

2012 - 2013

**Florida Department of Education
Curriculum Framework**

Program Title: Solid Waste Disposal Operation
Program Type: Career Preparatory
Career Cluster: Agriculture, Food & Natural Resources

PSAV	
Program Number	P440699
CIP Number	0744999900
Grade Level	30, 31
Standard Length	140 hours
Teacher Certification	WSP OPER @7 G WASTE MGMT 7 G
CTSO	N/A
SOC Codes (all applicable)	13-1041
Facility Code	264 http://www.fldoe.org/edfacil/sref.asp (State Requirements for Educational Facilities)
Targeted Occupation List	http://www.labormarketinfo.com/wec/TargetOccupationList.htm
Perkins Technical Skill Attainment Inventory	http://www.fldoe.org/workforce/perkins/perkins_resources.asp
Industry Certifications	http://www.fldoe.org/workforce/fcpea/default.asp
Statewide Articulation	http://www.fldoe.org/workforce/dwdframe/artic_frame.asp
Basic Skills Level	Mathematics: N/A Language: N/A Reading: N/A

Purpose

This program offers a sequence of courses that provides coherent and rigorous content aligned with challenging academic standards and relevant technical knowledge and skills needed to prepare for further education and careers in the solid waste disposal sector of the Agriculture, Food & Natural Resources career cluster; provides technical skill proficiency, and includes competency-based applied learning that contributes to the academic knowledge, higher-order reasoning and problem-solving skills, work attitudes, general employability skills, technical skills, and occupation-specific skills, and knowledge of all aspects of the solid waste disposal sector of the Agriculture, Food & Natural Resources career cluster.

The content includes but is not limited to the role of sanitary landfills in municipal solid waste management, mathematics for landfill operations, state regulations, proposed federal regulations; waste acceptance at the site, basics of site selection, waste decomposition, landfill economics, control processes for landfill gas and leachate; complying with permit requirements, operational techniques; and site closure and post closure considerations.

Program Structure

This program is a planned sequence of instruction consisting of one occupational completion point.

When offered at the postsecondary adult career and technical level, this program is comprised of courses which have been assigned course numbers in the SCNS (Statewide Course Numbering System) in accordance with Section 1007.24 (1), F.S. Career and Technical credit shall be awarded to the student on a transcript in accordance with Section 1001.44(3)(b), F.S.

The following table illustrates the program structure:

OCP	Course Number	Course Title	Course Length	SOC Code
A	EVS0055	Landfill Managers	140 hours	13-1041

Laboratory Activities

Laboratory activities are an integral part of this program. These activities include instruction in the use of safety procedures, tools, equipment, materials, and processes related to these occupations. Equipment and supplies should be provided to enhance hands-on experiences for students.

Special Notes

Accommodations

Federal and state legislation requires the provision of accommodations for students with disabilities as identified on the secondary student's IEP or 504 plan or postsecondary student's accommodations' plan to meet individual needs and ensure equal access. Postsecondary students with disabilities must self-identify, present documentation, request accommodations if needed, and develop a plan with their counselor and/or instructors. Accommodations received in postsecondary education may differ from those received in secondary education. Accommodations change the way the student is instructed. Students with disabilities may need accommodations in such areas as instructional methods and materials, assignments and assessments, time demands and schedules, learning environment, assistive technology and special communication systems. Documentation of the accommodations requested and provided should be maintained in a confidential file.

In addition to accommodations, some secondary students with disabilities (students with an Individual Educational Plan (IEP) served in Exceptional Student Education or ESE) will need modifications to meet their needs. Modifications change the outcomes or what the student is expected to learn, e.g., modifying the curriculum of a secondary career and technical education course. Note postsecondary curriculum cannot be modified.

Some secondary students with disabilities (ESE) may need additional time (i.e., longer than the regular school year), to master the student performance standards associated with a regular Occupational Completion Point (OCP) or a Modified Occupational Completion Point (MOCP). If needed, a student may enroll in the same career and technical course more than once.

Documentation should be included in the IEP that clearly indicates that it is anticipated that the student may need an additional year to complete an OCP/MOCP. The student should work on different competencies and new applications of competencies each year toward completion of the OCP/MOCP. After achieving the competencies identified for the year, the student earns credit for the course. It is important to ensure that credits earned by students are reported accurately. The district's information system must be designed to accept multiple credits for the same course number (for eligible students with disabilities).

Articulation

This program has no statewide articulation agreement approved by the Florida State Board of Education. However, this does not preclude the awarding of credits by any college through local agreements.

For details on statewide articulation agreements which correlate to programs and industry certifications, refer to http://www.fldoe.org/workforce/dwdframe/artic_frame.asp.

Standards

After successfully completing this program, the student will be able to perform the following:

- 01.0 Identify the basic characteristics of solid waste treatment.
- 02.0 Comply with Department of Environmental Protection rules and relevant state and federal statutes and local ordinances.
- 03.0 Perform mathematic calculations related to landfill operations.
- 04.0 Describe process of waste acceptance on site.
- 05.0 Describe the basics of site selection.
- 06.0 Describe the process of waste decomposition as it relates to waste management.
- 07.0 Participate in the analysis of a case study which details the economics of sanitary landfills.
- 08.0 Describe control processes for landfill gas and leachate.
- 09.0 Demonstrate knowledge of design requirements for sanitary landfills.
- 10.0 Demonstrate knowledge of standard operational techniques for sanitary landfills.
- 11.0 Demonstrate knowledge of the various types of equipment used in sanitary landfills.
- 12.0 Demonstrate knowledge of site closure methods and post-closure considerations.
- 13.0 Participate in field exercise which will familiarize the student with existing real life conditions prevalent in a sanitary landfill.

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**Florida Department of Education
Student Performance Standards**

**Program Title: Solid Waste Disposal Operation
PSAV Number: P440699**

**Course Number: EVS0055
Occupational Completion Point: A
Landfill Managers – 140 Hours – SOC Code 19-4091**

01.0 Identify the basic characteristics of solid waste treatment--The student will be able to:

- 01.01 Define solid waste.
- 01.02 List sources of solid waste.
- 01.03 Identify types of solid waste.
- 01.04 Identify physical and chemical compositions of waste.
- 01.05 Correlate typical source with locations and type of solid waste.
- 01.06 Describe landfill alternatives (reduction, separation, processing, waste to energy).
- 01.07 Describe characteristics of a sanitary landfill.
- 01.08 List the three most significant reactions that occur as a landfill matures.
- 01.09 List characteristics of hazardous waste.

02.0 Comply with Department of Environmental Regulation rules and relevant state and federal statutes and local ordinances--The student will be able to:

- 02.01 Demonstrate knowledge of the 1976 Resource Conservation and Recovery Act (RCRA) as amended 1984 [Vol. 53 No. 168 p. 33405 Federal Register].
- 02.02 List characteristics of an effective monitoring program.
- 02.03 Demonstrate knowledge of Florida Resource Recovery and Management Act of 1988 [Chapter 88-130 F.S.].
- 02.04 Demonstrate knowledge of permit requirements as it relates to leachate production and control.
- 02.05 Demonstrate knowledge of permit requirements as they relate to vector control, landfill gas and settlement.
- 02.06 Identify techniques for responding to site inspection under relevant rules and statutes.
- 02.07 Demonstrate knowledge of construction/demolition disposal techniques under relevant rules and statutes.
- 02.08 Demonstrate knowledge of tire processing/storage under relevant rules and statutes.

03.0 Perform mathematic calculations related to landfill operations--The student will be able to:

- 03.01 Convert such readings to real distance using a set of plans drawn to scale within a reasonable period of time.
- 03.02 Calculate the area of a square, rectangle and trapezoid within a reasonable period of time.
- 03.03 Demonstrate the ability to read and understand slopes.

- 03.04 Calculate the volume of a square, rectangular and trapezoidal figure within a reasonable period of time.
- 04.0 Describe process of waste acceptance on site--The student will be able to:
- 04.01 Identify wastes which are not acceptable to be put in the landfill.
 - 04.02 Demonstrate appropriate action which would prevent unacceptable waste from entering the landfill.
 - 04.03 Develop a plan to identify and manage the parts of the waste stream.
 - 04.04 List factors which determine waste acceptability.
 - 04.05 Define hazardous waste.
 - 04.06 Identify liquids which may be excluded from landfill.
 - 04.07 Describe management options for lead acid batteries, used oil, sludge and infectious waste.
 - 04.08 Define radioactive waste.
 - 04.09 Describe operational/equipment limitations which would prevent materials from going into the landfill and disposal options.
- 05.0 Describe the basics of site selection--The student will be able to:
- 05.01 List typical factors which may restrict or eliminate a potential location from consideration as a future landfill site.
 - 05.02 List regulations which may further restrict or eliminate a potential location from consideration.
- 06.0 Describe the process of waste decomposition as it relates to waste management--The student will be able to:
- 06.01 List categories of waste by method of decomposition and by products created.
 - 06.02 List factors which affect the rate of decomposition.
 - 06.03 List three events which will occur in a landfill as a result of decomposition.
 - 06.04 Define subsidence.
 - 06.05 Define differential settlement.
 - 06.06 Describe settlement control and how to determine whether settlement is occurring.
 - 06.07 Define landfill gas operation.
 - 06.08 Describe composition of landfill gas and gas generation cycle.
 - 06.09 Define landfill gas migration.
 - 06.10 List items that intercept migration routes.
 - 06.11 Describe techniques for recognition and control of landfill migration.
 - 06.12 Define leachate generation.
 - 06.13 List characteristics of leachate and describe leachate impact.
 - 06.14 List controlling factors in establishing leachate quality.
- 07.0 Participate in the analysis of a case study which details the economics of sanitary landfills--The student will be able to:
- 07.01 List expenses for a landfill.
 - 07.02 Describe the impact of new regulations on landfill costs.
 - 07.03 Estimate the cost of regulatory requirements.
 - 07.04 Describe what impact size has on landfill economics.

08.0 Describe control processes for landfill gas and leachate--The student will be able to:

- 08.01 Review decomposition, leachate and landfill gas characteristics.
- 08.02 Describe process for determining the potential for landfill gas.
- 08.03 Describe process for locating test wells.
- 08.04 List two types of test wells.
- 08.05 Describe monitoring process used to detect the presence of methane.
- 08.06 Describe control methods for landfill gas.
- 08.07 Define and list active control systems for landfill gas.
- 08.08 Define and list passive control systems for landfill gas.
- 08.09 Describe methods for landfill gas recovery and use.
- 08.10 Review definition of leachate.
- 08.11 Describe process which prevents leachate contact with groundwater.
- 08.12 Describe control process of surface water.
- 08.13 Define leachate migration.
- 08.14 List characteristics of migration.
- 08.15 Describe controls for surface discharge of leachate.
- 08.16 Describe methods for detecting leachate discharge to groundwater.
- 08.17 List and describe methods for control of leachate migration.
- 08.18 Describe remedial actions which may be taken where leachate is contaminating groundwater.
- 08.19 List seven types of leachate treatment systems.
- 08.20 Describe methods of leachate recirculation.
- 08.21 List representative leachate treatment technologies both biological and physical/chemical and give characteristics of each.
- 08.22 List characteristics of an effective groundwater monitoring program.

09.0 Demonstrate knowledge of design requirements for sanitary landfills--The student will be able to:

- 09.01 Describe how specifications are used in the construction of landfills.
- 09.02 List the four (4) basic types of plans necessary to show how a facility is to be developed and describe each one.
- 09.03 Demonstrate the use of plan scale in reading plans.
- 09.04 Define contour lines and demonstrate how they are used in plan reading.
- 09.05 List items essential to following facility plans.
- 09.06 Demonstrate three (3) methods of measuring horizontal distance determining compliance with a facility plan.
- 09.07 Identify the tools needed and describe the steps necessary to measure elevations.
- 09.08 Define slope verification.
- 09.09 Demonstrate the steps necessary to perform slope determination.

10.0 Demonstrate knowledge of standard operational techniques for sanitary landfills--The student will be able to:

- 10.01 Identify the three basic elements which dictate facility operations.
- 10.02 Demonstrate the ability to read plans.
- 10.03 Identify the elements of a design plan.
- 10.04 Define Operational Plan.

- 10.05 List items in the daily plan which will contribute to success of the operational plan.
 - 10.06 List two (2) major items an operator must control for a successful operation.
 - 10.07 Identify three (3) methods for controlling moisture.
 - 10.08 List three (3) methods for controlling run-off.
 - 10.09 List three (3) methods for controlling waste.
 - 10.10 Define confinement and list five (5) methods for facilitating confinement.
 - 10.11 Define compaction and list three (3) methods which will accomplish this.
 - 10.12 Demonstrate ratio of slope to compaction in an ideal landfill situation.
 - 10.13 Describe the advantages of using proper soil for use as cover.
 - 10.14 List three (3) types of cover and explain their functions.
 - 10.15 Demonstrate knowledge of the operation of a lined sanitary landfill.
 - 10.16 List (6) general items that must be accomplished to ensure a lined system will function.
 - 10.17 Describe operational problems which are exacerbated by wet weather and list four (4) solutions.
 - 10.18 Describe operational problems which are exacerbated by winter and list ten (10) coping strategies.
 - 10.19 Describe operational problems which are exacerbated by hard to handle wastes.
 - 10.20 List ten (10) hard to handle wastes and describe how they can best be handled.
 - 10.21 List six (6) failures of site operation principles which could result in environmental and health problems.
 - 10.22 List eight (8) major nuisance and health problems which may occur and discuss causes and potential controls that can be used to reduce the problem.
- 11.0 Demonstrate knowledge of the various types of equipment used in sanitary landfills--The student will be able to:
- 11.01 List nine (9) uses for equipment in the operation of a sanitary landfill.
 - 11.02 List six (6) types of machines and describe their advantages and disadvantages in the operation of a sanitary landfill.
 - 11.03 Describe maintenance of equipment program and list nine (9) items to be performed daily.
 - 11.04 Describe shutdown procedures.
 - 11.05 Describe a periodic maintenance program.
 - 11.06 Discuss the role of accurate records of maintenance in the decision to depreciate and replace equipment.
 - 11.07 List five (5) costs which are common in the use of equipment to maintain a sanitary landfill and define each.
 - 11.08 Demonstrate knowledge of bid process.
 - 11.09 List methods of equipment financing.
 - 11.10 Perform a total cost evaluation (TCE) of equipment considered for purchase or lease-purchase.
- 12.0 Demonstrate knowledge of site closure methods and post-closure considerations--The student will be able to:
- 12.01 List two (2) basic goals which must be met for successful site closure.
 - 12.02 List the six (6) steps in preplanning the closures.
 - 12.03 Describe the process which should occur three (3) months prior to closure.
 - 12.04 List four (4) steps which should occur at closure.

- 12.05 List give (5) things which need to be done three months after closure.
 - 12.06 Describe landfill gas control systems and explain their usefulness in long-term maintenance of a closed landfill.
 - 12.07 Describe leachate control system and explain the purpose of this system.
 - 12.08 Describe landfill gas and leachate monitoring systems and explain how the data gathered is used.
 - 12.09 Describe how surface water and settlement can effect the containment of waste in a closed landfill.
 - 12.10 Discuss some end uses for closed sites.
 - 12.11 Describe each layer in the final cover: buffer layer, gas channel, filter layer, barrier, topsoil and vegetation.
 - 12.12 List five (5) guidelines for constructing the final cover system.
 - 12.13 List six (6) desirable characteristics for vegetation on final cover.
 - 12.14 Describe how to determine soil suitability for planting and detail plant requirement for nutrients.
 - 12.15 Describe method for planting and protecting the seed.
 - 12.16 List seven (7) methods for controlling run-on and run-off on a closed site.
 - 12.17 List information normally recorded with the parcel of land in local county recorder's office which will be used by inspectors at closure to determine acceptability of closure.
 - 12.18 Describe methods of financing closure and post closure activities.
 - 12.19 Demonstrate knowledge of all site safety requirements including fire safety and first aid.
- 13.0 Participate in field exercise which will familiarize the student with existing real life conditions prevalent in a sanitary landfill--The student will be able to:
- 13.01 List four (4) aspects of site security.
 - 13.02 Discuss the importance of excluding unacceptable waste from the landfill.
 - 13.03 Describe the careful execution of a monitoring permit.
 - 13.04 List eleven (11) safety rules and discuss the importance of each.
 - 13.05 List ten (10) individual safety items which may be found necessary for landfill personnel to be appropriately equipped.
 - 13.06 Observe the size of working face at the operations field station.
 - 13.07 Observe access for vehicles at operations field station.
 - 13.08 Observe safety at work face at operation field station including traffic flow, spotter skills, equipment operation and safety equipment use.
 - 13.09 Observe landfill equipment available at operation field station.
 - 13.10 Observe compaction practices at operations field station.
 - 13.11 Observe waste types received at operations field station, including liquids, hazardous wastes, and special wastes.
 - 13.12 Observe slope of work face at operations field station.
 - 13.13 Observe nuisance conditions at operations field station including litter control, odors, noise.
 - 13.14 Observe cover at operations field station and classify as daily, intermediate and final.
 - 13.15 Observe drainage control (i.e. run-on, run-off, depressions, and erosions) at operations field station.
 - 13.16 Observe liner integrity at field operations site including vegetation, sand blanket, erosion, waste placement and traffic.

- 13.17 Observe other factors at field operations site including leachate seeps and vegetation screening.
- 13.18 Observe sampling of monitoring well at field operations site including the purging of a well.
- 13.19 Complete laboratory analysis form.
- 13.20 List five (5) recommended procedures for maintaining monitoring well.
- 13.21 Complete chain of custody record for equipment at operations field station.
- 13.22 Observe an area of the field operations site which will illustrate the type of soil which is best for different methods of operation.
- 13.23 List various types of soil and their best use.
- 13.24 Observe the use of equipment used in soil sampling.
- 13.25 Observe use of gas sampling equipment at operations field site and demonstrate understanding of the meter readings.