Section H: Irrigation

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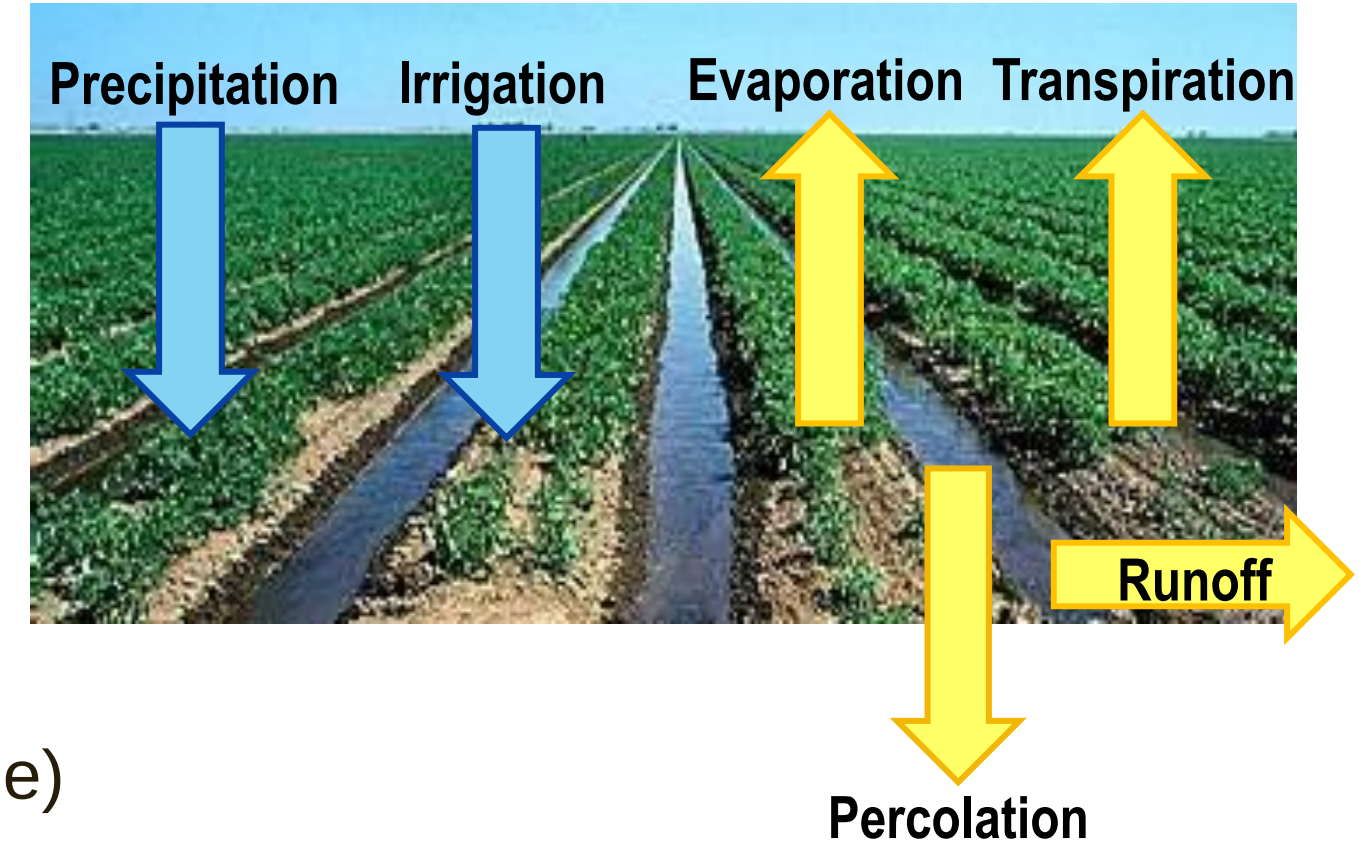
Section H Preview

- Describe the difference between “**gravity**” and “**pressure**” system
- Properly code the **type** of irrigation system used
- Understand irrigation and water management (IWM) terms and practices

Water Balance

- **Inflows**
  - Precipitation
  - Irrigation
- **Outflows**
  - Runoff - edge of field
  - Evaporation (soil surface)
  - Transpiration (plants)
  - Percolation (below the root zone)



Pressure vs. Gravity Systems

Pressure systems distribute water to the field through a series of pressurized pipes and nozzles.

Gravity irrigation systems distribute water at the field level by a free surface.

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Pressure

	Percent of irrigated acres	Percent of farms*
IN	99.3%	98.1%
MI	~100.0%	95.7%
OH	98.6%	97.2%

**percentage of farms that use irrigation*

Gravity

	Percent of irrigated acres	Percent of farms*
IN	0.7%	1.9%
MI	~0.0%	4.3%
OH	1.4%	2.8%

**percentage of farms that use irrigation*

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Irrigation System Type Codes

Section H, Item 1a

IRRIGATION SYSTEM TYPE CODES

	Pressure Systems
1	Hand-move
2	Solid or Permanent Set
3	Side Roll or Wheel Line
4	Center Pivot or Linear Move with impact sprinklers
5	Center Pivot or Linear Move low pressure spray nozzles below the tower and suspended above ground level
6	Center Pivot or Linear Move with spray or bubbler nozzles discharging on or near the ground
7	Big Gun
8	Low-Flow Irrigation (drip, trickle, or micro spray)
9	Other (Specify: _____)

	Gravity Systems
10	Siphon-Tube System from unlined ditches
11	Siphon-Tube System from lined ditches
12	Portal System from unlined ditches
13	Portal System from lined ditches
14	Any Poly-Pipe System
15	Gated-Pipe (not poly-pipe)
16	Improved Gated Pipe (surge flow or cablegation, not poly-pipe
17	Sub irrigation
18	Open discharge from well, pump, border large scale turned structures or large alfalfa valves
19	Other (Specify: _____)

Irrigation system type codes found in the Respondent Booklet on **page 38** to complete Section H Question 1

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Pressure Systems

Hand Move

Solid Set

Pressure Systems

Wheel line

Center Pivot - Impact Sprinklers

- Sprinklers **directly on** water line
- Higher pressure: **30+ psi**

Pressure Systems

Center Pivot - low pressure nozzles

- Sprinklers **below** water line, but **more than 2 ft.** above the ground
- Medium pressure: **30-15 psi**

Center Pivot - spray or bubbler

- Sprinklers **below** water line, but **less than 2 ft**. above ground
- Very low pressure: Less than **15 psi**

Center Pivot Prevalence

	Percent of irrigated acres	Percent of farms*
IN	92.8%	59.4%
MI	75.5%	32.9%
OH	55.2%	11.9%

**percentage of farms that use irrigation, IWMS 2023 publication*

Pressure Systems: Big gun/traveler

	Percent of irrigated acres	Percent of farms*
IN	1.0%	4.6%
MI	9.2%	11.1%
OH	8.3%	4.1%

**percentage of farms that use irrigation, IWMS 2023 publication*

Pressure Systems continued

Micro-drip

Subsurface Drip

Drip Tape

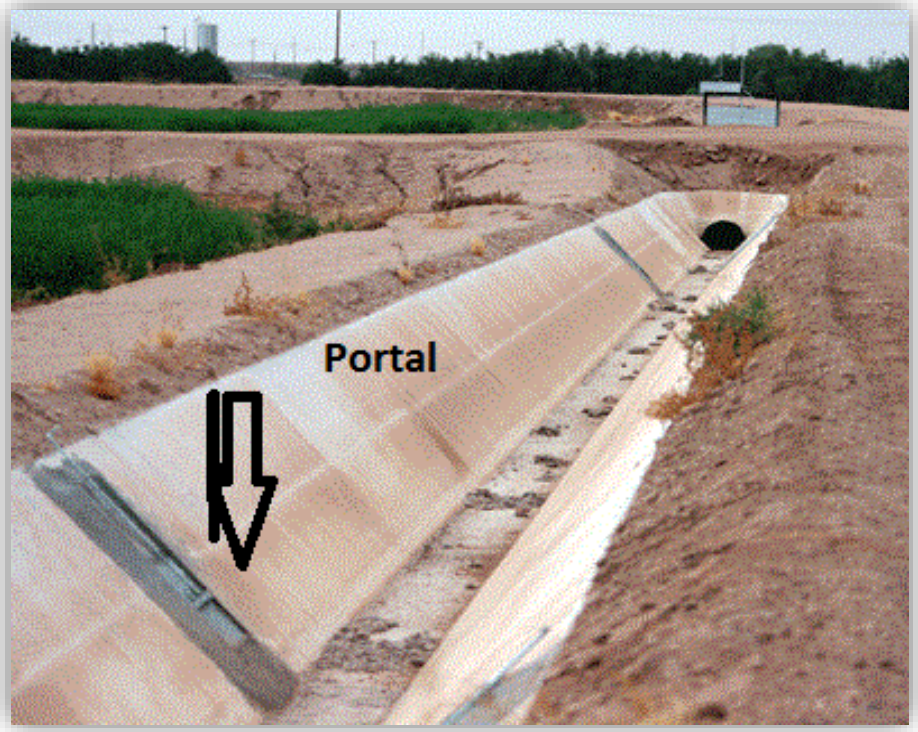
Micro-spray

Gravity Systems

Unlined Ditch with Siphon Tubes

Lined Ditch with Siphon Tubes

Gravity Systems



Lined Ditch With Portals

Unlined Ditch With Portals

Gravity Systems continued

Poly Pipe

Gated Pipe

Gravity Systems continued

Improved Gated Pipe (Surge or Cablegation)

Gravity Systems continued

Open Discharge

Type of Irrigation System Used

Eunumerator Action: Confirm if Irrigation was utilized on the selected field, Section C. Cropping History and Conservation Practices, Item j = Yes on pages 7,8,9. If no Irrigation was reported for any crop years in SECTION C, Go to SECTION I.

1. Now, I have some questions about the irrigation of this field for the [years of irrigation] crops(s).

   a. What type of irrigation system(s) were used to irrigate this field?
   [Show System Type Codes in RESPONDENT BOOKLET pg. 38. If more than 1 system was used, enter System Type Code for the system most-used during the irrigation season as the Primary System and the next most-used system during the season as the Secondary System. If only 1 type of system was used, report under the Primary System and then skip to 1b.]

	2024 SYSTEM TYPE	2023 SYSTEM TYPE	2022 SYSTEM TYPE
i. Primary Irrigation System ..... Code	1505	1506	1507
ii. Secondary Irrigation System ..... Code	1511	1513	1515

   b. Were any major changes made to the way the field was irrigated during the period from 2022 to 2024 (INCLUDE irrigation system type, source of water, and major changes to scheduling or monitoring)? ..... Yes = 1, No = 3 — 1593

Enumerator Action: If an irrigation system reported in 1a for any year is a gravity system (code 10 - 19) then continue; else , Go to Item 4.

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If the Irrigation System was a Gravity System

2. What gravity irrigation system source was used? .....

1	furrow
2	border
3	basin
4	contour levee
5	meadow or wild flood

	2024	2023	2022
Primary System Code	1508	1509	1510
Secondary System Code	1517	1518	1519

Furrow

Border

Basin

If the Irrigation System was a Gravity System

2. What gravity irrigation system source was used? .....

1	furrow
2	border
3	basin
4	contour levee
5	meadow or wild flood

	2024	2023	2022
Primary System Code	1508	1509	1510
Secondary System Code	1517	1518	1519

Contour Levee

Wild Flood

Rice-Specific Questions

3. In which of the following years (2024, 2023, or 2022.)

		2024	2023	2022
a. Did you use mid-season drainage?	Yes = 1 No = 3	0882	0883	0884
b. Did you practice winter flooding?	Yes = 1 No = 3	0885	0886	0887
c. Did you practice alternate wetting and drying?	Yes = 1 No = 3	0888	0889	0890

4. In 2024, 2023, and 2022 which of these water management approaches best describes the irrigation water management of the selected field? .....

	2024	2023	2022
Code	0891	0892	0893

1	Permanent flooding
2	Pinpoint flooding
3	Delayed flooding
4	None of the above

Irrigation Water Runoff

5. Irrigation runoff from the field is primarily? .....
[See Respondent Booklet pg. 38 for codes.]

	2024	2023	2022
Code	1536	1537	1538

Section H, Item 5.....

IRRIGATION RUNOFF CODES

1	Retained at the end of the field with no re-use
2	Retained at the end of the field and re-used to irrigate on the farm
3	Collected in evaporation ponds on the farm
4	Drained from the farm
5	There is no runoff

Irrigation runoff codes are in the respondent booklet, **page 38**

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Irrigation Application Amount

		2024	2023	2022
6. If the amount of water applied is known, what was the total amount of water applied?	Inches per Acre	3407	3408	3409

		Amount / Acre
7. If there is a limit on water availability or supply for this field, what is the maximum annual application amount? [If no maximum annual application amount, enter 99.]	Inches	1541

- The amount of water available to a field may be limited by an irrigation district
  - Expect many “99” answers

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If the Irrigation System was a Pressure System

Enumerator Action:	If irrigation system reported in Item 1a, for any year, is a pressure system (Code 1 - 9), then Continue, else Go to Item 10.

		Code
9.	Did you take steps to evaluate or improve the uniformity of water application of your pressure system?	Yes = 1 No = 3	1551

Q13: Determining When to Irrigate

13. Which of the following are ways you decide when to irrigate? (Select all that apply)		Code
a. When plants appear dry or stressed	Yes = 1 No = 3	1560
b. When indicated by the calendar or schedule of field operations	Yes = 1 No = 3	1561
c. When water is available	Yes = 1 No = 3	1562
d. On the soil surface appearance or feel, or current climate observations	Yes = 1 No = 3	1563
e. When a target "dryness" value, such as inches depleted, centibars of tension, percent remaining, etc, from soil moisture monitoring devices is reached	Yes = 1 No = 3	1564
f. When a target water use value, such as inches of evapotranspiration (ET) since last irrigation, from root zone water budget and current weather data (California Irrigation Management Information System (CIMIS)) is reached	Yes = 1 No = 3	1568
g. When a target measured plant stress level, such as pressure bomb, canopy temperature, etc., is reached	Yes = 1 No = 3	1569

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Determining How Long to Irrigate

14. Which of the following are ways you decide how long to apply water at each field location (e.g., set time for manually moved or fixed systems, or speed of automated pressure systems, like a center-pivot)? (Select all that apply)

		Code
a. Observe when the right amount of time has passed, the furrows or border checks appear to be adequately wet, or the water has reached the end of the field	Yes = 1 No = 3	1574
b. Run times based on past experience and schedule of required field operations	Yes = 1 No = 3	1575
c. When the target amount of water (inches or gallons) is applied, the system moves automatically or manually, or is shutoff. (May be calculated from the run time and flow rate.) ...	Yes = 1 No = 3	1576
d. Field collected data such as from an observation well or soil moisture probe	Yes = 1 No = 3	0895

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Determining How Much Water is Applied

15. Which of the following are ways you determine how much water is applied?
(Select all that apply)

		Code
a. Irrigation district record, report, or bill	Yes = 1 No = 3	1579
b. A flow measuring device	Yes = 1 No = 3	1580
c. Measuring the flows to the field	Yes = 1 No = 3	1582
d. Measuring the flows at the water supply	Yes = 1 No = 3	1583
e. The runtime plus a known system application rate	Yes = 1 No = 3	1584
f. A pump test flow rate and runtime	Yes = 1 No = 3	1585

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Determining How Much Water is Removed by Crop

		Code
16. Do you know how much water the crop(s) removed from the soil? [If Yes, Continue. If No, Go to Item 18.]	Yes = 1 No = 3	1587

17. How did you determine how much water the crop(s) removed from the soil? (Select all that apply)

		Code
a. The current (real time) climate-based measurements such as CIMIS	Yes = 1 No = 3	1588
b. Historic ET data through CIMIS, Cooperative Extension publications, etc	Yes = 1 No = 3	1589
c. Tracking root zone soil moisture changes with electronic probes or other devices	Yes = 1 No = 3	1590

Practices to Improve Water Applications

19. If other practices were used to improve water applications, what were the three primary practices?

List up to three practices. [See Respondent Booklet pg. 38 for codes.]

1565	1566	1567

Section H, Item 19

PRACTICES TO IMPROVE WATER USE APPLICATIONS

1	Ditch Improvement	8	Field Borders/Run Off Control
2	Water Leveling	9	Angle Dikes
3	Pipe Drop	10	Stale Seed Bed
4	Overflow Gate	11	Tail Water Recovery
5	Furrow Dams (check dam)	12	Alternating Row Furrows
6	Underground Pipes	13	Irrigation Scheduling
7	Water measurement and/or flow		

- Codes for Q19 are on **pg. 38** of the Respondent Booklet

Reminders

- Don’t leave Yes/No questions blank
- Probe for additional information to clarify
- Leave notes when the respondent provides additional information or the situation is complex

Questions?

1. What type of irrigation system is most common in the Great Lakes region? **Pressure** or **gravity**?
   - **Pressure**

2. Which pressure irrigation system accounts for **more than half** of irrigated acres in IN, MI, and OH?
   - **Center Pivot System**

3. **What page** of your respondent booklet contains codes for Section H?
   - **Page 38**


Questions?

Irrigation Water Quality – Salinity & Nitrogen

	Code
8. Has the irrigation water supply been tested for either nitrogen content or salinity? [If Yes — Continue. If No — Go to Question 9.] ..... Yes = 1 No = 3	1542

Please provide the following information for the last test performed on this field:

	Salinity Test Value	Unit (1 ppm, 2 mg/L, 3 microseimens/cm)	Nitrate-Nitrogen (NO_3 - N) Test Value	Unit (1 ppm, 2 mg/L)
a. Surface water	1543	1544	1547	1548
b. Ground water	1545	1546	1549	1550

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General System Information

10. Which of the following are sources of your irrigation water? (Select all that apply)

		Code
a. Well	Yes = 1 No = 3	1552
b. Irrigation district	Yes = 1 No = 3	1553
c. River or stream	Yes = 1 No = 3	1554
d. Other Specify: 0894 _____	Yes = 1 No = 3	1555

[If Item 10b = 1, Continue, Else — Go to Item 12.]

11. Which one of the following best describes how you receive your water from the irrigation district?

		Code
a. I receive it when it's my turn	Yes = 1 No = 3	1556
b. I receive it by calling one or more days ahead of when I want it	Yes = 1 No = 3	1557
c. I receive it anytime I want it	Yes = 1 No = 3	1558

12. Does the source of your water limit your selection of irrigation methods, such as a conversion to a pressurized system?

	Code
Yes = 1 No = 3	1559

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Other Reasons for Irrigating

18. In addition to replacing water used by the crop, which of the following were reasons you irrigated? (Select all that apply)

		Code
a. Pre-planting irrigation to refill root zone	Yes = 1 No = 3	1592
b. Apply moisture for seed germination and emergence	Yes = 1 No = 3	1594
c. Freeze protection or crop cooling	Yes = 1 No = 3	1595
d. To apply fertilizer or other chemicals	Yes = 1 No = 3	1596
e. Ground water recharge	Yes = 1 No = 3	1597

Other General Irrigation Information

		Code
20. During and after each irrigation, do you defer grazing animals from the field until soil is no longer saturated?	Yes = 1 No = 3	3410
21. Do you manage irrigation to address salinity problems in this field?	Yes = 1 No = 3	1539

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