

### **Standard Operating Procedures for Settlement Accommodation Plan (SAP)**

The following outlines the procedures for a landfill operator to submit a request for a minor permit modification to allow for settlement accommodation to permitted landfill grades. The department reserves the right to require a major modification, additional safe guards, or facility improvements for facilities that have odor, leachate management, storm water, landfill gas management, or other related issues. These additional requirements may be imposed by the department prior to or in conjunction with the submission of the Settlement Accommodation Plan (SAP), after its submission, or as a condition of its approval. Permit modifications should be submitted to the department's appropriate regional office. If the operator fills beyond the permitted SAP plan grades or is experiencing other significant compliance issues, the department may suspend the operator's approval to operate under a SAP.

- A. The SAP shall be prepared by a PA-licensed Professional Engineer (PE).
- B. The SAP shall include the following:
  1. Narrative explaining the SAP.
  2. A plan view of the affected area, including locations of settlement monuments, if any;
  3. Drawings with sections spaced at intervals no larger than 100 feet within the affected area, showing:
    - a. Bottom of waste grades and elevations (this should account for original bottom of waste grades in "piggybacking" scenarios);
    - b. Existing grades and elevations;
    - c. Permitted grades and elevations;
    - d. Boundaries of the "landfill overfill area." A "landfill overfill area" would be defined by the permittee, and would be a geographical section of the facility, typically larger than a cell;
    - e. Proposed "overfilled" grades and elevations;

- f. Proposed “overfilled” grades and elevations at 1 year and every 2 years thereafter until final permitted elevations are met or 5 years after final waste acceptance within the “landfill overfill area.”
    - g. Cross sections shall identify composition of waste (waste type, if known); and
    - h. Cross sections shall identify median age of waste in layers no larger than 20 feet (in thickness).
  4. Settlement calculations accounting for age, thickness, density, moisture conditions, and composition of waste. If settlement data exists, such data shall be provided in cross section and considered in the settlement calculations. Calculations shall show the predicted settlement (elevations) at 1 year and every 2 years thereafter until final permitted elevations are met or 5 years after final waste acceptance within the “landfill overfill area,” so that the rate can be tracked and validated based on the proposed settlement accommodation period and capping schedule at the facility.
  5. A slope stability analysis that considers the additional height of waste and steeper waste grades proposed in the SAP. If temporary and/or permanent capping is proposed along with or after the implementation of the SAP, such that capping materials are proposed for deployment over slopes steeper than those analyzed and approved in the original permit, a veneer stability analysis shall be conducted and submitted with the SAP. The stability analyses shall demonstrate that industry-accepted safety factors for global and veneer stability are achieved.
  6. A capping schedule that illustrates the proposed areas to be capped, approximate proposed capping dates (by year) for each area, approximate proposed dates (by year) each area will reach “overfill” grade, and approximate proposed dates (by year) each area is predicted to reach permitted final grade.
  7. An illustration and computation of the amount of waste that can be disposed of as a result of the settlement accommodation (i.e., capacity lost if not for the SAP).
  8. Statement expressly stating that the operator will adjust grades to the permitted grades prior to capping, and that the capping schedule submitted with the SAP shall be adhered to unless a modified SAP and capping schedule are submitted and approved by the Department. The annual operations report (AOR) shall be the method through which SAP progress/performance is reported to the department. Modifications to the SAP and

- capping schedule shall be submitted in conjunction with the AOR (refer to item 3, below).
- C. The AOR shall contain a SAP update, including: narrative; drawings, if applicable; and calculations concerning the status of the settlements realized relative to those proposed in the SAP, and a validation of the assumptions/estimates used in the SAP. Proposed versus actual settlement must be shown on 100 foot cross sections, successively each year. If changes in grades included in the SAP or the capping schedule are necessary, a minor permit modification must be submitted and approved by the department. Updates to the SAP and capping schedule shall be provided within the AOR based on the annual topographic survey and capacity report provided within the AOR. The bonding update shall consider the SAP.
- D. Temporary and Permanent Capping:
1. Operators may install temporary caps in overfilled areas, if approved by the department as a minor permit modification. If temporary caps do not meet the prescribed regulatory performance standards, they shall not be approved for permanent capping or conversion to permanent capping.
  2. If temporary caps are installed (e.g., exposed geomembrane caps [EGC]), that meet the prescribed regulatory performance standards (properties after exposure, if EGC), they may be converted to permanent capping systems after permitted grades are attained, if done in accordance with the approved SAP and capping design approved in the permit. The department will not require a permit modification for this scenario. However, the operator must demonstrate to the department that the properties of any previously exposed geosynthetics conform to performance standards prior to placement of cover material.
  3. Operators may install permanent caps meeting prescribed regulatory design requirements on overfilled areas if provided for in the approved SAP. If the subject areas do not settle to the permitted grades in accordance with the schedule set forth in the approved SAP, the operator must rectify the grades (e.g., cover and waste removal) and reinstall the permanent cap system, or receive approval from the department to modify the SAP schedule with appropriate justification and bonding.

## E. SAP Limitations:

1. During landfill operations, an operator of a landfill with an approved SAP design may exceed the 33% maximum grade limitation on the outer slopes of the landfill that will eventually represent final grade slopes to allow for settlement to occur, but shall not exceed 40%. Interim slopes in areas that exceed final permitted slopes may exist for up to 5 years following final waste acceptance in a landfill area if the operator can demonstrate that storm-water, landfill gas and leachate are managed in accordance with the respective storm-water, landfill gas and leachate management plans approved in the permit.
  
2. During landfill operations, an operator of a landfill with an approved SAP design may exceed final permitted elevations to allow for settlement to occur, but shall not exceed final permitted elevations by more than 10% of the total permitted waste thickness in that area. For computations, the total waste thickness may include waste that was deposited in underlying non-Subtitle D-compliant/non-PADEP-conforming landfill cells (i.e., for “piggy-backed cells”), but shall not include the proposed additional waste thickness afforded by the SAP. The operator shall demonstrate with supporting engineering analyses that the permitted final elevations will be achieved within 5 years after final waste acceptance within a landfill overfill area. Elevations that exceed final permitted elevations may exist for up to 5 years, or a shorter time if required by the permit, following final waste acceptance in a landfill area. Calculated bond amounts shall be consistent with the SAP and associated capping schedule.