NC Solid Waste Rules Review and Readoption Working Group
Environmental Monitoring
Tuesday, June 20, 2017
NCDEQ Winston Salem Regional Office

Meeting #4 Summary

The Solid Waste Section is working with stakeholder groups to review and update all of the solid waste management rules. G.S. 150B-21.3A requires agencies to review and update rules every 10 years.

The fourth Environmental Monitoring Working Group meeting was coordinated by the Solid Waste Section, and was led by Jackie Drummond (Hydrogeologist).

The Environmental Monitoring Working Group included:
DWM-SW – Jackie Drummond
DWM-SW – Ervin Lane
NC Conservation Network – Jamie Cole
SWANA – Joan Smyth
Independent Consultant – Mat Colone
Geologist Licensing Board – Rachel Kirkman
NWRA - Matt Einsmann
Republic – Derek Bouchard

All attendees are included on the following page.

The working group continued to review 15A NCAC .0600 with discussions regarding .0601, .0602, and the addition of .0603 (Gas Monitoring). The working group added corrective action and stats language to .0601, and discussions regarding .0544 and .0545 began. The comments and draft rules are located on the following pages.

The next meeting is scheduled for August 9, 2017, and a call in number will also be available.

MEETING SIGN-IN SHEET

Meeting:	Environmental Monitoring Working Group for Rule Readoption Meeting	**Date/Time:**	6/20/2017, 10:00 – 12:00
Facilitator:	NCDEQ – DWM - Solid Waste Section	**Place/Room:**	WSRO Training Room

Name	Representing	Phone	E-Mail
Mat Colone	Consultant/Client	919 325-3569	colonemf@cdmsmith.com
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Matt Meinsmann	NWRA	919 672-2837	meinsmannc republicservices.com
Erwin Lane			
Xavier Boatright	Clean Water for North Carolina		
Perry Sugg	SWS/DWM		
Christine Ritter	SWS/DWM		
Elizabeth Werner	SWS/DWM		

acceptable to the Division, which shall include, at a minimum, the following factors:

(I) the hydrogeologic characteristics of the facility and surrounding lands;

(II) the climatic factors of the area; and

(III) the volume and physical and chemical characteristics of the leachate; or

(B) a design with a leachate collection system, a closure cap system, and a composite liner system consisting of two components: the upper component shall consist of a minimum 30-ml flexible membrane (FML), and the lower components shall consist of at least a two-foot layer of compacted soil with a hydraulic conductivity of no more than 1 X 10-7cm/sec. FML components consisting of high density polyethylene (HDPE) shall be at least 60-ml thick.

The FML component shall be installed in direct and uniform contact with the compacted soil component.

(iii) The Division reserves the right to require an applicant to submit a liner design if the groundwater protection demonstration is Sub-item (ii) of this Paragraph is not satisfactory.

(iv) Industrial solid waste landfills shall comply with ground water standards established under 15A NCAC 2L at the compliance boundary.

(e) A site shall not engage in open burning of solid waste;

(f) A site, except a land clearing and inert debris landfill, shall meet the following buffer requirements:

(i) A 50-foot minimum buffer between all property lines and disposal areas;

(ii) A 500-foot minimum buffer between private dwellings and wells and disposal areas; and

(iii) A 50-foot minimum buffer between streams and rivers and disposal areas; and

(g) Requirements of the Sedimentation Pollution Control Law (15A NCAC 4) shall be met.

History Note: *Authority G.S. 130A-294;*
Eff. April 1, 1982;
Amended Eff. October 1, 1995; January 4, 1993; February 1, 1991; September 1, 1990.

15A NCAC 13B .0544 MONITORING PLANS AND REQUIREMENTS FOR C&DLF FACILITIES

(a) A Monitoring Plan must be submitted that contains the following information and must apply to all C&DLF units. The Monitoring Plan must be prepared in accordance with this Rule.

(b) Ground-water monitoring plan. A ground-water monitoring plan, including information on the proposed ground-water monitoring system(s), sampling and analysis requirements, and detection monitoring requirements that fulfills the requirements of Part (1)(A) through (1)(E) of this Paragraph, must be submitted.

(1) A ground-water monitoring system must be installed that consists of a sufficient number of wells, installed at appropriate locations and depths, to yield ground-water samples from the aquifer that:

(A) Represent the quality of the background ground water that has not been affected by leakage from the unit. Normally, determination of background water quality will be based on sampling of a well or wells that are hydraulically upgradient of the waste management area. However, the determination of background water quality may include sampling of wells that are not hydraulically upgradient of the waste management area where hydrogeologic conditions do not allow the owner and operator to determine which wells are hydraulically upgradient, or hydrogeologic conditions do not allow the owner and operator to place a well in a hydraulically upgradient location, or sampling at other wells will provide an indication of background ground-water quality that is as representative as that provided by the upgradient well(s); and

(B) Represent the quality of ground water passing the relevant point of compliance as approved by the Division. The downgradient monitoring system must be installed at the relevant point of compliance so as to ensure detection of ground-water contamination in the

uppermost aquifer. The relevant point of compliance must be established no more than 250 feet from a waste boundary, or must be at least 50 feet within the facility property boundary, whichever point is closer to the waste boundary. In determining the relevant point of compliance, the Division shall consider recommendations made by the owner and operator based upon consideration of at least the hydrogeologic characteristics of the facility and surrounding land; the quantity, quality, and direction of flow of the ground water; the proximity and withdrawal rate of the ground-water users; the existing quality of the ground water, including other sources of contamination and their cumulative impacts on the ground water, and whether the ground water is currently used or reasonably expected to be used for drinking water; public health, safety, and welfare effects; and practicable capability of the owner and operator.

(C) The ground-water monitoring programs must include consistent sampling and analysis procedures that are designed to ensure monitoring results that provide an accurate representation of ground-water quality at the background and downgradient wells. The plan must include procedures and techniques for sample collection; sample preservation and shipment; chain-of-custody control; and quality assurance and quality control.

(D) Detection ground-water monitoring program. The monitoring programs must include sampling and analytical methods that are appropriate for ground-water sampling and that accurately measure target constituents and other monitoring parameters in ground-water samples. Detection monitoring is required at C&DLF units at all ground-water monitoring wells that are part of the detection monitoring system as established in the approved monitoring plan. At a minimum, the detection monitoring program must include monitoring for the constituents listed in Appendix I of 40 CFR Part 258, Mercury, Chloride, Manganese, Sulfate, Iron, specific conductance, pH, temperature, Alkalinity, and Total Dissolved Solids. The monitoring frequency for all detection monitoring constituents must be at least semiannual during the active life of the facility, and during the closure and post-closure periods. A minimum of one sample from each well, background and downgradient, must be collected and analyzed for the constituents before waste placement in each cell or phase. At least one sample from each well, background and downgradient, must be collected and analyzed during subsequent semiannual sampling events. The Classifications and Water Quality Standards Applicable to the Groundwaters of North Carolina (15A NCAC 02L) are incorporated by reference, including subsequent amendments and editions. Copies of this material may be inspected or obtained at the Department of Environment and Natural Resources or on the Department website.

(E) The sampling procedures and frequency must be protective of human health and the environment.

(F) Each time ground-water is sampled elevations must be measured in each well immediately prior to purging. Ground-water elevations in wells which monitor the same waste management area must be measured within a 24 hour period of time to avoid temporal variations in ground-water flow which could preclude accurate determination of ground-water flow rate and direction. In order to accurately determine ground-water elevations for each monitoring well, the wells must have been accurately surveyed by a North Carolina Registered Land Surveyor. The survey of the wells must conform to at least the following levels of accuracy: horizontal location to the nearest 0.1 foot, vertical control for the ground surface elevation to the nearest 0.01 foot, and vertical control for the measuring reference point on the top of the inner well casing to the nearest 0.01 foot. In order to determine the rate of ground-water flow, the owner or operator must provide data for hydraulic conductivity and porosity for the formation materials at each of the well locations.

(G) The owner or operator must establish existing conditions of ground-water quality in hydraulically upgradient or background well(s) for each of the monitoring parameters or constituents required in the particular ground-water monitoring program that applies to the C&DLF unit.

(H) Should the owner or operator choose to perform statistical analysis of groundwater quality data whether for purposes of establishing background concentrations or to determine if there is an exceedance of the groundwater protection standard, the owner or operator shall select one of the following statistical methods to be used in evaluating ground-water monitoring data for each hazardous constituent. The statistical test chosen shall be conducted separately for each hazardous constituent in each well.

(i) A parametric analysis of variance (ANOVA) followed by multiple comparisons procedures to identify statistically significant evidence of contamination. The method shall include estimation and testing of the contrasts between each compliance well's mean and the background mean levels for each constituent.

(ii) A parametric analysis of variance (ANOVA) based on ranks followed by multiple comparisons procedures to identify statistically significant evidence of contamination. The method shall include estimation and testing of the contrasts between each compliance well's median and the background median levels for each constituent.

(iii) 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 compliance well is compared to the upper tolerance or prediction limit.

(iv) A control chart approach that gives control limits for each constituent.

(v) Another statistical test method that meets the performance standards of this Rule. The owner or operator shall submit a justification for an alternative test method to the Division for approval. The justification shall demonstrate that the alternative statistical test method meets the performance standards of this Rule. If approved, the owner or operator shall place a copy of the justification for an alternative test method in the operating record.

(I) Any statistical method chosen to evaluate ground-water monitoring data shall comply with the following performance standards, as appropriate:

(i) The statistical method used to evaluate ground-water monitoring data shall be appropriate for the distribution of chemical parameters or hazardous constituents. If the distribution of the chemical parameters or hazardous constituents is shown by the owner or operator (or the Division) to be inappropriate for a normal theory test, then the data shall be transformed or a distribution-free theory test shall be used. If the distributions for the constituents differ, more than one statistical method shall be considered.

(ii) If an individual well comparison procedure is used to compare an individual compliance well constituent concentration with background constituent concentrations or a ground-water protection standard, the test shall be done at a Type I error level no less than 0.01 for each testing period. If a multiple comparisons procedure is used, the Type I experiment wise error rate for each testing period shall be no less than 0.05; however, the Type I error of no less than 0.01 for individual well comparisons shall be maintained. This performance standard does not apply to tolerance intervals, prediction intervals, or control charts.

(iii) If a control chart approach is used to evaluate ground-water monitoring data, the specific type of control chart and its associated parameter values shall be protective of human health and the environment. The parameters shall be determined after considering the number of samples in the background data base, the data distribution, and the range of the concentration values for each constituent of concern.

(iv) If a tolerance interval or a prediction interval is used to evaluate ground-water monitoring data, the levels of confidence and, for tolerance intervals, the percentage of the population that the interval shall contain, shall be protective of human health and the environment. These parameters shall be determined after considering the number of samples in the background data base, the data distribution, and the range of the concentration values for each constituent of concern.

(v) The statistical method shall account for data below the limit of detection with one or more statistical procedures that are protective of human health and the environment. Any practical quantitation limit (pql) that is used in the statistical method shall be the lowest

Commented [A1]: H and I are optional for the landfill owner or operator

concentration level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility.
(vi) If necessary, as provided for in 40 CFR 258,the statistical method shall include procedures to control or correct for seasonal and spatial variability as well as temporal correlation in the data.

(J)(H) Within 120 days of completing a ground-water sampling event, the owner or operator must submit to the Division a report~~, with one copy~~ in electronic format~~,~~ that includes information from the sampling event; including: field observations relating to the condition of the monitoring wells; field data; summary of the laboratory data; field sampling quality assurance and quality control data; information on ground-water flow direction; ground-water flow rate for each well with constituents that exceed ground-water standards over background levels; and any other pertinent information related to the sampling event.

(K)(I) The owner or operator may demonstrate that a source other than the C&DLF unit or a natural variation in ground-water quality has caused contamination, or an error in sampling or analysis of data has resulted in false reporting of contamination. A report documenting this demonstration must be certified by a Licensed Geologist or Professional Engineer and must be submitted to the Division for review. The Division shall date and stamp the demonstration "approved" if the conditions of this Paragraph are met. A copy of the approved report must also be placed in the operating record. If after 90 days, a successful demonstration is not made, the owner or operator shall initiate an assessment monitoring program as required in 15A NCAC 13B .0545.

(2) Monitoring wells must be designed and constructed in accordance with the applicable North Carolina Well Construction Standards as codified in 15A NCAC 02C.
(A) Owners and operators must obtain approval from the Division for the design, installation, development, and decommission of any monitoring well or piezometer. Documentation must be placed in the operating record and provided to the Division.
(B) The monitoring wells and piezometers must be operated, maintained, and accessible so that they perform to design specifications throughout the life of the monitoring program.

(3) The number, spacing, and depths of monitoring points must be determined based upon site-specific technical information that must include investigation of:
(A) aquifer thickness, ground-water flow rate, and ground-water flow direction, including seasonal and temporal fluctuations in ground-water flow; and
(B) unsaturated and saturated geologic units (including fill materials) overlying and comprising the uppermost aquifer, including thickness, stratigraphy, lithology, hydraulic conductivities, porosities and effective porosities.

(4) The Division may require or allow the use of alternative monitoring systems in addition to ground-water monitoring wells:
(A) at sites where the owner and operator does not control the property from any landfill unit to the ground-water discharge feature(s); or
(B) at sites with hydrogeologic conditions favorable to detection monitoring by alternative methods.

(5) Owners and operators of C&DLF units must comply with the ground-water monitoring, assessment and corrective action requirements under Rules .0544 through .0545 of this Section according to the following schedule:
(A) new C&DLF units must be in compliance with the requirements before waste can be placed in the unit; and
(B) lateral expansions to existing C&DLF units must be in compliance with the requirements before waste can be placed in the expansion area.

(c) Surface water monitoring plan. The Surface Water Monitoring System must be as follows:
(1) The Division shall require a solid waste management facility to provide such surface water monitoring capability as the Division determines to be necessary to detect the effects of the facility on surface water in the area. In making such a determination, the Division shall consider the following factors:

Commented [A2]: Relettering for remaining part of .0544 due to addition of statistical analysis with H and I.

Commented [A3]: Cost savings to the owner or operator.

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(A) the design of the facility, the nature of the process it will use, and the type of waste it will handle;
(B) drainage patterns and other hydrological conditions in the area;
(C) proximity of surface water to the facility;
(D) uses that are being or may be made of any surface water that may be affected by the facility; and
(E) any other factors that reasonably relate to the potential for surface water effects from the facility.

(2) Responsibility for sample collection and analysis must be defined as a part of the monitoring plan.

(d) Gas control plan.

(1) Owners and operators of all C&DLF units must ensure that:
(A) the concentration of methane gas or other explosive gases generated by the facility does not exceed 25 percent of the lower explosive limit in on-site facility structures (excluding gas control or recovery system components);
(B) the concentration of methane gas or other explosive gases does not exceed the lower explosive limit for methane or other explosive gases at the facility property boundary; and
(C) the facility does not release methane gas or other explosive gases in any concentration that can be detected in offsite structures.

(2) Owners and operators of all C&DLF units must implement a routine methane monitoring program to ensure that the standards of this Paragraph are met.
(A) The type of monitoring must be determined based on soil conditions, the hydrogeologic conditions under and surrounding the facility, hydraulic conditions on and surrounding the facility, the location of facility structures and property boundaries, and the location of all off-site structures adjacent to property boundaries.
(B) The frequency of monitoring shall be quarterly or as approved by the Division.

(3) If methane or explosive gas levels exceeding the limits specified in Subparagraph (d)(1) of this Rule are detected, the owner and operator must:
(A) immediately take all steps necessary to ensure protection of human health and notify the Division;
(B) within seven days of detection, place in the operating record the methane or explosive gas levels detected and a description of the steps taken to protect human health; and
(C) within 60 days of detection, implement a remediation plan for the methane or explosive gas releases, place a copy of the plan in the operating record, and notify the Division that the plan has been implemented. The plan must describe the nature and extent of the problem and the proposed remedy.

(4) Owners or operators must ensure that
(1) The concentration of hydrogen sulfide gas generated by the facility does not exceed 20 parts per million in facility structures (excluding gas control or recovery system components); and
(2) The concentration of hydrogen sulfide gas does not exceed 50 parts per million at the facility property boundary.

(5) Owners or operators must ensure that
(1) The concentration of oxygen generated by the facility does not exceed assigned threshold of 19.5%-23.5% in facility structures (excluding gas control or recovery system components);

(6~~4~~) Based on the need for an extension demonstrated by the operator, the Division may establish alternative schedules for demonstrating compliance with Parts (3)(B) and (3)(C) of this Paragraph.

(7~~5~~) For purposes of this Item, "lower explosive limit" means the lowest percent by volume of a mixture of explosive gases in air that will propagate a flame at 25 C and atmospheric pressure.

(e) A waste acceptability program. Owners and operators of all C&DLF units must implement a program at the facility for detecting and preventing the disposal of industrial, hazardous, liquid, municipal solid waste and excluded wastes in accordance with the Operating Plan or the effective permit. This program must include, at a minimum:
(1) random inspections of incoming loads or other comparable procedures;
(2) records of any inspections;
(3) training of facility personnel to recognize industrial, hazardous, liquid, municipal and excluded waste; and

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Commented [A6]: Standards derived from 29CFR 1910.1000 Table Z-2

Commented [A7]: Oxygen added for protection of human health and safety utilizing the OSHA reference. Consistent with .0603.

(4) development of a contingency plan to properly manage any identified industrial hazardous, liquid, municipal or excluded waste. The plan must address identification, removal, storage and final disposition of the waste.

(f) The Monitoring Plan must include any other monitoring plan or program which is necessary according to the Operating Plan or the effective permit.

(g) Monitoring plans must be prepared under the responsible charge of and bear the seal of a Licensed Geologist or Professional Engineer in accordance with G.S. 89E or 89C, respectively.

(h) Monitoring plans must be certified by a Licensed Geologist or Professional Engineer to be effective in providing early detection of any release of hazardous constituents from any point in a disposal cell or leachate surface impoundment to the uppermost aquifer, air, surface waters, or proximal area, so as to be protective of public health and the environment.

(i) Monitoring plans must be submitted to the Division for review. The Division shall date and stamp the monitoring plans "approved" if they meet the conditions of this Rule. A copy of the approved monitoring plan must be placed in the operating record.

(j) Once established at a C&DLF facility, all monitoring must be conducted throughout the active life and post-closure care period for all C&DLF units.

History Note: *Authority G.S. 130A-294;*
Eff. January 1, 2007.

15A NCAC 13B .0545 ASSESSMENT AND CORRECTIVE ACTION PROGRAM FOR C&DLF FACILITIES AND UNITS

(a) Assessment Program. Assessment is required if one or more constituents, as listed in Part (b)(1)(D) of Rule .0544 of this Section are detected above the current ground-water quality standards in accordance with 15A NCAC 02L .0202, in any sampling event. The owner and operator must also immediately:

(1) Notify all persons who own land or reside on land that directly overlies any part of the plume of contamination if contaminants have migrated off-site or are thought to have migrated off site;

(2) Within 90 days of triggering an assessment monitoring program, the owner and operator must submit an assessment monitoring work plan for Division review. The Division shall date and stamp the assessment monitoring program "approved" if the conditions in Paragraph (b) of this Rule are met. The owner and operator must place the approved program in the operation record, and notify all appropriate local government officials.

(b) Assessment Monitoring Work Plan. The assessment monitoring work plan must be in accordance with the following:

(1) Install at least one additional groundwater monitoring well or methane gas monitoring well at the facility boundary or the compliance boundary, as defined in 15A NCAC 02L .0100, in the direction of contaminant migration. The new sampling point must be installed at the facility boundary or compliance boundary at the location most likely to show impact based on the known geology and hydrogeology; Install additional monitoring wells to characterize the nature and extent of the release by determining the following:

(A) Lithology of the aquifer and unsaturated zone;
(B) Hydraulic conductivity of the aquifer and unsaturated zone;
(C) Ground-water flow rates;
(D) Minimum distance of travel;
(E) Resource value of the aquifer; and
(F) Nature, fate, and transport of any detected constituents.

(2) Establish timeline and schedule

Analyze for additional parameters, which may include constituents on the Appendix II of 40 CFR Part 258 as directed by the Division. For any constituent detected in the downgradient wells as the result of analyzing of additional parameters, a minimum of four independent samples from each well (background and downgradient) must be collected and analyzed to establish background for the new constituents.

Commented [A8]: Reorganized rules for clarification for the owner or operator.

Commented [A9]: Changed 30 days to 90 to be consistent with .1600 rules.

Commented [A10]: Reorganized rules for clarification for the owner or operator. Moved from .0545(a) to .0545(b).

Commented [A11]: Public comments need to be reviewed regarding assessment monitoring in .1600 rules.

Commented [A12]: Begin for August meeting

(3) If the new constituents do not have an established 15A NCAC 02L .0202 groundwater quality standard, the owner or operator must obtain a determination from the Division on establishing a groundwater protection standard for each constituent detected in groundwater. The groundwater protection standard must be the most protective of the following:

(A) For constituents for which a maximum contamination level (MCL) has been promulgated under the Section 1412 of the Safe Drinking Water Act codified under 40 CFR Part 141, the MCL for that constituent;

(B) For constituents for which a water quality standard has been established under the North Carolina Rules Governing Public Water Systems, 15A NCAC 18C, the water quality standard for that constituent;

(C) For constituents for which MCLs or water quality standards have not been promulgated, the background concentration for the constituent established from wells in accordance with Rule .1631(a)(1) of this Section; or

(D) For constituents for which the background level is higher than the MCL or water quality standard or health based levels identified under Paragraph (i) of this Rule, the background concentration.

(4) The Division may establish an alternative ground-water protection standard for constituents for which neither an MCL or water quality standard has not been established. These ground-water protection standards must be appropriate health based levels that satisfy the following criteria:

(A) The level is derived in a manner consistent with E.P.A. guidelines for assessing the health risks of environmental pollutants;

(B) The level is based on scientifically valid studies conducted in accordance with the Toxic Substances Control Act Good Laboratory Practice Standards (40 CFR Part 792) or equivalent;

(C) For carcinogens, the level represents a concentration associated with an excess lifetime cancer risk level (due to continuous lifetime exposure) of 1 x 10-6;

(D) For systemic toxicants, the level represents a concentration to which the human population (including sensitive subgroups) could be exposed on a daily basis that is likely to be without appreciable risk of deleterious effects during a lifetime. For the purposes of this Rule, systemic toxicants include toxic chemicals that cause effects other than cancer or mutation.

(5) In establishing ground-water protection standards under Paragraph (b) of this Rule the Division may consider the following:

(A) Multiple contaminants in the ground water;

(B) Exposure threats to sensitive environmental receptors; and

(C) Other site-specific exposure or potential exposure to ground water.

(6) The Division may specify an appropriate subset of wells to be sampled and analyzed during assessment monitoring. The Division may delete any of the additional monitoring parameters if it can be shown that the removed constituents are not reasonably expected to be in or derived from the waste contained in the unit.

(7) After obtaining the results from the initial and subsequent sampling events, the owner or operator must submit an assessment monitoring report to the Division which must be certified by a Licensed Geologist.

(8) The owner or operator may demonstrate that a source other than a C&DLF caused the contamination. An alternate source demonstration report must be prepared by a certified Licensed Geologist and submitted for approval by the Division. A copy of the approved report must also be placed in the operating record. If a successful demonstration is made, the owner or operator may discontinue assessment monitoring, and may return to detection monitoring if the constituents are at or below background values and 15A NCAC 02L .0202 or approval is given by the Division according to Subparagraph (9) of this Paragraph. Until a successful demonstration is made, the owner or operator must comply with Paragraph (b) of this Rule.

(9) The Division may give approval to the owner or operator to return to detection monitoring if:

(A) The concentrations of the constituents are shown to be at or below background values and 15A NCAC 02L .0202 for two consecutive sampling events;

(B) The plume is not migrating horizontally or vertically; and

(C) The plume has not exceeded the compliance boundary.

(10) If constituents are consistently detected above background, 15A NCAC 02L .0202, and the approved groundwater protection standards, the owner or operator must initiate Assessment of Corrective Measures.

(c) Assessment of Corrective Measures. Assessment of corrective measures is required upon completion of Paragraphs (a) and (b) of this Rule as determined by the Division. The assessment of corrective measures must include an analysis of the effectiveness of potential corrective actions in meeting all of the requirements and objectives of the remedy as described under this Rule. The assessment of corrective measures document must address the following at a minimum:

(1) the performance, reliability, ease of implementation, and potential impacts of appropriate potential remedies, including safety impacts, cross-media impacts, and control of exposure to any residual contamination;

(2) the time required to begin and to complete the remedy;

(3) the costs of remedy implementation; and

(4) the institutional requirements such as State and Local permit requirements or other environmental or public health requirements that may substantially affect implementation of the remedy(s).

(d) The owner and operator must discuss the results of the assessment of corrective measures, prior to the selection of the remedy, in a public meeting with interested and affected parties. The owner and operator must provide a public notice of the meeting at least 30 days prior to the meeting. The notice must include the time, place, date, and purpose of the meeting required by this Paragraph of this Rule. A copy of the public notice must be forwarded to the Division at least five days prior to publication. The owner and operator must mail a copy of the public notice to those persons requesting notification. Public notice must be in accordance with Rule .0533(c)(4) of this Section.

(e) Selection of Remedy. Based on the results of the Assessment of Corrective Actions, the owner and operator must select a remedy that, at a minimum, meets the standards listed in Subparagraph (2) of this Paragraph as follows:

(1) Within 30 days of selecting a remedy, the permittee must submit an application to modify the permit describing the selected remedy to the Division for evaluation and approval. The application must be subject to the processing requirements set forth in Rule .0533(c) of this Section. The application must include the demonstrations necessary to comply with the financial assurance requirements set forth in accordance with Rule .0546 of this Section.

(2) Remedies must:

(A) be protective of human health and the environment;

(B) attain the approved ground-water protection standards;

(C) control the source(s) of releases so as to reduce or eliminate, to the maximum extent practicable, further releases of constituents into the environment that may pose a threat to human health or the environment; and

(D) comply with standards for management of wastes as specified in Paragraph (k) of this Rule.

(3) In selecting a remedy that meets the standards of Subparagraph (e)(2) of this Rule, the owner and operator must consider the following evaluation factors:

(A) The long-term and short-term effectiveness and protectiveness of the potential remedy(s), along with the degree of certainty that the remedy will prove successful based on consideration of the magnitude of reduction of existing risks; magnitude of residual risks in terms of likelihood of further releases due to wastes remaining following implementation of a remedy; the type and degree of long-term management required, including monitoring, operation, and maintenance; short-term risks that might be posed to the community, to workers, or to the environment during implementation of such a remedy, including potential threats to human health and the environment associated with excavation, transportation, and redisposal or containment; time until full protection is achieved; potential for exposure of humans and environmental receptors to remaining wastes, considering the potential threat to human health and the environment associated with excavation, transportation, redisposal, or containment; long-term reliability of the engineering and institutional controls; and potential need for replacement of the remedy.

(B) The effectiveness of the remedy in controlling the source to reduce further releases, based on consideration of the extent to which containment practices will reduce further releases, and the extent to which treatment technologies may be used.

(C) The ease or difficulty of implementing a potential remedy, based on consideration of the degree of difficulty associated with constructing the technology; the expected operational reliability of the technologies; the need to coordinate with and obtain necessary approvals

and permits from other agencies; the availability of necessary equipment and specialists; and available capacity and location of needed treatment, storage, and disposal services.

(D) The practicable capability of the owner and operator, including a consideration of the technical and economic capability.

(4) The owner and operator must specify as part of the selected remedy a schedule for initiating and completing remedial activities included in a corrective action plan. This schedule must be submitted to the Division for review and approval. Such a schedule must require the initiation of remedial activities within a reasonable period of time, taking into consideration the factors set forth in this Rule. The owner and operator must consider the following factors in determining the schedule of remedial activities:

(A) nature and extent of contamination;

(B) practical capabilities of remedial technologies in achieving compliance with the approved ground-water protection standards and other objectives of the remedy;

(C) availability of treatment or disposal capacity for wastes managed during implementation of the remedy;

(D) desirability of utilizing technologies that are not currently available, but which may offer advantages over already available technologies in terms of effectiveness, reliability, safety, or ability to achieve remedial objectives;

(E) potential risks to human health and the environment from exposure to contamination prior to completion of the remedy;

(F) resource value of the aquifer, including current and future uses; proximity and withdrawal rate of users; ground-water quantity and quality; the potential damage to wildlife, crops, vegetation, and physical structures caused by exposure to contaminants; the hydrogeologic characteristics of the facility and surrounding land; ground-water removal and treatment costs; the costs and availability of alternative water supplies;

(G) practical capability of the owner and operator; and

(H) other relevant factors.

(f) The Division may determine that active remediation of a release of any detected constituent from a C&DLF unit is not necessary if the owner or operator demonstrates to the satisfaction of the Division that:

(1) The ground-water is additionally contaminated by substances that have originated from a source other than a C&DLF unit and those substances are present in concentrations such that active cleanup of the release from the C&DLF unit would provide no significant reduction in risk to actual or potential receptor;

(2) The constituent or constituents are present in ground-water that is not currently or reasonably expected to be a source of drinking water and is not hydraulically connected with water to which the constituents are migrating or are likely to migrate in concentrations that would exceed the approved ground-water protection standards;

(3) Remediation of the release is technically impracticable; or

(4) Remediation results in unacceptable cross-media impacts.

(g) A determination by the Division pursuant to this Paragraph must not affect the authority of the State to require the owner and operator to undertake source control measures or other measures that may be necessary to eliminate or minimize further releases to the ground water, to prevent exposure to the ground water, or to remediate ground water to concentrations that are technically practicable and reduce threats to human health or the environment.

(h) Implementation of the Corrective Action Program. Based on the approved schedule for initiation and completion of remedial activities, the owner and operator must submit in a corrective action plan:

(1) Establish and implement a corrective action ground-water monitoring program that:

(A) at a minimum, meets the requirements of an assessment monitoring program under Paragraphs (a) and (b) of this Rule;

(B) indicates the effectiveness of the corrective action remedy; and

(C) demonstrates compliance with ground-water protection standards pursuant to Paragraph (i) of this Rule.

(2) Implement the approved corrective action remedy; and

(3) Take any interim measures necessary to ensure the protection of human health and the environment. Interim measures must be consistent with the objectives of and contribute to the performance of any remedy that may be required. The following factors must be considered by an owner and operator in determining whether interim measures are necessary:

(A) time required to develop and implement a final remedy;
(B) actual or potential exposure of nearby populations or environmental receptors to hazardous constituents;
(C) actual or potential contamination of drinking water supplies or sensitive ecosystems;
(D) further degradation of the ground water that may occur if remedial action is not initiated expeditiously;
(E) weather conditions that may cause hazardous constituents to migrate or be released;
(F) risks of fire or explosion, or potential for exposure to hazardous constituents as a result of an accident or failure of a container or handling system; and
(G) other situations that may pose threats to human health or the environment.

(i) The owner or operator or the Division may determine, based on information developed after implementation of the remedy has begun or other information, that compliance with requirements of Subparagraph (e)(2) of this Rule are not being achieved through the remedy selected. In such cases, the owner and operator must implement other methods or techniques, as approved by the Division that could practicably achieve compliance with the requirements, unless the owner or operator makes the determination under Paragraph (f) of this Rule.

(j) If the owner or operator determines that compliance with requirements of Subparagraph (e)(2) of this Rule cannot be practically achieved with any currently available methods, the owner and operator must:

(1) obtain certification of a Licensed Geologist or Professional Engineer and approval from the Division that compliance with the requirements under Subparagraph (e)(2) of this Rule cannot be practically achieved with any currently available methods;
(2) implement alternate measures to control exposure of humans or the environment to residual contamination, as necessary to protect human health and the environment;
(3) implement alternate measures for control of the sources of contamination, or for removal or decontamination of equipment, units, devices, or structures that are:
    (A) technically practicable and
    (B) consistent with the overall objective of the remedy; and
(4) submit a report justifying the alternative measures to the Division for review. The Division shall date and stamp the report "approved" if the conditions of this paragraph are satisfied. The approved report must be placed in the operating record prior to implementing the alternative measures.

(k) All solid wastes that are managed pursuant to a remedy required under Paragraph (e) of this Rule, or an interim measure required under Paragraph (e) of this Rule, must be managed in a manner:

(1) that is protective of human health and the environment, and
(2) that complies with applicable state and federal requirements.

(l) Remedies selected pursuant to Paragraph (e) of this Rule shall be considered complete when:

(1) the owner and operator complies with the ground-water protection standards at all points within the plume of contamination that lie beyond the relevant point of compliance;
(2) compliance with the ground-water protection standards has been achieved by demonstrating that concentrations of constituents have not exceeded these standards for a period of three consecutive years, consistent with performance standards in Subparagraph (e)(2) of this Rule; and
(3) all actions required to complete the remedy have been satisfied.

(m) Upon completion of the remedy, the owner and operator must submit a report to the Division documenting that the remedy has been completed in compliance with Paragraph (l) of this Rule. This report must be signed by the owner and by a Licensed Geologist or Professional Engineer. Upon approval by the Division, this report must be placed in the operating record.

(n) When, upon completion of the certification, the Division determines that the corrective action remedy has been completed in accordance with Paragraph (l) of this Rule, the owner and operator shall be released from the requirements for financial assurance for corrective action under Rule .0546 of this Section.

History Note: *Authority G.S. 130A-294;*
Eff. January 1, 2007.

15A NCAC 13B .0547 EXISTING C&DLF UNITS AS OF JANUARY 1, 2007

An owner and operator of an existing C&DLF unit(s), those receiving waste prior to January 1, 2007, must close or submit an application document according to the criteria and scheduling requirements set forth in this Rule. All C&DLF unit(s) must conform to the specific conditions set forth in the permit and the following general provisions.

(1) Closure of existing C&DLF unit(s). C&DLF unit(s), which did not and will not receive solid waste after June 30, 2008, must comply with the Solid Waste Permit, the Conditions of Permit, and Rule .0510 of this Section.

(2) Financial Assurance for existing C&DLF facilities and units. Owners and operators of existing C&DLF facilities and units must submit the following by July 1, 2008:

(a) a closure and post-closure plan prepared in accordance with Rule .0543 of this Section; and

(b) financial responsibility in accordance with Rule .0546 of this Section.

(3) Application for a Permit to Construct a new phase of an existing C&DLF facility or unit must be subject to the following. An owner and operator of an existing C&DLF must submit an application 120 days prior to the expiration date of the effective permit to operate or at least 180 days prior to the date scheduled for constructing a phase of C&DLF development not approved in the effective permit to operate, whichever occurs first. The application must consist of the following:

(a) a facility plan that defines the comprehensive development of the property. The plan includes a set of drawings and a report which presents the long-term, general design concepts related to construction, operation, and closure of the C&DLF unit(s). The scope of the plan spans the active life of the unit(s). A facility plan must be prepared in accordance with Subparagraphs (d)(1), (e)(1), (e)(2), and (e)(3) of Rule .0537 of this Section. Additional solid waste management activities located at the C&DLF facility must be identified in the plan and must meet the requirements of this Subchapter. The facility plan defines the waste stream proposed for management at the C&DLF facility. If different types of landfill units or non-disposal activities are included in the facility design, the plan must describe general waste acceptance and segregation procedures. The areal limits of the C&DLF unit(s), total capacity of the C&DLF unit(s), and the proposed waste stream must be in accordance with the current permit for an existing facility applying for a Permit to Construct a new phase not approved in the current permit;

(b) an engineering plan that is prepared for the initial phase of landfill development prepared in accordance with Rule .0539 of this Section;

(c) a construction quality assurance plan prepared in accordance with Rule .0541 of this Section;

(d) an operation plan prepared in accordance with Rule .0542 of this Section, with an appended monitoring plan in accordance with Rule .0544 of this Section; and

(e) a closure and post-closure plan prepared in accordance with Rule .0543 of this Section.

(4) Owners and operators of existing C&DLF units on top of closed MSWLFs must submit a permit application by July 1, 2008, for the continued operations of those units. The permit must be reviewed at the end of each five-year period. The permit will be reissued upon receipt of a complete permit amendment prepared in accordance with Rule .0535(b) and upon determination that the corrective action plan prepared in accordance with Rule .0547(4)(c) is being implemented. The application must contain:

(a) local government approval in accordance with Rule .0536(c)(11) of this Section,

(b) an operations plan in accordance with Rule .0542 of this Section, including a five-year phase of development and a waste acceptance plan in accordance with the existing permit,

(c) a corrective action plan for the closed MSWLF, as required by Rule .1635 of this Subchapter, prepared in accordance with Rules .1636 and .1637 of this Subchapter,

(d) a closure and post-closure plan in accordance with Rule .1627 of this Subchapter, and

(e) financial assurance in accordance with Rule .1628 of this Subchapter.

History Note: *Authority G.S. 130A-294;*
Eff. January 1, 2007.

SECTION .0600 - MONITORING REQUIREMENTS

Rules .0601 - .0602 of Title 15A Subchapter 13B of the North Carolina Administrative Code (T15A.13B .0601 - .0602); have been transferred and recodified from Rules .0601 - .0602 of Title 10 Subchapter 10G of the North Carolina Administrative Code (T10.10G .0601 - .0602), effective April 4, 1990.

The requirements of this Section shall not apply to municipal solid waste landfill units, which are defined under and subject to the requirements of Section .1600 of this Subchapter or construction and demolition units, which are defined under and subject to the requirements of Section .0531-.0547. The following Sections are applicable to permitted facilites during life of site and post closure monitoring.

15A NCAC 13B .0601 GROUND-WATER MONITORING

(a) The Division shall require a solid waste management facility to provide such ground-water monitoring capability as the Division determines to be necessary to detect the effects of the facility on ground-water in the area. In making such a determination, the Division shall consider the following factors:

(1) the design of the facility, the nature of the processes it will use, and the type of waste it will handle;
(2) soil and other geological conditions in the area;
(3) nearness of ground-water to the facility;
(4) uses that are being or may be made of any ground-water that may be affected by the facility; and
(5) any other factors that reasonably relate to the potential for ground-water effects from the facility.

(b) Responsibility for sample collection and analysis will be defined as a part of the permit condition.
(c) Any other information that the Division deems pertinent to the development of a ground-water monitoring system will be required.
(d) All monitoring wells required pursuant to this Rule shall comply with monitoring well construction standards of 15A NCAC 2C .0105. Copies of 15A NCAC 2C may be obtained from and inspected at the Division.
(e) A record of well installation shall be filed with the Division upon completion of the monitoring wells.
(f) Groundwater quality monitoring wells shall be constructed of materials, and by procedures, approved by the Division.
(g) Ground water standards established under 15A NCAC 2L shall not be exceeded in the uppermost aquifer at the compliance boundary. A compliance boundary shall be established 250 feet from the waste boundary, or 50 feet within the property boundary, whichever point is closer to the source.
(h) Should the owner or operator choose to perform statistical analysis of groundwater quality data whether for purposes of establishing background concentrations or to determine if there is an exceedance of the groundwater protection standard, the owner or operator shall select one of the following statistical methods to be used in evaluating ground-water monitoring data for each hazardous constituent. The statistical test chosen shall be conducted separately for each hazardous constituent in each well.

(1) A parametric analysis of variance (ANOVA) followed by multiple comparisons procedures to identify statistically significant evidence of contamination. The method shall include estimation and testing of the contrasts between each compliance well's mean and the background mean levels for each constituent.
(2) A parametric analysis of variance (ANOVA) based on ranks followed by multiple comparisons procedures to identify statistically significant evidence of contamination. The method shall include estimation and testing of the contrasts between each compliance well's median and the background median levels for each constituent.
(3) 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 compliance well is compared to the upper tolerance or prediction limit.
(4) A control chart approach that gives control limits for each constituent.
(5) Another statistical test method that meets the performance standards of this Rule. The owner or operator shall submit a justification for an alternative test method to the Division for approval. The justification shall demonstrate that the alternative statistical test method meets the performance standards of this Rule. If approved, the owner or operator shall place a copy of the justification for an alternative test method in the operating record.

Commented [A13]: For clarification.

Commented [A14]: Discussion about 30 year post closure requirements in this Section. The permittee (or owner or operator) shall conduct the post-closure care for at least thirty (30) years. However, this 30-year post closure period shall be extended by Division to the date when compliance is achieved in accordance with the General Statutes, Solid Waste Rules and 15A NCAC 2L.

Commented [A15]: Want to establish minimal standards and for clarification and consistency.

Commented [A16]: (g) added from 15A NCAC 2L for clarification and consistency.

Commented [A17]: (h) added from 15A NCAC 13B for as an option for an owner or operator. This is also the same language as added to 15A NCAC 13B .0544. For clarification and consistency.

(i) Any statistical method chosen to evaluate ground-water monitoring data shall comply with the following performance standards, as appropriate:

(1) The statistical method used to evaluate ground-water monitoring data shall be appropriate for the distribution of chemical parameters or hazardous constituents. If the distribution of the chemical parameters or hazardous constituents is shown by the owner or operator (or the Division) to be inappropriate for a normal theory test, then the data shall be transformed or a distribution-free theory test shall be used. If the distributions for the constituents differ, more than one statistical method shall be considered.

(2) If an individual well comparison procedure is used to compare an individual compliance well constituent concentration with background constituent concentrations or a ground-water protection standard, the test shall be done at a Type I error level no less than 0.01 for each testing period. If a multiple comparisons procedure is used, the Type I experiment wise error rate for each testing period shall be no less than 0.05; however, the Type I error of no less than 0.01 for individual well comparisons shall be maintained. This performance standard does not apply to tolerance intervals, prediction intervals, or control charts.

(3) If a control chart approach is used to evaluate ground-water monitoring data, the specific type of control chart and its associated parameter values shall be protective of human health and the environment. The parameters shall be determined after considering the number of samples in the background data base, the data distribution, and the range of the concentration values for each constituent of concern.

(4) If a tolerance interval or a prediction interval is used to evaluate ground-water monitoring data, the levels of confidence and, for tolerance intervals, the percentage of the population that the interval shall contain, shall be protective of human health and the environment. These parameters shall be determined after considering the number of samples in the background data base, the data distribution, and the range of the concentration values for each constituent of concern.

(5) The statistical method shall account for data below the limit of detection with one or more statistical procedures that are protective of human health and the environment. Any practical quantitation limit (pql) that is used in the statistical method shall be the lowest concentration level that can be reliably achieved within specified limits of precision and accuracy during routine laboratory operating conditions that are available to the facility.

(6) If necessary, as provided for in 40 CFR 258,the statistical method shall include procedures to control or correct for seasonal and spatial variability as well as temporal correlation in the data.

(j) Any person conducting or controlling an activity which is conducted under the authority of a permit issued by the Division and which results in an increase in concentration of a substance in excess of the standards:

(1) at or beyond a review boundary, shall demonstrate, through predictive calculations or modeling, that natural site conditions, facility design and operational controls will prevent a violation of standards at the compliance boundary; or submit a plan for alteration of existing site conditions, facility design or operational controls that will prevent a violation at the compliance boundary, and implement that plan upon its approval by the Director, or his designee.

(2) at or beyond a compliance boundary, shall assess the cause, significance and extent of the violation of standards and submit the results of the investigation, and a plan and proposed schedule for corrective action to the Director, or his designee. The permittee shall implement the plan as approved by and in accordance with a schedule established by the Director, or his designee. In establishing a schedule the Director, or his designee shall consider any reasonable schedule proposed by the permittee.

Commented [A18]: (j) added from 15A NCAC 2L for clarification and consistency.

History Note: *Authority G.S. 130A-294;*
Eff. April 1, 1982;
Amended Eff. September 1, 1990; August 1, 1988; January 1, 1985.

15A NCAC 13B .0602 SURFACE WATER MONITORING

(a) The Division shall require a solid waste management facility to provide such surface water monitoring capability as the Division determines to be necessary to detect the effects of the facility on surface water in the area. In making such a determination, the Division shall consider the following factors:

Commented [A19]: Want to establish minimal standards for consistency.

(1) the design of the facility, the nature of the process it will use, and the type of waste it will handle;
(2) drainage patterns and other hydrological conditions in the area;
(3) nearness of surface water to the facility;
(4) uses that are being or may be made of any surface water that may be affected by the facility; and
(5) any other factors that reasonably relate to the potential for surface water effects from the facility.

(b) Responsibility for sample collection and analysis will be defined as a part of the permit conditions.

(c) Any other information that the Division deems pertinent to the development of a surface water monitoring system will be required.

(d) Surface water standards established under 15A NCAC 2B shall not be exceeded. If a 2B standard is not established, the standard…

(e) A site shall not cause a discharge of pollutants into waters of the state that is in violation of the requirements of the National Pollutant Discharge Elimination System (NPDES), under Section 402 of the Clean Water Act, as amended, or that is in violation of standards promulgated under G.S. 143-214.1 and G.S. 143-215.

(f) A site shall not cause a discharge of dredged material or fill material into waters of the state that is in violation of the requirements under Section 404 of the Clean Water Act, as amended, or that is in violation of any state requirements regulating the discharge of dredged or fill material into waters of the state, including wetlands.

(g) A site shall not cause non point source pollution of waters of the state that violates assigned water quality standards.

History Note: *Authority G.S. 130A-294;*
Eff. April 1, 1982.

15A NCAC 13B .0603 GAS MONITORING

(a) Owners or operators must ensure that

(1) The concentration of methane gas generated by the facility does not exceed 25 percent of the lower explosive limit for methane in facility structures (excluding gas control or recovery system components); and

(2) The concentration of methane gas does not exceed the lower explosive limit for methane at the facility property boundary.

(b) Owners or operators must ensure that

(1) The concentration of hydrogen sulfide gas generated by the facility does not exceed 20 parts per million in facility structures (excluding gas control or recovery system components); and

(2) The concentration of hydrogen sulfide gas does not exceed 50 parts per million at the facility property boundary.

(c) Owners or operators must ensure that

(1) The concentration of oxygen generated by the facility does not exceed assigned threshold of 19.5%-23.5% in facility structures (excluding gas control or recovery system components);

(d) Owners or operators must implement a routine gas monitoring program to ensure that the standards of items(a),(b), and (c) of this Rule are met.

The type and frequency of monitoring must be determined based on the following factors:

(1) Soil conditions;
(2) The hydrogeologic conditions surrounding the facility;
(3) The hydraulic conditions surrounding the facility; and
(4) The location of facility structures and property boundaries.
(5) The minimum frequency of monitoring shall be quarterly.

(e) If gas levels exceeding the limits specified in items(1),(2), and (3) of this Rule are detected, the owner or operator must:

(1) Immediately take all necessary steps to ensure protection of human health and notify the Division;.

Commented [A20]: For clarification and consistency reasons (addition of d, e, f, g)

Commented [A21]: DWM reached out to DWR for clarification on the term "assigned".)

Commented [A22]: From DWR, "assigned" means the classification of the water, the appropriate standards, and antidegradation policies to support that classification. It means all three – classification+standards+antidegradation

Commented [A23]: Addition of new section for gas monitoring for-clarification and consistency.

Commented [A24]: Establish minimal standards for consistency.

Commented [A25]: Language also from .0544 and .1600 rules for consistency and clarification.

Commented [A26]: Hydrogen sulfide added for protection of human health and safety.

Commented [A27]: Standards derived from 29CFR 1910.1000 Table Z-2

Commented [A28]: Oxygen added for protection of human health and safety utilizing the OSHA reference.

Commented [A29]: (d) and (e) were added to provide how to address gas exceedances. Language consistent with .0544 and .1626.

(2) Within seven days of detection, place in the operating record the gas levels detected and a description of the steps taken to protect human health; and

(3) Within 60 days of detection, implement a remediation plan for the gas releases, place a copy of the plan in the operating record, and notify the Division that the plan has been implemented. The plan shall describe the nature and extent of the problem and the proposed remedy.

Based on the need for an extension demonstrated by the operator, the Division may establish alternative schedules for demonstrating compliance with this Rule.

(f) For purposes of this Item, "lower explosive limit" means the lowest percent by volume of a mixture of explosive gases in air that will propagate a flame at 25 degrees C and atmospheric pressure.

(g) Within 120 days from the date of -quarterly gas monitoring, the owner or operator shall submit to the Division a report certified by a Licensed Geologist or Professional Engineer containing the quarterly gas monitoring locations, results, the equipment used and the calibration information.

(h) Facilites currently conducting gas monitoring and meeting the rules above are not required to submit a gas monitoring plan. This is a requirement for life of site and post closure monitoring.

(i) The owner or operator may demonstrate that a source other than the facility caused the gas exeednace. A report documenting this demonstration shall be certified by a Licensed Geologist or Professional Engineer and approved by the Division. A copy of this report shall also be placed in the operating record. If a successful demonstration is made, documented, and approved by the Division, the owner or operator will not be required to further assess and remediate the gas exceedance.

Commented [A30]: For consistency and for clarification for public record, Also for quality assurance,

Commented [A31]: (h) is similar to .0600 additional statement for consistency and clarification.

Commented [A32]: Optional for owner or operator that may help save money.