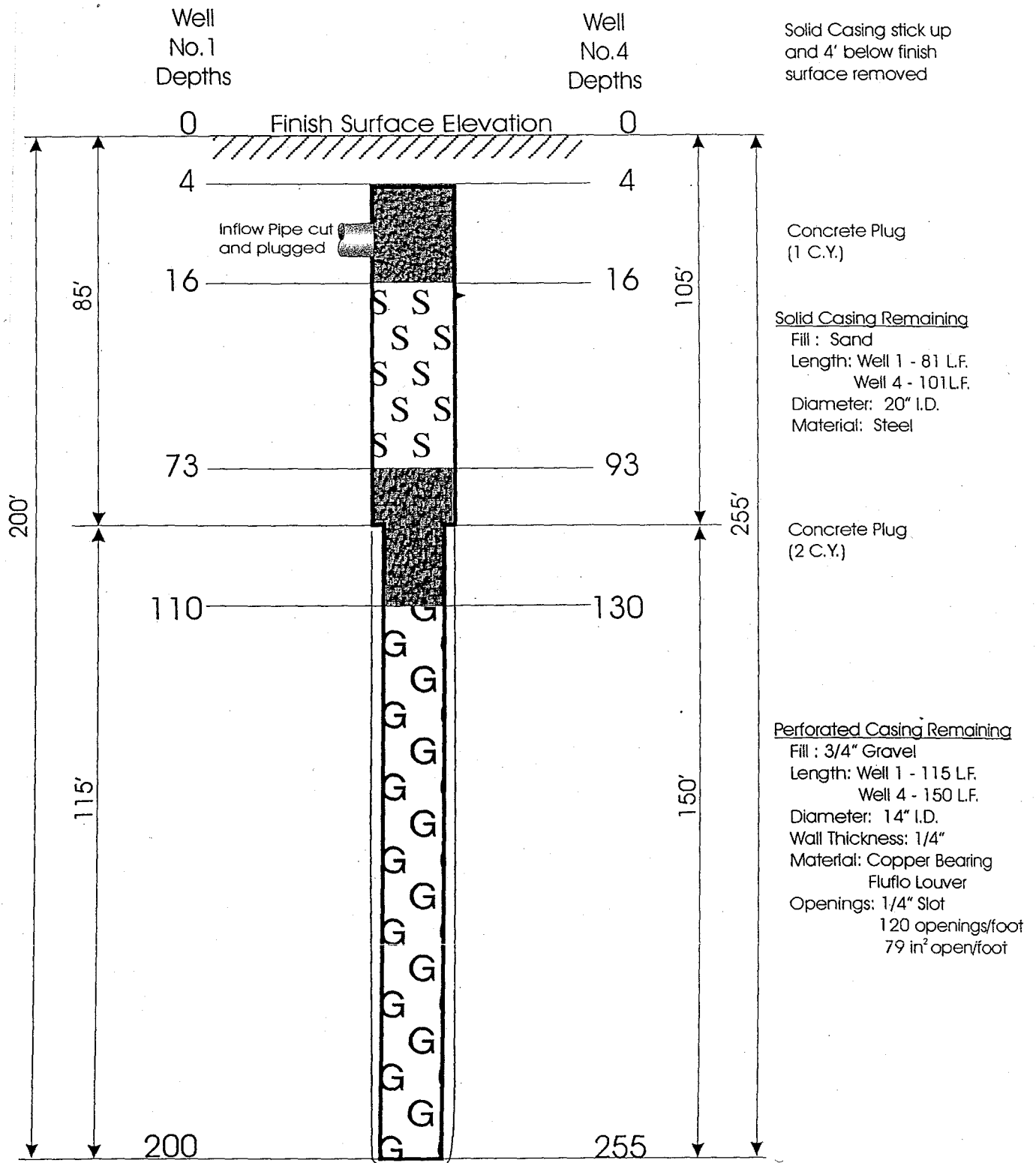
Fill Material Required

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

