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Texas Commission on Environmental Quality

CHECKLIST WORKSHEET

MSW GROUNDWATER O&M PART 1

Reg Ent Name : _____

Date : _____

Add ID _____

Investigator Name _____

Item No	Description	Answer	Citations	Notes
	SECTION A: Applicability			
1	If ground water monitoring requirements do not apply to the landfill for one or more of the following reasons, indicate YES and include a brief explanation in the investigation comments section. Otherwise, indicate NO.			
1A	The landfill ceased receiving waste prior to October 9, 1993 and has no ground water monitoring requirements specified in its permit.			
1B	The landfill has been granted an exemption ("arid-exempt") from ground water monitoring requirements.			
1C	The landfill is a Type IV landfill which has not been required by the commission or the executive director to conduct ground water monitoring.			
1D	The regulated entity is other than a Type I or IV landfill and has not been required by the commission or the executive director to conduct ground water monitoring.			
1E	Ground water monitoring requirements have been suspended by the executive director.			
2	Has the owner or operator submitted a certification to the executive director that the ground water monitoring system is in compliance with the requirements of 30 TAC 330.403, 330.405, 330.407, and 330.409 for any units which are receiving waste?		330.401(e)	
3	If the landfill is active or in the post-closure care period, is ground water monitoring being conducted?		330.401(f)	
	SECTION B: Groundwater Monitoring System Review			
4	Has a ground water monitoring system been installed in accordance with the description provided in Attachments 4 & 5 of the approved Site Development Plan or in Part V of the permit application?		330.403(a) 330.121(a)	
5	The approved ground water monitoring system is (choose Yes for one item, No for the other four) (Refer to 330.3(146), 40 CFR 257.2, 330.403(b) and definitions for Waste Management Area, Municipal Solid Waste Landfill, and Solid Waste Management Unit):			
5A	A single multi-unit ground water monitoring system for a landfill that consists of more than one landfill unit.			
5B	Separate ground water monitoring systems at a landfill that consists of more than one landfill unit.			

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5C	Some combination of multi-unit and separate monitoring systems at a landfill that consists of more than one landfill unit.			
5D	A single monitoring system at a landfill that consists of a single landfill unit.			
5E	An alternative design, approved by the executive director, that uses other means in conjunction with monitoring wells to ensure detection of ground water contamination in the uppermost aquifer.			
6	If an existing monitoring well has been replaced (no change to design or depth and a change in location of up to 20 feet horizontally), has a Class I permit modification request been approved by the Executive Director in accordance with 30 TAC 305.70(a)?		330.121	
7	If any monitoring well have been added or removed from the approved ground water monitoring system, has a Class I permit modification request been approved by the Executive Director in accordance with 30 TAC 305.70(a)?		330.121	
8	If any designated background or point of compliance monitoring wells have been installed or replaced, have copies of the well installation diagrams, including lithologic logs, particle size or other sample data from the well, development procedures, a site map drawn to scale showing the location of all monitoring wells, and any forms required by other agencies been submitted to the TCEQ within 60 days of well completion? If not compliant, discuss in comments.		330.421(e)	
9	If any monitoring well has been damaged to the extent that it is no longer suitable for sampling, has it been reported to the executive director for a determination about whether to repair or replace the well?		330.421(f)	
10	If a monitoring well is no longer in use, has permission to abandon the well been granted in writing by the executive director, and has the well been properly abandoned and plugged in accordance with 16 TAC 76.1004?		330.421(g)	
11	If there have been any changes in site construction or operation or changes in adjacent property that affect or are likely to effect the direction and rate of ground water flow and the potential for detecting ground water contamination from a landfill unit, and that may require the installation of additional monitoring wells or sampling points, has the owner or operator notified the executive director in writing of such changes?		330.403(e)(3)	
12	Does Point of Compliance monitoring well spacing exceed 600 feet?		330.403(a)(2)	

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13	Complete MSW Ground Water Operation and Maintenance Checklist Table I for monitoring wells, gas probes, piezometers, water wells, and any other penetrations to the water table not designated as point of compliance or background monitoring wells. This information should be in Attachment 4 of the Site Development Plan. Also ask the owner or operator's authorized representative whether there have been any other wells, probes, borings, etc. installed after the permit application was prepared.			
14	Complete MSW Ground Water Operation and Maintenance Checklist Table II and include it as an attachment to this report for background and point of compliance monitoring wells. This information should be in Attachments 4 and 5 of the Site Development Plan or in Part V of the permit application. Be sure to provide the actual ("as-built") construction information.			
15	Complete MSW Ground Water Operation and Maintenance Checklist Table III and include it as an attachment to this report for background and Point of Compliance monitoring wells. The information in this table should be actual, observed information for each well.			
	SECTION C: Monitoring Well Construction Review			
16	Review available records (Attachments 4 and 5 of the approved Site Development Plan, Part V of the permit application, or the Site Operating Record) and make visual observations to verify compliance with 330.421. If an alternative specification was approved per 330.421(a), indicate "Not Applicable" and include a brief explanation. If records are not available and compliance cannot be determined by visual observation, indicate "Indeterminate" and include a brief explanation.			
17	If evidence of damaged or inadequately installed or developed wells is noted during field observation of a sampling event, a comment should be included in the investigation comments, and such observation should be relayed to the owner or operator as an "Additional Issue". These observations may include, slow recovery rates, excessive turbidity, decreasing total depth measurements, or the presence of sand or gravel in water samples extracted from the well.			
18	Were all monitoring wells drilled by a Texas-licensed driller?		330.421(a)(1)(A)	
19	Were the installation and development of all monitoring wells supervised by a licensed professional geoscientist or engineer who is familiar with the geology of the area?		330.421(a)(1)(A)	
20	Was an appropriate drilling method used?		330.421(a)(1)(B)	
21	If drilling fluids were used, were the fluids approved in writing by the executive director; or was treated city water used and a current chemical analysis of the city water provided with the monitor well report?		330.421(a)(1)(B)	

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22	Was the boring diameter of each well at least four inches larger than the diameter of the casing; or, was the boring in hard rock and a smaller annulus was approved in writing by the executive director?		330.421(a)(1)(C)	
23	Was a boring log made by or under the supervision of a licensed professional geoscientist or engineer who is familiar with the geology of the area, and sealed, signed, and dated by the licensed professional?		330.421(a)(1)(D)	
	SECTION D: Well Completion			
24	Are the well casings two to four inch, National Science Foundation-certified polyvinyl chloride (PVC) Schedule 40 or 80 with flush-thread screw joints sealed with O-rings or PTFE (e.g. Teflon tape)?		330.421(a)(2)(A)	
25	Are the tops of casings at least two feet above ground level?		330.421(a)(2)(A)	
26	For wells over 20 feet in length, were the casings and screens centered in the well bores using appropriately placed centralizer(s)?		330.421(a)(2)(A)	
27	Are the tops of the casings protected by threaded or slip-on top caps or by sealing caps or screw-plug seals, vented to prevent buildup of methane or other gases and designed to prevent moisture from entering the wells?		330.421(a)(2)(A)	
28	Are the screens the same material as the casings, or otherwise compatible with the casings?		330.421(a)(2)(B)	
29	Were the screens installed without the use of any glues or solvents?		330.421(a)(2)(B)	
30	Are the screens either wire-wound or factory-cut slots (not field-cut slots or equipped with filter cloth)?		330.421(a)(2)(B)	
31	Are screen openings at least as small as the smallest fraction of the filter pack?		330.421(a)(2)(B)	
32	Does the filter pack consist of pre-packaged, inert, clean silica sand or glass beads (not sand or gravel from an open stockpile)?		330.421(a)(2)(C)	
33	Does the filter pack extend from one to four feet above the top of the screen?		330.421(a)(2)(C)	
34	Was an annular seal, composed of coarse-grain sodium bentonite, or bentonite grout, and at least two feet thick, placed on top of the filter pack, within the zone of saturation; or was a bentonite grout (without cement) casing seal used in the well bore.		330.421(a)(2)(D)	
35	Was a casing seal, composed of bentonite grout or a cement-bentonite mixture (drilling spoil, cuttings, or other native materials or quick-setting cements are not permitted), placed on top of the annular seal to within two to five feet of the surface?		330.421(a)(2)(E)	
	SECTION E: Surface Completion			
36	Was a concrete pad, composed of high quality structural-type concrete placed from the top of the casing seal (two to five feet below the surface) continuously to the top of the ground to form a pad at the surface?		330.421(a)(3)	
37	Is the surface pad at least six inches thick and at least four feet square or five feet in diameter?		330.421(a)(3)	

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38	Does the surface pad contain sufficient reinforcing steel to ensure its structural integrity in the event that soil support is lost?		330.421(a)(3)	
39	Does the top of the surface pad slope away from the well bore to the edges to prevent ponding of water around the casing or collar?		330.421(a)(3)	
40	Was a steel protective pipe collar placed around the casing "stick up" to protect it from damage and unwanted entry?		330.421(a)(4)	
41	Was the steel collar set at least one foot into the surface pad during its construction, and extend at least three inches above the top of the well casing (and top cap, if present)?		330.421(a)(4)	
42	Does the top of the collar have a lockable hinged top flap or cover?		330.421(a)(4)	
43	Is the cover equipped with a sturdy lock, which is in working order, and which is kept locked when the well is not being bailed/purged or sampled?		330.421(a)(4)	
44	Is the well number or other designation permanently marked on the protective steel collar.		330.421(a)(4)	
45	Are protective barriers installed around wells that are located in heavily traveled areas or other locations where they are likely to be damaged by moving equipment?		330.421(a)(5)	
46	If any wells are installed in unusual conditions (e.g. the use of cellar-type enclosures for the top-well equipment or multiple completions in a single hole), were all aspects of the installation of these wells approved in writing in advance by the executive director?		330.421(b)	
47	Were all wells properly developed after installation (drilling artifacts were removed and field measurements of pH, specific conductance, and temperature stabilized)?		330.421(c)	
	SECTION F: Location & Elevation Survey			
48	Were the locations of all wells and all appropriate elevations associated with the top-well equipment surveyed by a registered professional surveyor upon completion of each monitoring well?		330.421(d)	
49	What was the date of the most recent survey?			
50	Were the well elevations surveyed to the nearest 0.01 foot relative to mean sea level (with year of the sea level datum shown)?		330.421(d)	
51	Are the points on the well casings for which the elevations were determined permanently marked on the casings?		330.421(d)	
52	Are the surveyed locations of monitoring wells given in terms of latitude and longitude to the nearest tenth of a second or accurately located with respect to the landfill grid system as described in 330.143(b)(5) relating to landfill markers and benchmarks?		330.421(d)	
	SECTION G: Ground Water Sampling and Analysis Requirements			

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53	Review the Site Development Plan and the most recent ground water analysis report submitted by the regulated entity and the ground water sampling and analysis plan (GWSAP). If any of the items listed in this section are not addressed in the GWSAP, determine whether the regulated entity is conducting a ground water monitoring program that includes consistent sampling and analysis procedures in accordance with 330.405.			
54	Is a copy of the Site Development Plan kept on-site or at an alternate location approved by the executive director ?		330.125(a)	
55	Date of current, approved GWSAP:			
56	Are sample collection procedures being conducted as described in the GWSAP?		330.405(b)(1) 330.405(b)(3)	
57	Are sample preservation and shipment procedures being conducted as described in the GWSAP?		330.405(b)(1)	
58	Are chain of custody control procedures being conducted as described in the GWSAP?		330.405(b)(1)	
59	Are analytical procedures being conducted as described in the GWSAP?		330.405(b)(3) 330.405(b)(1)	
60	Are quality assurance and quality control procedures being conducted as described in the GWSAP?		330.405(b)(1)	
61	Are ground water elevations measured at each sampling point prior to bailing or purging as described in the GWSAP?		330.405(b)(2)	
62	Are samples collected from the point with the highest water level elevation first, then proceeding to those with successively lower elevations; or, if contamination is known to be present, are samples collected from wells not likely to be contaminated first, then proceeding to known contaminated wells; or otherwise in accordance with the sampling protocol as described in the approved GWSAP? Include a brief discussion of this aspect of the sampling protocol in the investigation comments.		330.405(b)(2)	
63	Are ground water samples not field-filtered prior to laboratory analysis unless authorized in writing by the executive director (or in the approved GWSAP)? If any samples are field-filtered (30 TAC 330.401(b)), include a brief discussion in the investigation comments.		330.405(c)	
64	Has background upgradient wells or background wells been established for each of the monitoring parameters required in the ground water monitoring program in accordance with 30 TAC 330.403(a)(1), and 330.407 or 330.409? If background water quality is currently in the process of being established or re-established in accordance with the permit or other requirement, indicate "Compliant" for this item and include a brief discussion in the investigation comments.		330.405(d)	
65	Are point of compliance ground water data not adjusted by subtracting background ground water data?		330.405(d)	
	SECTION H: Statistical Tests			

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66	Is/are approved statistical test(s) conducted separately for each tested constituent in each well or sampling point?		330.405(e)	
67	Identify which statistical method(s) is used by indicating "YES" , otherwise, indicate "NO":			
67A	Parametric analysis of variance (ANOVA) followed by multiple-comparisons procedures to identify statistically significant evidence of contamination, including estimation and testing of the contrasts between each point of compliance well's mean and the background mean levels for each constituent.			
67B	An analysis of variance (ANOVA) based on ranks followed by multiple-comparisons procedures to identify statistically significant evidence of contamination, including estimation and testing of the contrasts between each point of compliance well's median and the background median levels for each constituent.			
67C	A tolerance or prediction interval procedure in which an interval for each constituent is established from the distribution of the background data and the level of each constituent in each point of compliance well is compared to the upper tolerance or prediction limit.			
67D	A control-chart approach that gives control limits for each constituent.			
67E	Another statistical test method as described in the permit or that has been approved in writing by the executive director. If so, identify and discuss the approval mechanism in the investigation comments.			
	SECTION I: Applicable Monitoring Program			
68	Indicate which monitoring program applies and complete the appropriate checklist section. If different units at the same landfill are in different programs, complete all appropriate checklist sections and indicate to which unit(s) each section applies.			
69	Detection Monitoring Program applies if:			
69A	Hazardous constituents have not been measured in the ground water at the time of the initial permit application in accordance with 30 TAC 330.63(f) (6), and assessment monitoring has not been triggered in accordance with 30 TAC 330.409(a);			
69B	If an assessment monitoring program has been completed and the executive director approved a return to detection monitoring in accordance with 30 TAC 409(e) or 330.409(g)(2) and (g)(3).			
69C	If Detection Monitoring Program applies, complete the following checklist section , E-1, Detection Monitoring Program.			
70	Assessment Monitoring Program applies if:			
70A	Hazardous constituents have been detected in the ground water at the time of the initial permit application in accordance with 30 TAC 330.63(f) (7), or if assessment monitoring has Been triggered in accordance with 30 TAC 330.409(a);			

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70B	If an assessment monitoring program has indicated the presence of assessment constituents above background values, but all concentrations are below the ground water protection standard in accordance with 30 TAC 330. 409(f).			
70C	If Assessment Monitoring Program applies (operator has established an Assessment monitoring program, or the executive director has not accepted a report submitted in accordance with 330.407(d)(3), complete Section J, Detection Monitoring Program and Section K, Assessment Monitoring Program in the Groundwater O&M Checklist Part 2.			