

3745-30-05 Residual waste landfill facility permit to install application.

- (A) A permit to install application as required by section 3734.05 of the Revised Code shall be submitted, and approved by the director, before the establishment or modification of the residual waste landfill facility is begun. Compliance with this rule shall not exempt any person from compliance with any other permit, license, or other obligation for authorization.
- (1) The permit to install application shall contain all the information required in paragraphs (B) and (C) of this rule, as specified below, so that the director can determine if the criteria set forth in rules 3745-27-02 and 3745-30-06 of the Administrative Code are satisfied. If Ohio EPA determines that information in addition to that required by paragraphs (B) and (C) of this rule is necessary to determine whether the criteria set forth in rules 3745-27-02 and 3745-30-06 of the Administrative Code are satisfied, the applicant shall supply such information as a precondition to further consideration of the permit to install application.
- (a) The permit to install application for a new residual waste landfill facility, to modify a residual waste landfill facility for a lateral expansion, or one that is submitted in response to division (A)(3), (A)(4) or (A)(5) of section 3734.05 of the Revised Code, shall contain all the information required in paragraphs (B) and (C) of this rule with the exception of paragraph (B)(5)(d) of this rule.
- (b) The permit to install application to modify a residual waste landfill facility for a vertical expansion to the upper limits of solid waste placement shall contain the following information:
- (i) All of the plan sheets specified in paragraphs (B)(1), (B)(2), (B)(3)(g), (B)(4), (B)(5) and (B)(6) of this rule.
 - (ii) The plan sheet showing the location of any proposed explosive gas control system, if necessary, specified in paragraph (B)(3)(f) of this rule.
 - (iii) Detail drawings, as necessary, specified in paragraph (B)(7) of this rule.
 - (iv) All the reports specified in paragraphs (C)(1), (C)(2), and (C)(7) of this rule.
 - (v) The subsurface investigation report, as necessary to provide supporting information for the stability analysis, specified in paragraph (C)(4) of this rule.
 - (vi) Stability analysis for bearing capacity, static stability, seismic stability and settlement specified in paragraphs (C)(5)(b) to (C)(5)(f) of this rule.
 - (vii) Calculations, as necessary, specified in paragraph (C)(6) of this rule.
 - (viii) The quality assurance/quality control plan and the final closure/post-closure care plan, specified in paragraphs (C)(9)(c) and (C)(9)(d) of this rule.
 - (ix) The letters, description, and list of permits specified in paragraphs (C)(10)(a), (C)(10)(b), and (C)(10)(c) of this rule.
- (c) The permit to install application to modify a residual waste landfill facility for a vertical expansion to the lower limits of solid waste placement shall contain the following information:
- (i) All of the plan sheets specified in paragraphs (B)(1) to (B)(6) of this rule.
 - (ii) Detail drawings, as necessary, specified in paragraph (B)(7) of this rule.

- (iii) All of the reports specified in paragraphs (C)(1), (C)(2), (C)(4), and (C)(8) of this rule.
 - (iv) Stability analysis for hydrostatic uplift, bearing capacity, static stability, seismic stability and settlement specified in paragraphs (C)(5)(a) to (C)(5)(e) of this rule.
 - (v) Calculations, as necessary, specified in paragraph (C)(6) of this rule.
 - (vi) The explosive gas monitoring plan, as necessary, specified in paragraph (C)(9)(b) of this rule.
 - (vii) The quality assurance/quality control plan, as necessary, specified in paragraph (C)(9)(c) of this rule.
 - (viii) The letters, description, and list of permits specified in paragraphs (C)(10)(a), (C)(10)(b), and (C)(10)(c) of this rule.
- (d) The permit to install application to modify a residual waste landfill facility for a change to the information specified in paragraph (C)(3) or (C)(8) of this rule shall discuss the change pursuant to paragraph (C)(3) or (C)(8) of this rule in addition to the following:
- (i) The summary specified in paragraph (C)(1) of this rule.
 - (ii) Any variance or exemption requests specified in paragraph (C)(2) of this rule.
 - (iii) If the change is to the authorized maximum daily waste receipt, the calculations showing gross volume and life specified in paragraph (C)(6)(a) of this rule.
 - (iv) The certification specified in paragraph (C)(10)(e) of this rule.
- (e) The permit to install application to modify a residual waste landfill facility, other than what is listed in paragraphs (A)(1)(b) to (A)(1)(d) of this rule, shall contain the information specified by paragraphs (B) and (C) of this rule that are affected by the change and shall incorporate any alterations that were previously approved for those components affected by the change.
- (2) The permit to install application shall contain detail engineering plans, specifications, and information that shall follow the format specified in paragraphs (B) and (C) of this rule. Detail shall be sufficient to allow clear understanding for technical review of the permit application, to provide assurance that the facility is designed and will be operated in accordance with Chapters 3745-30 and 3745-37 of the Administrative Code.
- (3) [Reserved.]
- (4) For regulatory review purposes, the initial application and any subsequent revisions to the application, shall be submitted in duplicate to the director with a third copy sent to the board of health of the health district where the facility is or will be located. Any revisions to the application must be accompanied by an index listing the change and the page(s) where the change occurred. Upon written request from Ohio EPA, the applicant shall submit two additional and identically complete copies of the revised application to the director and a notarized statement that, to the best of the knowledge of the applicant, the detail engineering plans, specifications, and information in the permit application are true and accurate.
- (5) Concurrent to submitting the permit to install application, the applicant shall also do the following:
- (a) Submit a disclosure statement to the office of the attorney general if required by rules 109:6-1-01 to 109:6-1-04 of the Administrative Code.

- (b) Submit to the division of Ohio EPA regulating air pollution control and water pollution control written notification of intent to establish or modify a residual waste landfill facility and a written request for information pertaining to any regulatory requirements under Chapter 3704. or 6111. of the Revised Code.
- (6) The permit to install application, notwithstanding any deficiencies, may be considered and acted upon if sufficient information is provided in the application for the director to determine whether the criteria set forth in rules 3745-27-02 and 3745-30-06 of the Administrative Code are satisfied.
- (7) Upon issuance of the permit to install, the director will send one copy of the permit to install and approved permit application to the board of health where the facility is or will be located, will return one copy to the applicant, and will retain two copies in Ohio EPA's files.
- (8) The permit to install shall remain in effect until the director has discontinued the post-closure care period, unless the permit has been revoked or terminated in accordance with rule 3745-27-02 of the Administrative Code.
- (B) Plan sheets. The following detail engineering plans, specifications, and information for residual waste landfill facilities shall be shown by means of drawings and narrative descriptions where appropriate. Minimum dimensions of the plan drawings shall be twenty-four inches by thirty-six inches. If a class IV residual waste landfill is proposed, any information which pertains only to requirements that are not applicable to a class IV landfill in accordance with paragraph (C)(3) of rule 3745-30-04 of the Administrative Code may be omitted from the detail plans, specifications, and information.
- (1) The detail engineering plan cover sheet, to be numbered sheet 1, shall contain the following information:
- (a) The name of the residual waste landfill facility.
 - (b) The precise geographic location and boundaries of the residual waste landfill facility and the area within a five-mile radius shown on a road map with a scale of one inch equals no greater than one mile.
 - (c) The name and address of the applicant and the residual waste landfill facility operator.
 - (d) The name and address of the owner(s) of the land to be used for the residual waste landfill facility.
 - (e) The name and address of the person who prepared the plans.
 - (f) Index of plan sheets.
- (2) Plan drawings, showing the following items located within the facility boundary or within one thousand feet of the limits of residual waste placement, shall contain all information in paragraphs (B)(2)(a) to (B)(2)(c) of this rule. Those items specified in paragraphs (B)(2)(b) and (B)(2)(c) of this rule shall be illustrated on a series of plan drawings which shall be numbered consecutively: 2A, 2B, 2C, etc. All items specified in an individual subheading shall be shown on the same plan drawing or a note shall be on the plan sheet stating the item does not exist within the specified distance of the limits of residual waste placement. An individual plan drawing may contain information specified in more than one individual subheading. A scale of one inch equals no greater than two hundred feet shall be used.
- (a) All plan drawings required by paragraph (B)(2) of this rule shall include the following:
- (i) The property lines of land owned or leased for the residual waste landfill facility as determined by a property survey conducted by a professional surveyor registered in Ohio.

- (ii) The limits of residual waste placement.
 - (iii) All occupied structures.
 - (iv) Existing topography showing streams, swamps, lakes, springs, wetlands and other surface waters, with a contour interval no greater than five feet.
 - (v) The north arrow.
 - (vi) The location of all survey marks.
 - (vii) The facility boundary.
- (b) The following based on publicly available information. For the purposes of this rule, "publicly available information" means written or published information from public or private sources that is reasonably available to the public, and includes but is not limited to visual surveys from public right-of-ways and public lands of the area surrounding the proposed residual waste landfill facility and/or written or oral surveys of the landowners around the proposed residual waste landfill facility.
- [Comment: As long as the applicant can document that a reasonable attempt was made to obtain the information, the application will be considered complete even if information is lacking (e.g. the written or oral survey is not responded to).]
- (i) All zoning classifications, property owners, and political subdivisions.
 - (ii) All man-made potential explosive gas migration pathways, including underground utilities (sewers, water lines, electric cables), field tiles, french drains, pipelines, and all other potential sources of explosive gas including oil wells and gas wells and other landfills. This requirement applies only to facilities that are required to have an explosive gas monitoring system by paragraph (C)(10) of this rule.
 - (iii) The limits of all regulatory flood plains.
 - (iv) National park of recreation areas, candidate areas for potential inclusion into the national park system, and any state park or established state park purchase areas.
 - (v) State nature preserves, state wildlife areas, national and state scenic rivers, any national wildlife refuge, special interest areas, research natural areas in the Wayne national forest, outstanding national resource waters, and exceptional coldwater habitats, or exceptional warmwater habitats as defined in Chapter 3745-1 of the Administrative Code.
 - (vi) All public and private water supply wells within two thousand feet of the limits of residual waste placement (use a scale insert if necessary).
 - (vii) The limits of all wellhead protection areas or ground water source water assessment and protection areas that have been endorsed or delineated by Ohio EPA for a public water supply.
 - (viii) Faults that have had displacement in Holocene time.
 - (ix) All surface and underground mining of coal and noncoal minerals and the angle of draw within two thousand feet of the limits of residual waste placement (use a scale insert if necessary) and all oil and gas wells.
 - (x) The limits of all aquifers declared by the federal government under the Safe Drinking Water Act,

42 U.S.C 300f et. seq. (2003), to be a sole source aquifer.

- (c) The limits of disturbance and the facility boundary. The limits of disturbance includes but is not limited to the limits of excavation, borrow areas, storage areas, staging areas, areas to be cleared and grubbed, and roadways.
- (3) Plan drawings, showing the following items located within three hundred feet of the limits of residual waste placement, shall contain all information in paragraphs (B)(3)(a) to (B)(3)(h) of this rule. Those items specified in paragraphs (B)(3)(a) to (B)(3)(h) of this rule shall be illustrated on a series of plan drawings which shall be numbered consecutively: 3A, 3B, 3C, etc. All items specified in an individual subheading shall be shown on the same plan drawing (unless specified otherwise). An individual plan drawing may contain information specified in more than one individual subheading. A scale of one inch equals no greater than two hundred feet shall be used.
- (a) All plan drawings required by paragraph (B)(3) of this rule shall include those items specified in paragraph (B)(2)(a) of this rule.
 - (b) The location of existing or proposed pipes and conduits, electric lines, french drains, roads, and railroads, and any easements bordering or within the proposed facility boundaries.
 - (c) The location of all subsurface investigation sites, which are any location where subsurface conditions are investigated by data collection and/or evaluation, including but not limited to borings, test pits, monitoring wells, piezometers, tensiometers, geophysical survey stations and soil gas survey stations, and all proposed ground water monitoring wells.
 - (d) Potentiometric maps of the uppermost aquifer system and all significant zones of saturation above the uppermost aquifer system (more than one plan sheet may be used).
 - (e) The location of any permanent ground water control structures.
 - (f) The location of any existing or proposed explosive gas control system.
 - (g) A diagram showing the phases of the facility.
 - (h) The land set aside for leachate treatment/pre-treatment facilities if required by paragraph (C)(3)(g) of rule 3745-30-07 of the Administrative Code.
- (4) Plan drawings for the entire residual waste landfill facility showing the grades of the following items shall be on plan drawings numbered consecutively 4A, 4B, 4C, etc. The scale on these drawings shall be one inch equals no greater than two hundred feet and contour intervals shall be no greater than five feet for slopes less than or equal to twenty-five per cent and ten feet for slopes greater than twenty-five per cent.
- (a) The horizontal and vertical limits of excavation proposed in the permit to install application, showing any areas where added geologic material necessary to comply with the isolation distance requirement in rule 3745-30-06 of the Administrative Code is to be placed.
 - (b) The horizontal limits and top and bottom elevations of the recompacted soil liner proposed in the permit to install application.
 - (c) The top elevation of the leachate collection layer, pipe inverts, and layout of the leachate collection and management system(s), including any leachate storage tanks, proposed in the permit to install application.

- (d) The horizontal limits and top and bottom elevations of all existing waste and waste placement proposed in the permit to install application. Limits and elevations of existing waste can be determined by surveys. If a residual waste landfill facility was not required or does not have survey results, the owner or operator shall provide justification of the limits shown in the permit to install application. If the authorizing document(s) does not show limits of existing waste placement, then the elevation of final waste placement shall be deemed to be two feet below the final grade shown, unless alternative limits are satisfactorily demonstrated to Ohio EPA.
 - (e) If a separatory liner/leachate collection system is required, its horizontal limits and top and bottom elevations.
 - (f) The horizontal limits and top and bottom elevations of the cap system; surface water control structures including permanent ditches to control run-on and runoff; and sedimentation ponds including the inlet and outlet; and any permanent ground water control structures proposed in the permit to install application.
 - (g) Establish a grid system with northings and eastings not more than five hundred feet apart.
- (5) Cross sections of the following shall be on plan drawings numbered consecutively 5A, 5B, 5C, etc. and shall clearly show the horizontal and vertical scale used:
- (a) The hydrogeology of the residual waste landfill facility intercepted by borings or other subsurface investigation methods showing the following:
 - (i) Existing topography.
 - (ii) The horizontal and vertical limits of excavation proposed in the permit to install application.
 - (iii) The horizontal limits and top and bottom elevations of any added geologic material.
 - (iv) The horizontal limits and bottom elevations of the recompacted soil liner, if any.
 - (v) Geologic stratigraphy and significant zones of saturation corresponding to information from the subsurface investigation.
 - (vi) The uppermost aquifer system and all saturated stratigraphic units above the uppermost aquifer system.
 - (vii) All subsurface investigation logs, and monitoring well and piezometer construction diagrams, intercepted by the cross-section.
 - (viii) Any permanent ground water control structures.
 - (b) The perimeter of the property showing the natural potential explosive gas migration pathways. This requirement applies only to facilities that are required to have an explosive gas monitoring system by paragraph (C)(10) of this rule.
 - (c) The length and width of the residual waste facility dividing the facility into quarters (i.e. three cross-sections in each direction) showing the following:
 - [Comment: Additional cross-sections may be submitted.]
 - (i) Existing topography.

- (ii) The proposed horizontal and vertical limits of excavation.
 - (iii) The horizontal limits and top and bottom elevations of all existing waste and all proposed areas of waste placement.
 - (iv) The horizontal limits and top and bottom elevations of the proposed cap system.
- (d) If the permit to install application is for a vertical expansion, show the following at an interval no greater than every three hundred feet of length and width of the vertical expansion:
- (i) Limits of existing waste with the date of the survey.
 - (ii) Approved and proposed limits of waste placement.
 - (iii) Separatory liner/leachate collection systems.
- (6) Plan drawings showing the systematic development of each phase of the residual waste landfill facility. Each drawing numbered consecutively 6A, 6B, 6C, etc. shall show the phase, all previously operated phases, the grid system established in accordance with paragraph (B)(4)(g) of this rule, and all of the following:
- (a) The location of any ground water monitoring wells, piezometers, explosive gas permanent monitors and punch bar stations and alarms (if required), leachate collection and management structures, or surface water control structures to be installed prior to accepting waste in the depicted phase.
 - (b) Extent of waste placement for that phase.
 - (c) The contours of any previously filled phases.
 - (d) The limits of final cover and intermediate cover on the previously filled phases.
 - (e) The contours of the bottom limits of solid waste placement for the depicted phase.
 - (f) Location of access roads for the depicted phase.
 - (g) The permanent and temporary measures to be utilized to control surface water run-on and runoff, erosion, and any temporary or permanent ground water control structures.
- (7) The following detail drawings shall be on plan drawings numbered consecutively 7A, 7B, 7C, etc.:
- (a) Recompacted soil liner, flexible membrane liner (if applicable), geosynthetic liner (if applicable), liner cushion layer, leachate collection layer, and filter layer (if required) including any engineered components that are constructed through the liner system, and the interface between phases.
 - (b) Cap system, including any engineered components that are constructed through the cap system, and surface water control structures.
 - (c) Relationship of the cap system to the leachate collection and management system and recompacted soil liner.
 - (d) All leachate collection and management system elements, including but not limited to the following:
 - (i) Leachate collection layer.
 - (ii) Collection pipes, including bedding media and boots.

- (iii) Filter layer, if required.
- (iv) Any sumps.
- (v) Any conveyance apparatus.
- (vi) Any storage tanks.

- (e) Permanent ground water control structures, if any.
- (f) Ground water monitoring well and piezometer construction.
- (g) Explosive gas control system elements, if any.
- (h) Separatory liner/leachate collection systems, if required.
- (i) Sedimentation pond and discharge structures, if any, and surface water run-on and runoff control structures.
- (j) A general process flow diagram which displays the processes, points of waste generation, and types of wastes generated.
- (k) Other necessary details, including but not limited to structural fill for berms and subbase, and the gas collection layer.

(C) Reports. The following information shall be presented in narrative form in a report with a table of contents and divided and labeled according to paragraphs and subparagraphs (C)(1) to (C)(10) of this rule. If a class IV residual waste landfill is proposed, any information which pertains only to requirements that are not applicable to a class IV landfill in accordance with paragraph (C)(3) of rule 3745-30-04 of the Administrative Code may be omitted from the narrative information.

- (1) Summary. Summary of the waste characterization and proposed landfill classification, the facility environs and a demonstration that the residual waste landfill facility will meet the criteria for permit approval by the director specified in rules 3745-27-02 and 3745-30-06 of the Administrative Code. The demonstration shall include a discussion of the facility's, owner's, or operator's compliance with any applicable authorizing document(s), the facility's limits of waste placement, and operational criteria.

[Comment: The discussion of the facility's, owner's, or operator's compliance status should compare the limits of waste placement specified in the facility's authorizing document(s) with the information on existing waste required by paragraphs (B)(4) and (B)(5) of this rule. The discussion should also include the facility's, owner's, or operator's compliance with the operational requirements in rule 3745-30-14 of the Administrative Code.]

- (2) Variance and exemption requests. Any variance or exemption requests from the requirements in rule 3745-27-12, 3745-27-15, 3745-27-16, 3745-30-09, 3745-30-03, 3745-30-04, 3745-30-05, 3745-30-06, 3745-30-07, 3745-30-08, 3745-30-10, or 3745-30-14 of the Administrative Code.
- (3) A residual waste characterization report, which shall at a minimum include the following:
 - (a) A listing of each residual waste proposed for disposal, and its approximate percentage of total residual waste disposal by weight and volume.
 - (b) The name, location, and contact person of each generator of residual waste to be disposed at the

landfill.

- (c) The residual waste sampling plan used to ensure that accurate and representative sampling of the waste, in accordance with paragraph (E) of rule 3745-30-03 of the Administrative Code, occurs prior to testing.
 - (d) A description of any mixing to be proposed for purposes described in either paragraph (C)(2) of rule 3745-30-03 of the Administrative Code or paragraph (E)(1)(f) of rule 3745-30-14 of the Administrative Code, and if for the former paragraph, any available information which will be required by that paragraph.
 - (e) Any methods used to stabilize the residual waste for compliance with paragraph (E)(1)(e) of rule 3745-30-14 of the Administrative Code.
 - (f) All laboratory results and supporting quality assurance/quality control documentation that fully characterizes each residual waste as specified in rule 3745-30-03 of the Administrative Code.
- (4) Site investigation. A hydrogeologic and geotechnical site investigation report(s), which shall at a minimum include the following:
- (a) Sufficient information to allow the director to determine the suitability of the site for residual waste disposal through the following:
 - (i) Identification and characterization of the hydrogeology of the uppermost aquifer system and all stratigraphic units that exist above the uppermost aquifer system.
 - (ii) Characterization of the site geology and hydrogeology to allow for the evaluation of the proposed design of the facility and to ensure that it will be in compliance with the requirements of rules 3745-30-06 and 3745-30-08 of the Administrative Code.

[Comment: The narrative portion of the hydrogeologic and geotechnical report focuses on the siting and ground water monitoring issues. The subsurface investigation portion of the report also addresses stability and design issues.]
 - (b) A description, based on publicly available information, of the regional geology and hydrogeology within one mile of the proposed residual waste landfill facility. This shall include, but is not limited to the following:

[Comment: Publicly available information regarding unstable areas is placed in a separate section located in the stability analysis in paragraph (C)(5) of this rule.]
 - (i) The identification and average yield of the regional aquifer system(s).
 - (ii) The direction of ground water flow in the regional aquifer system(s).
 - (iii) The identification of recharge and discharge areas, within one mile of the limits of solid waste placement, of the regional aquifer system(s).
 - (iv) Regional stratigraphy, including any regional stratigraphic or structural features, such as the bedrock surface, bedrock dip, or joint systems, that may influence the ground water flow system.
 - (v) A description of the regional geomorphology, including the location of surface water bodies,

flood plains, etc. and a description of any topographic features that may influence the ground water flow system.

(c) The following documents:

- (i) If any surface or underground mines were identified in accordance with paragraph (B)(2)(b)(ix) of this rule, a letter from the Ohio department of natural resources, division of mineral resources management or other appropriate agency verifying type, mining method, location, depth, and status.
 - (ii) Documentation of who owns the mineral rights below the residual solid waste landfill facility.
 - (iii) If any oil or gas wells were identified in accordance with paragraph (B)(2)(b)(ix) of this rule, a letter from the Ohio department of natural resources division of mineral resources management or other appropriate agency verifying type, location, depth and status.
 - (iv) A letter from the army corps of engineers agreeing with the wetland delineation, as depicted on the plan drawing with the information required by paragraph (B)(2)(a)(iv) of this rule, including if appropriate, that no wetlands are present, and if any wetlands are isolated.
- (d) A detailed description and analysis of the geology and hydrogeology under the proposed residual waste landfill facility. This description shall be based on data collected using appropriate subsurface investigatory methods such as borings, monitoring wells, tensiometers, piezometers, geophysical surveys, soil gas surveys, dutch cone penetrometers, and test pits. The description and analysis shall include, but is not limited to, the following:

[Comment: This information may also be used in the stability analysis required by paragraph (C)(5) of this rule.]

- (i) The consolidated and unconsolidated stratigraphic units from the ground surface down to the base of the uppermost aquifer system including the following:
 - (a) Characteristics, composition and features including the following:
 - (i) For unconsolidated stratigraphic units, the textural classification using the Unified Soil Classification System (USCS), described in ASTM D2487-00.
 - (ii) For consolidated stratigraphic units, the rock type(s) such as limestone, dolomite, coal, shale, siltstone, sandstone.
 - (iii) Color; moisture content; stratigraphic features such as layering, interbedding, or weathering; fracturing, jointing, and other types of secondary porosity; and any visible accessory minerals such as pyrite, calcite or gypsum.
 - (iv) Hydraulic conductivity.
 - (b) Thickness.
 - (c) Lateral extent.
 - (d) Depth and elevation.
 - (e) Variations in texture, saturation, stratigraphy, structure, or mineralogy exhibited by each stratigraphic unit that could influence the ground water flow or quality in the uppermost

aquifer system or any overlying zones of saturation.

- (ii) The local geomorphology at the proposed residual waste landfill facility including surface water bodies or topographic features that could influence the ground water flow or quality in the uppermost aquifer system or any overlying zones of saturation.
- (iii) Any local structural geologic features under the proposed residual waste landfill facility that could influence the ground water flow or quality in the uppermost aquifer system or any overlying zones of saturation.
- (iv) The uppermost aquifer system and all significant zones of saturation above the uppermost aquifer system. This description shall include the depth to, and lateral and vertical extent of, the uppermost aquifer system and all significant zones of saturation above the uppermost aquifer system. This description and analysis shall include but not be limited to the following:
 - (a) Temporal fluctuations in ground water levels over a period of time to determine the seasonal effects on ground water flow directions.

[Comment: Temporal fluctuations will also be used for determining the temporal high phreatic and piezometric surfaces, required to address stability issues.]
 - (b) An interpretation of the ground water flow system, including hydraulic conductivity, rate of flow, direction of flow, vertical and lateral components of flow, and interconnections between and within the uppermost aquifer system and any significant zones of saturation above the uppermost aquifer system. This interpretation shall be described in both narrative and map form.
 - (c) Identification and characterization of recharge and discharge areas within the boundaries of the proposed residual waste landfill facility. This shall include any relationships of ground water with seeps, springs, streams, and other surface water features.
 - (d) Yield of any significant zones of saturation and of the uppermost aquifer system(s).
- (v) If the applicant chooses, site specific justification that an unconsolidated aquifer system capable of sustaining a yield of one hundred gallons per minute for a twenty-four hour period (based on evidence gathered in accordance with paragraph (C)(4)(b) of this rule), is not located beneath the facility.
- (e) A description and quantification of the ground water quality of the uppermost aquifer system and all significant zones of saturation above the uppermost aquifer system. This shall include a description and the source of any ground water contamination located under the facility.
- (f) Subsurface investigation information. The following information will be used to prepare the site investigation report narrative required in paragraphs (C)(4)(b), (C)(4)(d), and (C)(4)(e) of this rule and the stability analyses required in paragraph (C)(5) of this rule. All submitted information shall be adequate to satisfy the performance standards of paragraphs (C)(4)(a) and (C)(5) of this rule. At a minimum the information shall include the following:

[Comment: The narrative portion of the hydrogeologic and geotechnical report focuses on the siting and ground water monitoring issues. The subsurface investigation portion of the report also address stability and design issues.]
- (i) Publicly available information collected and used to prepare the site investigation report narrative

required in paragraph (C)(4)(b) of this rule and the plan sheets required in paragraph (B)(2) of this rule. For the purposes of this rule, "publicly available information" means written or published information from public or private sources that is reasonably available to the public, and includes but is not limited to visual surveys from public right-of-ways and public lands of the area surrounding the proposed residual waste landfill facility and/or written or oral surveys of the landowners around the proposed residual waste landfill facility. At a minimum, the publicly available information includes the following:

[Comment: As long as the applicant can document that a reasonable attempt was made to obtain the information, the application will be considered complete even if information is lacking (e.g. the written or oral survey is not responded to).]

- (a) All well logs, and, where applicable, the decommissioning records, for public and private water supply wells within one mile of the proposed residual waste landfill facility.
 - (b) The Ohio department of natural resources division of water's county ground water resource maps or other appropriate regional hydrogeological data.
 - (c) Other publicly available information.
- (ii) Information collected at the site for each stratigraphic unit from the surface to the bottom of the uppermost aquifer system or to one hundred and fifty feet below the proposed liner system, whichever is shallower. The information will be used to prepare the site investigation report narrative required in paragraph (C)(4)(d) of this rule. This information shall be presented on logs appropriate for the subsurface investigatory method used. At a minimum that information shall include the following:

[Comment: The subsurface investigation conducted to provide the information required by this paragraph may be combined with the subsurface investigation conducted to provide the information required by paragraph (C)(4)(f)(v) of this rule.]

- (a) Location of the subsurface investigation site (northing and easting location coordinates).
- (b) Surface elevation surveyed to the nearest tenth of a foot.
- (c) Depth interval for each stratigraphic unit.
- (d) Field descriptions of the consolidated and unconsolidated units. At a minimum the information shall include the following:
 - (i) Textural classification for each unconsolidated stratigraphic unit using the Unified Soil Classification System (USCS), described in ASTM D2487-00.
 - (ii) Color.
 - (iii) Moisture content.
 - (iv) Stratigraphic features such as layering, interbedding, or weathering.
 - (v) Structural features such as fracturing or jointing.
 - (vi) Visible accessory minerals such as pyrite, calcite or gypsum.
 - (vii) Rock type such as limestone, dolomite, coal, shale, siltstone or sandstone.

- (viii) Thickness.
 - (ix) Variations in texture, saturation, stratigraphy, structure or mineralogy in each stratigraphic unit.
- (e) Depth to saturation.
- (f) Hydraulic conductivity, including the following:
- (i) For saturated unconsolidated stratigraphic units, at least one field measurement of hydraulic conductivity per saturated unconsolidated unit and one additional measurement per saturated unconsolidated unit for each twenty acres.
 - (ii) For unconsolidated stratigraphic units, from which an undisturbed sample can be collected, at least one laboratory measurement of vertical hydraulic conductivity per unconsolidated unit and one additional measurement per unconsolidated unit for each twenty acres.
 - (iii) For saturated consolidated stratigraphic units, at least one field measurement of hydraulic conductivity per saturated consolidated unit and one additional measurement per saturated consolidated unit for each twenty acres.
- [Comment: Most field methods for measuring hydraulic conductivity primarily evaluate lateral hydraulic conductivity, but also account for at least some effects of vertical hydraulic conductivity over the tested interval. In cases where laboratory measurements of vertical hydraulic conductivity are obtained for unconsolidated saturated units which are wholly or partially saturated, the vertical hydraulic conductivity should be compared to the field hydraulic conductivity to help evaluate the extent to which near-vertical fractures may be contributing to ground water flow through the unit. Hydraulic conductivity data should be interpreted with respect to the primary and secondary porosity features that are observed or are reasonably expected to occur in the investigated units, as well as the stratigraphic and structural features of the investigated units.]
- (g) Yield of any significant zones of saturation and of the uppermost aquifer.
- (h) If an unconsolidated aquifer system capable of sustaining a yield of one hundred gallons per minute for a twenty-four-hour period is suspected beneath the facility based on evidence gathered in accordance with paragraph (C)(4)(b) of this rule, and the applicant proposes to revise that finding, the applicant must provide adequate site-specific information on the suspected aquifer system to justify any requested revision, including but not limited to the yield of any aquifer systems below the uppermost aquifer system.
- (iii) Construction diagrams of all monitoring wells and piezometers. At a minimum the diagrams shall include the following:
- (a) The top-of-casing elevation used for water level measurement reference surveyed to the nearest hundredth of a foot.
 - (b) The boring diameter and the inside diameter of the well casing.
 - (c) The total depth of the boring and the total depth of the well.

- (d)* The screened interval depth and elevation, and the screen slot size.
- (e)* A description of all construction materials and depth intervals for all construction materials.
- (iv) Data gathered by sampling and analyzing the ground water from the uppermost aquifer system and all significant zones of saturation above the uppermost aquifer system. These samples shall, at a minimum, be analyzed for compounds listed in appendix C to rule 3745-30-08 of the Administrative Code.
- (v) Information collected at the site and used to prepare the stability analysis required in paragraph (C)(5) of this rule. This information shall be presented on logs appropriate for the subsurface investigatory method used. The subsurface investigatory method(s) and frequency must be adequate to find the unconsolidated stratigraphic units susceptible to bearing capacity failure, static stability failure, seismic stability failure, or settlement, at the site. The information shall be collected for each unconsolidated stratigraphic unit under the facility down to fifty feet below the proposed depths of excavation. At a minimum the information shall include the following:

[Comment: Ohio EPA recommends a frequency of one subsurface investigatory site for every four acres on a more or less uniform grid across the site. However, for sites which are located in areas where landslides or mass movements of unconsolidated material have occurred, or are underlain by complex geology with multiple unconsolidated stratigraphic units, more borings may be necessary pursuant to paragraph (A)(1) of this rule. Sites which are located in areas with a consistent stratigraphy, which is supported by comprehensive and reliable information from previous studies, may use a lower frequency of borings. Ohio EPA recommends against boring through cap, existing waste, or liner to obtain this information. Other methods or increased borings around the landfill footprint should be used.]

[Comment: Given the objective of finding thin unconsolidated stratigraphic units susceptible to bearing capacity failure, static stability failure, seismic stability failure, or settlement, the unconsolidated stratigraphic units should be logged continuously, and the subsurface investigation may also need to go deeper if publicly available data gathered pursuant to paragraph (C)(5)(g) of this rule or if field data gathered pursuant to paragraph (C)(4)(d)(i) of this rule indicate that deeper susceptible units exist.]

[Comment: The subsurface investigation conducted to provide the information required by this paragraph may be combined with the subsurface investigation conducted to provide the information required by paragraph (C)(4)(f)(ii) of this rule.]

- (a)* Northing and easting location coordinates.
- (b)* Surface elevation surveyed to the nearest tenth of a foot.
- (c)* Depth interval for each stratigraphic unit.
- (d)* Field descriptions of the unconsolidated units. At a minimum the information shall include the following:
 - (i)* Textural classification for each unconsolidated stratigraphic unit using the Unified Soil Classification System (USCS), described in ASTM D2487-00.
 - (ii)* Color.

- (f) Dry unit weight.
- (g) For unconsolidated stratigraphic units susceptible to bearing capacity failure, the effective drained or undrained peak shear strength parameters as appropriate using direct shear (ASTM D3080-03), unconsolidated undrained compression (ASTM D2850-03a), or consolidated undrained triaxial compression (ASTM D6467-99).
- (h) For unconsolidated stratigraphic units susceptible to static stability failure or seismic stability failure, the effective shear strength using ASTM D3080-03 (direct shear test) or ASTM D4767-02 (consolidated undrained triaxial compression test), or ASTM D6467-99 (torsional ring shear test).
- (i) For unconsolidated stratigraphic units susceptible to static stability failure or seismic stability failure due to excessive increase in pore pressures from construction and operation activities, the undrained shear strength using fully saturated samples shall be determined using ASTM D2850-03a (unconsolidated-undrained triaxial compression).
- (j) For unconsolidated stratigraphic units susceptible to settlement, the following parameters:
 - (i) The coefficient of consolidation.
 - (ii) The over consolidation ratio.
 - (iii) The pre-consolidation pressure.
 - (iv) The compression index.
 - (v) The swelling index.
 - (vi) The in situ void ratio.
 - (vii) The effective porosity.
- (vii) Any other data generated.
- (g) A detailed description of how the subsurface investigation was conducted including the following:
 - (i) The subsurface investigatory and sampling methods used in characterizing the geologic and hydrogeologic properties of the consolidated and unconsolidated stratigraphic units at the proposed residual waste landfill facility and an explanation of why the particular subsurface investigatory method(s) was chosen.
 - (ii) The analytical procedures and methodology used to characterize the unconsolidated and consolidated materials obtained from test pits and borings.
 - (iii) The methodology, equipment, and procedures used to define the uppermost aquifer system and all significant zones of saturation above the uppermost aquifer system, including the following:
 - (a) Well and piezometer construction specifications.
 - (b) Water level measurement procedures.
 - (iv) The methodology, equipment, and procedures used to determine the ground water quality in the uppermost aquifer system and any significant zones of saturation above the uppermost aquifer

system, including the following:

(a) Collection of ground water samples, including the following:

- (i) Well evacuation.
- (ii) Sample withdrawal.
- (iii) Sample containers and handling.
- (iv) Sample preservation.

(b) Performance of field analysis, including the following:

- (i) Procedures and forms for recording data and the exact location, time, and facility-specific considerations associated with the data acquisition.
- (ii) Calibration of field devices.

(c) Decontamination of equipment.

(d) Analysis of ground water samples.

(e) Chain of custody control, including the following:

- (i) Standardized field tracking reporting forms to record sample custody in the field prior to and during shipment and receipt at lab.
- (ii) Sample labels indicating a unique sample number, date, time, sample type, analytical methods, and any other information necessary for effective sample tracking.

(f) Field and laboratory quality assurance and quality control including the following, the number of which shall be enough to adequately demonstrate the accuracy of the analysis results:

- (i) Collection of duplicate samples.
- (ii) Submission of field-bias blanks.
- (iii) Potential interferences.

(5) Stability analysis. The following analyses establishing the stability of the sanitary landfill facility and the subsurface. The analyses shall provide sufficient information to allow Ohio EPA to sufficiently characterize the facility geology to allow for the evaluation of the proposed design of the residual waste landfill facility.

(a) The hydrostatic uplift analysis shall include the following:

- (i) The scope, extent, and findings of the subsurface investigation conducted in accordance with paragraph (C)(4) of this rule, as it pertains to hydrostatic uplift.
- (ii) A narrative description of the rationale used for the selection of the analysis input parameters.
- (iii) A description of the method used to calculate hydraulic uplift.
- (iv) A description of the assessed failure modes and conditions.

- (v) A narrative description of the rationale used for the selection of the critical cross section that, at a minimum, shall consider the worst case intersection of the highest phreatic or piezometric surface with the maximum excavation depth.
 - (vi) A plan drawing showing the greatest temporal high phreatic or piezometric surface (prepared in compliance with paragraph (B)(3)(d) of this rule) and the horizontal and vertical limits of excavation (prepared in compliance with paragraph (B)(4)(a) of this rule).
 - (vii) A profile view of the critical area that fully depicts the analysis input model including the following:
 - (a) The material boundaries.
 - (b) The applicable dimensions including but not limited to the depth of excavation, and depth to the temporal high phreatic and piezometric surfaces.
 - (c) The material types.
 - (d) The in situ unit weights and saturated unit weights.
 - (viii) The actual calculations and/or computer output.
- (b) The bearing capacity analysis for any vertical sump risers on the composite liner system shall include the following:
- (i) The scope, extent, and findings of the subsurface investigation conducted in accordance with paragraph (C)(4) of this rule, as it pertains to bearing capacity.
 - (ii) A narrative description of the rationale used for the selection of the analysis input parameters.
 - (iii) A description of the method used to calculate bearing capacity.
 - (iv) A description of the assessed failure modes and conditions.
 - (v) A profile view of the critical cross section that fully depicts the analysis input model including the following:
 - (a) The material boundaries.
 - (b) The temporal high piezometric surface.
 - (c) The material types.
 - (d) The in situ unit weights and saturated unit weights.
 - (vi) The plan view of the critical cross section including northings and eastings for the endpoints of the section.
 - (vii) The actual calculations and/or computer output.
- (c) The static stability analysis shall include the following:
- (i) The scope, extent, and findings of the subsurface investigation conducted in accordance with paragraph (C)(4) of this rule, and earthen materials testing program as it pertains to static stability.

- (ii) A narrative description of the rationale used for the selection of the analysis input parameters.
 - (iii) A description of the method used to calculate static stability.
 - (iv) An assessment of failure modes and conditions that at a minimum should include the following:
 - (a) Deep-seated translational and rotational failure mechanisms of internal slopes, interim slopes, and final slopes for drained conditions and, as applicable, undrained conditions.
 - (b) Shallow translational and rotational failure mechanisms of internal slopes and final slopes for saturated conditions and drained conditions.
 - (v) For each of the failure modes and conditions assessed, provide a narrative description of the rationale used for the selection of the critical cross sections for the internal slopes, interim slopes, and final slopes.
 - (vi) A profile view of the critical cross sections that fully depicts the analysis input model including the following:
 - (a) The material boundaries.
 - (b) The temporal high phreatic and piezometric surfaces.
 - (c) The material types.
 - (d) The in situ unit weights and, where applicable, the in situ saturated unit weights.
 - (e) The material shear strengths.
 - (vii) The plan view of the critical cross sections that includes the northings and eastings for the endpoints of the sections.
 - (viii) A summary of the results using two dimensional limit equilibrium methods or other methods acceptable to the director for each of the critical cross sections.
 - (ix) The actual calculations and/or computer output.
- (d) The seismic stability analysis demonstrating that the design meets the specifications in paragraph (C)(10) of rule 3745-30-07 of the Administrative Code and shall include the following:
- (i) The scope, extent, and findings of the subsurface investigation conducted in accordance with paragraph (C)(4) of this rule, and earthen materials testing program as it pertains to seismic stability.
 - (ii) A narrative description of the rationale used for the selection of the analysis input parameters.
 - (iii) A description of the method used to calculate the seismic stability.
 - (iv) An assessment of failure modes and conditions that, at a minimum, should include the following:
 - (a) Deep-seated translational and rotational failure mechanisms of final slopes for drained conditions.
 - (b) Deep-seated translational and rotational failure mechanisms of internal and interim slopes for drained conditions, if required by the director.

- (c) Shallow translational and rotational failure mechanisms of final slopes for drained conditions.
- (d) Liquefaction failure mechanisms of internal slopes, interim slopes, and final slopes.
- (v) For each of the failure modes and conditions assessed, provide a narrative description of the rationale used for the selection of the critical cross sections for the internal slopes, interim slopes, and final slopes.
- (vi) The profile views of the critical cross sections that fully depict the analysis input model including the following:
 - (a) The material boundaries.
 - (b) The temporal high phreatic and piezometric surfaces.
 - (c) The material types.
 - (d) The in situ unit weights and, where applicable, the in situ saturated unit weights.
 - (e) The material shear strengths.
- (vii) The plan views of the critical cross sections that include the northings and eastings for the endpoints of the sections.
- (viii) A summary of the results using two or three dimensional limit equilibrium methods or other methods acceptable to the director for each of the critical cross sections.
- (ix) The actual calculations and/or computer output.
- (e) The settlement analyses of the liner system, if any, shall include the following:
 - (i) The scope, extent, and findings of the subsurface investigation conducted in accordance with paragraph (C)(4) of this rule, and earthen materials testing program as it pertains to settlement.
 - (ii) A narrative description of the rationale used for the selection of the analysis input parameters.
 - (iii) A description of the method used to calculate the settlement.
 - (iv) A description of the assessed failure modes and conditions.
 - (v) A summary of the results.
 - (vi) The actual calculations of settlement and/or computer output.
- (f) If a separatory liner is used and is designed with a slope other than that specified by rule 3745-30-07 of the Administrative Code, the settlement analysis of the separatory liner shall include the following:
 - (i) A narrative description of the rationale used for the selection of the analysis input parameters.
 - (ii) A description of the method used to calculate the settlement.
 - (iii) A description of the assessed failure modes and conditions.
 - (iv) A summary of the results.

- (v) The actual calculations of settlement and/or computer output.
- (g) A description, based on publicly available information, of unstable areas within one mile of the limits of solid waste placement. For the purposes of this rule, "publicly available information" means written or published information from public or private sources that is reasonably available to the public, and includes but is not limited to visual surveys from public right-of-ways and public lands of the area surrounding the proposed residual waste landfill facility and/or written or oral surveys of the landowners around the proposed residual waste landfill facility. The description shall include the following:

[Comment: As long as the applicant can document that a reasonable attempt was made to obtain the information, the application will be considered complete even if information is lacking (e.g. the written or oral survey is not responded to).]

- (i) Any regional stratigraphic or structural features that are susceptible to bearing capacity failure, static stability failure, seismic stability failure, or settlement.
- (ii) Areas susceptible to liquefaction.
- (iii) Areas susceptible to mass movement such as landslides, debris slides and falls, and rock falls.
- (iv) Areas impacted by natural and human induced activities such as cutting and filling, draw down of ground water, rapid weathering, heavy rain, seismic activity and blasting.
- (v) Presence of karst terrain.
- (vi) Presence of underground mining.
- (vii) Areas susceptible to coastal and river erosion.

If the residual solid waste landfill facility is located in any of these areas, provide an analysis using the publicly available information and findings of the subsurface investigation conducted in accordance with paragraph (C)(4) of this rule, that demonstrates that the design meets the specifications in paragraph (C)(10) of rule 3745-30-07 of the Administrative Code.

- (6) Calculations. The following design calculations with references to equations used, showing site-specific input and assumptions that demonstrate compliance with the design requirements of rule 3745-30-07 of the Administrative Code:
 - (a) Calculations showing gross volume of the residual waste landfill facility in cubic yards and anticipated life in years.
 - (b) Recompacted soil liner thickness calculations, from appendix A to rule 3745-30-07 of the Administrative Code, if any.
 - (c) Calculations for the leachate head and flow.
 - (d) If leachate is to be recirculated, calculations for the amount of leachate to be recirculated and the leachate head and flow.
 - (e) Calculations for sizing any leachate storage tanks based on the volume generated after final closure.
 - (f) Pump size and pipe size calculations based on paragraphs (C)(6)(c) and (C)(6)(d) of this rule.

- (g) Pipe strength and pipe deflection calculations for the leachate collection and management system.
 - (h) An itemized written final closure cost estimate, in current dollars, based on the following:
 - (i) The cost of final closure of a residual waste landfill facility in accordance with rule 3745-27-15 of the Administrative Code.
 - (ii) A third-party conducting the final closure activities, assuming payment to its employees of not less than the applicable prevailing wage.
 - (i) An itemized written post-closure care cost estimate, in current dollars, based on the following:
 - (i) The cost of post-closure care of the phase(s) of the residual waste landfill facility in accordance with rule 3745-27-16 of the Administrative Code.
 - (ii) A third-party conducting the post-closure care activities, assuming payment to its employees of not less than the applicable prevailing wage.
 - (j) Soil erosion calculations.
 - (k) Calculations for sizing surface water control structures and verifying that scouring and crushing is minimized.
 - (l) Calculations for sizing the sedimentation basin, if any.
 - (m) Other relevant calculations.
- (7) Construction information. Discussion of the following construction information:
- (a) Installation of the items specified in rule 3745-30-08 of the Administrative Code.
 - (b) Demonstration of physical and chemical resistance as required in paragraphs (C) and (D) of rule 3745-30-07 of the Administrative Code.
 - (c) Compaction equipment slope limitations.
- (8) Operational information. State the following information, which if modified, could require a permit:
- (a) Technique of waste receipt, including but not limited to acceptance of baled waste or loose waste.
 - (b) Type of equipment to be used to construct, operate, and maintain the residual waste landfill facility.
[Comment: A change in equipment that decreases the capability of the owner or operator to handle the waste received, may be considered to endanger human health and may require a permit.]
 - (c) Authorized maximum daily waste receipt requested for the residual waste landfill facility. This requirement shall not apply to a residual waste landfill facility owned by a generator that exclusively disposes of residual wastes generated at one or more premises owned by the generator.
- (9) Plans. The following plans:
- (a) Ground water monitoring program as required in rule 3745-30-08 of the Administrative Code.
 - (b) The explosive gas monitoring plan as detailed in rule 3745-27-12 of the Administrative Code, if the facility disposes of residual waste as identified in paragraph (B)(3) of rule 3745-30-01 of the

Administrative Code and is not owned by a generator who disposes exclusively of residual waste generated on one or more premises owned by the generator.

- (c) The quality assurance/quality control plan for the engineered components addressing the following:
- (i) Surveying.
 - (ii) Calibration of testing equipment.
 - (iii) Sampling and testing procedures to be used in the field and in the laboratory, including but not limited to the following:
 - (a) Testing required by rule 3745-30-07 of the Administrative Code.
 - (b) Testing required due to design requirements that must be met.
 - (c) Voluntary testing.

Procedures shall establish testing frequency, parameters, and sample locations.

- (iv) Procedures to be followed if a test fails.
- (d) The "final closure/post closure care plan" as detailed in paragraph (A) of rule 3745-30-09 of the Administrative Code.
- (10) Notifications and certifications. An application for a new residual waste landfill facility or the expansion of an existing residual waste landfill facility shall include the following:
- (a) Letters of intent to establish or modify a residual waste landfill, which include a description of property and facility boundaries, shall be sent via certified mail or any other form of mail accompanied by a receipt to the following entities (copies of these letters of intent with copies of the mail receipts shall be included with the application):
 - (i) The governments of the general purpose political subdivisions where the residual waste landfill facility is located, i.e., county commissioners, legislative authority of a municipal corporation, or the board of township trustees.
 - (ii) The single county or joint county solid waste management district.
 - (iii) The owner or lessee of any easement or right of way bordering or within the proposed facility boundaries that may be affected by the proposed residual waste landfill facility.
 - (iv) The local zoning authority having jurisdiction, if any.
 - (v) The airport administrator and the federal aviation administration, if the residual waste proposed for disposal may serve as food for birds and if the placement of residual waste has occurred or will occur within ten thousand feet of any airport runway used by turbojet aircraft or within five thousand feet of any airport runway used by only piston-type aircraft. "Airport" is defined in rule 3745-27-01 of the Administrative Code.
 - (vi) The park system administrator, if any part of the facility is located within or shares the park boundary.
 - (vii) The conservancy district, if any part of the facility is located within or shares the conservancy

district boundary.

- (b) If the facility exclusively disposes of solid waste generated by the owner of the facility, a description of efforts at the original source of generation to prevent or reduce the generation of the residual solid waste, and efforts to recycle or reuse the residual solid waste in a manner other than disposal.

[Comment: The applicant can contact the office of pollution prevention at Ohio EPA for information on source reduction and recycling. The applicant can contact waste exchanges to find a user for the residual solid waste.]

- (c) A list of the permits, licenses, plan approvals, authorizations or other approvals that have been applied for and the local, state or federal office, or agency where application has been made.
- (d) Proof of property ownership or lease agreement to use the property as a residual waste landfill facility.

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CERTIFIED ELECTRONICALLY

Certification

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