



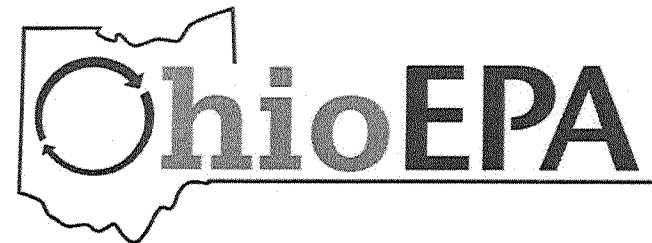
OHIO C&DD FACILITIES HYDROGEOLOGIC EVALUATION

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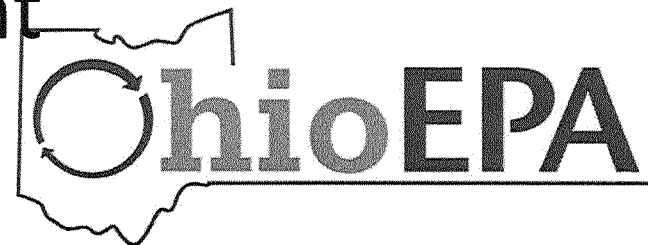
Background

Why was the study necessary?



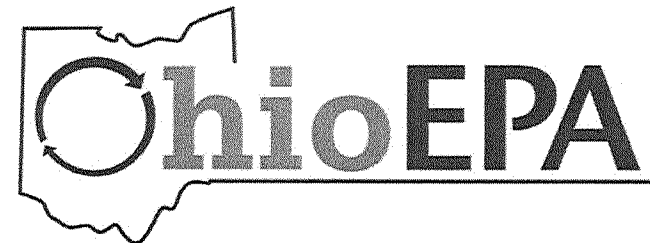
Ohio's 1996 C&DD Ground Water Requirements

- Monitoring only required for certain hydrogeologic settings.
- No requirement to determine impact of facility on ground water.
- Orders required to assess and correct contamination.
- Authority to regulate either with Ohio EPA or the Local Health Department



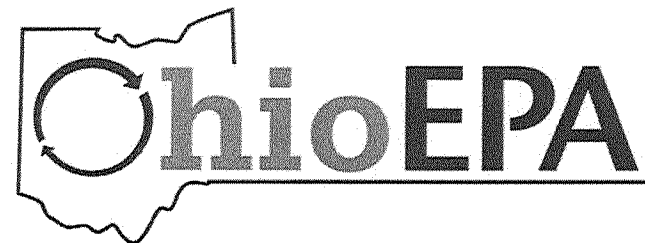
2005 revisions to Ohio C&DD Law

- Significantly revise GW requirements
- More stringent (Assess. & Corr. Act.)
- Links GW Mon. to leachate results
- Adds siting criteria
 - 500' from PWS
 - 5' isolation from aquifer
- Revise Rules



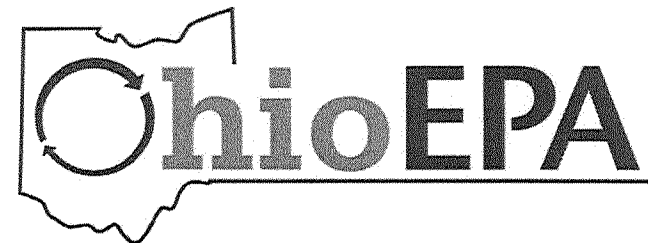
Information Needed to Revise Rules

- What are impacts to ground water quality from C&DD facilities?
- Does the facility setting make a difference?
- Is a liner and leachate collection system (LCS) necessary?
- What is the leachate quality?



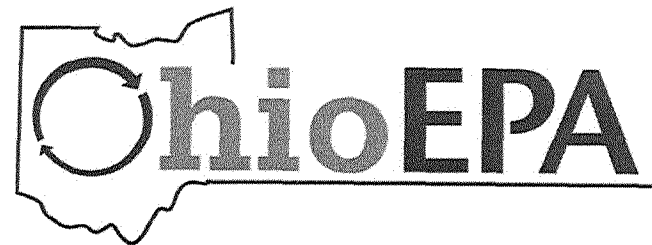
Two Studies

- Leachate study. 2008
- Hydrogeologic Evaluation of C&DD facilities.
Originally compiled in 2008: last revised in August 2011.



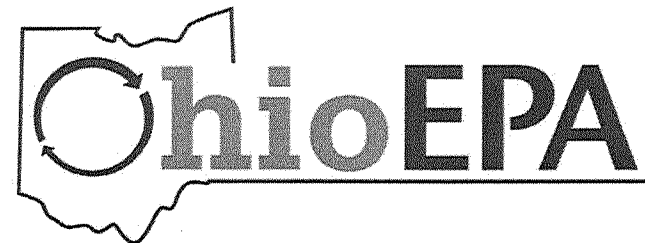
Performing the Study

You want me to do what?!



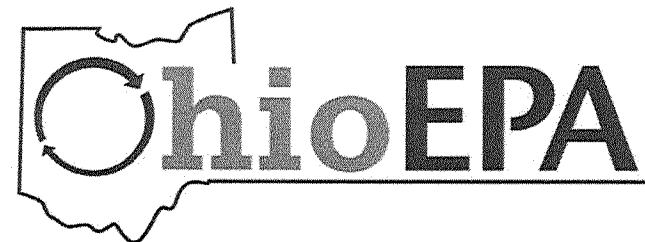
Evaluate All Licensed and Closed Ohio C&DD Facilities

- Determine Hydrogeologic Conditions.
- What is Impact on GW Quality in Ohio.
- Look at the Engineering.



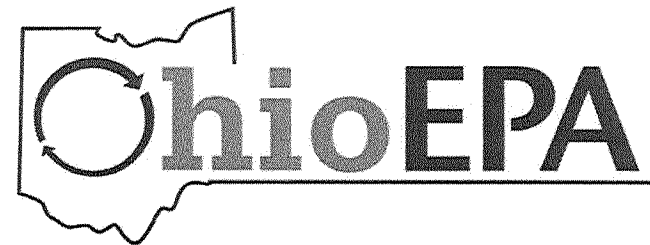
Hydrogeologic Conditions:

- Separation Distance
- Sensitive settings:
 - Glacial sand & gravel deposits
 - Known karst features
 - Shallow fractured bedrock
 - Drinking Water Source Protection Areas
 - Sole Source Aquifers
 - Areas with less than 5' separation from bedrock



Ground Water Quality

- Gather the existing ground water quality data.
- Evaluate upgradient against downgradient data.
- Determine if there is an indication of a release.



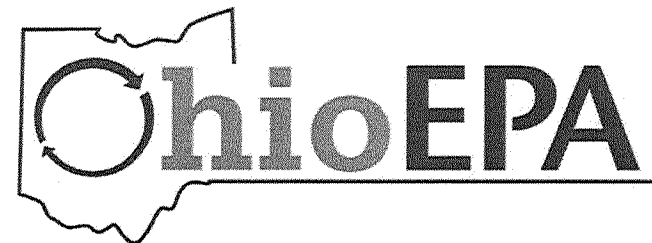
Indication of a Release

- ONLY INDICATION OF RELEASE, NOT CONFIRMED
- VOCs indicated (some only 1 round)
- Orders of magnitude difference between U/D
- NH₃ / NO₃ concentrations > 2 ppm (no other source nearby)



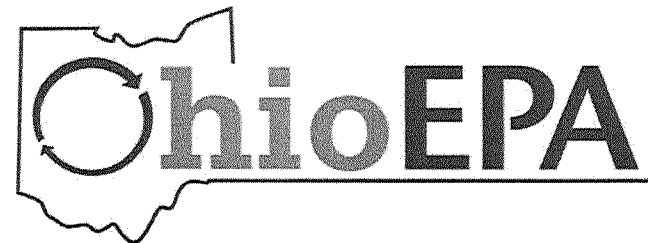
Engineering Controls

- Liner
- Leachate Collection System (LCS)



Data Collection and Evaluation Criteria

- 99 Facilities
- Ohio EPA/Local Health Departments – different authorities
- Site Characterization Report - convey nature of site and hydrogeology beneath.
- Ann'l. GW Reports: GW quality; how changed over time
- Public Information (water well logs, geologic maps, etc.)
- Information available varies greatly from site to site.



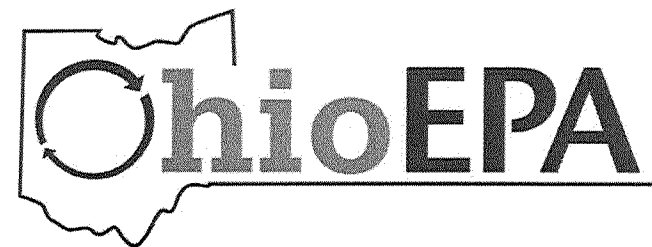
Substantially Complete Data Sets

- GW quality data (analyze key constituents).
- Information related to engineering components.
- Known isolation distance.
- Description of geology under site including depth to ground water.
- Characterization of hydrogeologic conditions.



Results

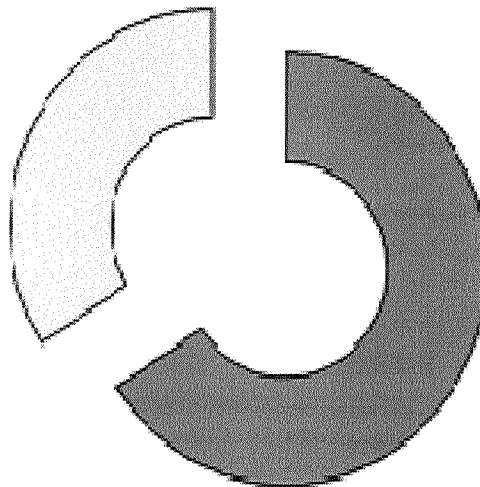
No surprises!



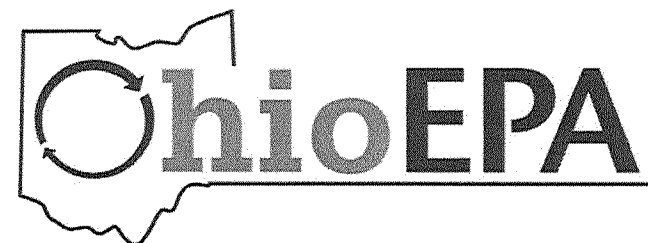
Overall

**47 C&DD facilities with substantially
complete data sets**

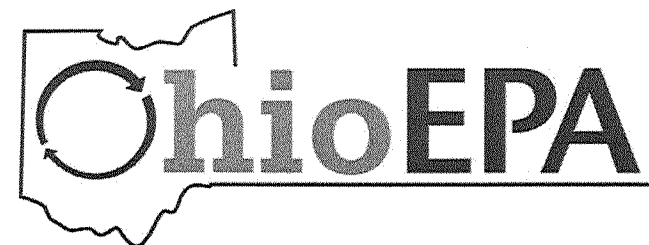
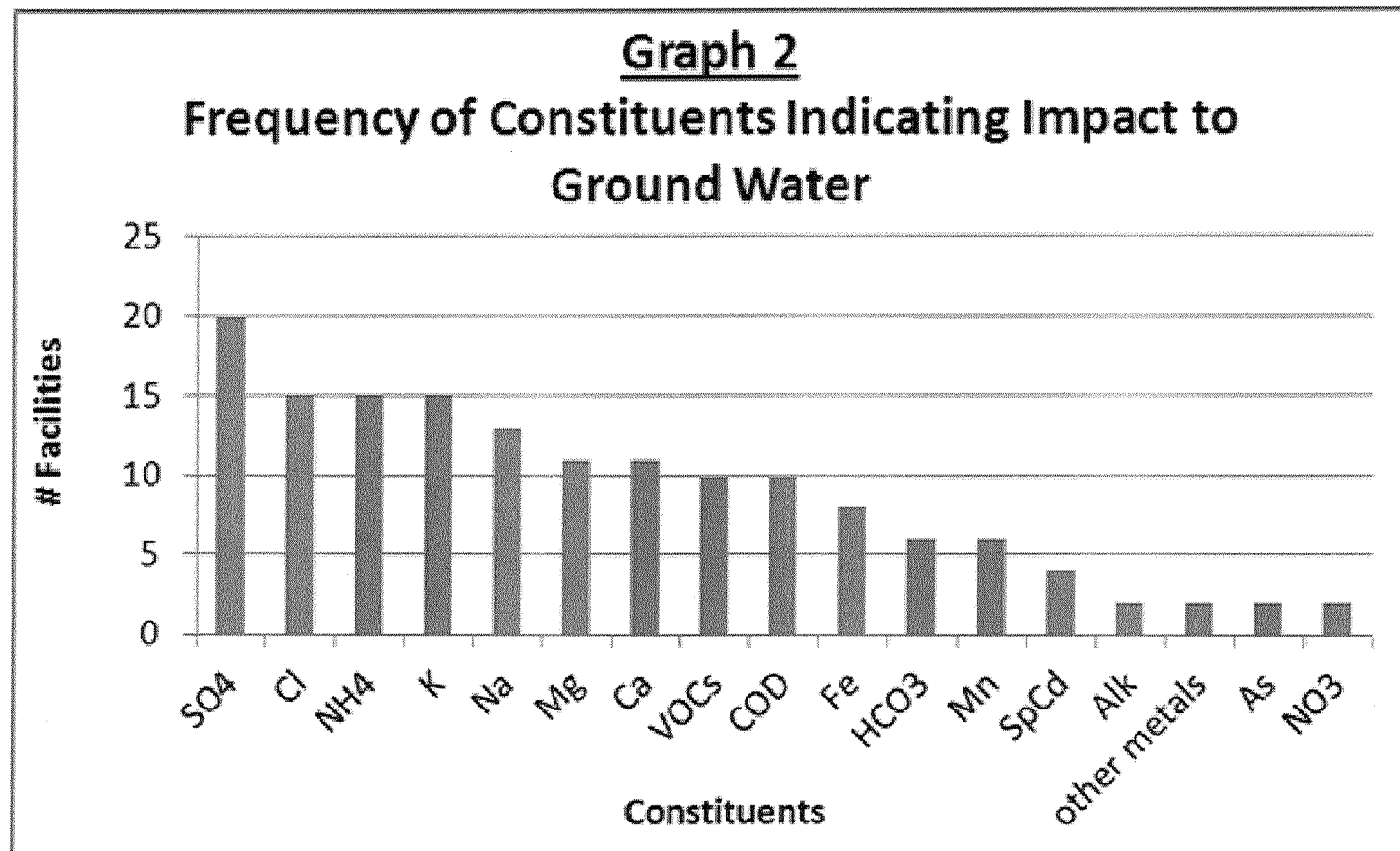
Facilities w/ NO GW
Impact Indicated: 17



Facilities w/ GW
Impact Indicated: 30

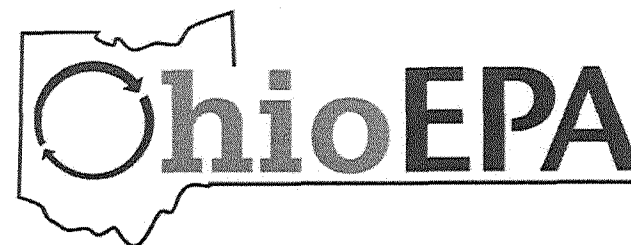


Contaminants



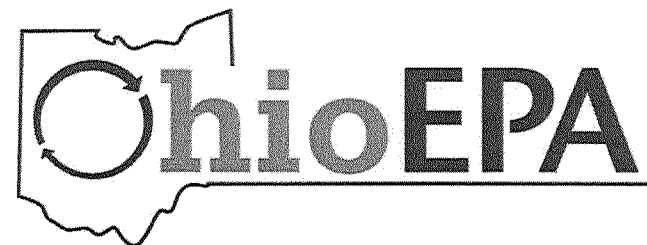
Comparison of Separation Distance and GW impact

Separation Distance	With indication of GW impact	Without indication of GW impact	Percent with indication of impact
0 feet	18	3	86%
>0 to 5 feet	6	1	86%
>5 to 10 feet	4	4	50%
>10 to 15 feet	0	0	n/a
>15 to 20 feet	0	2	0%
>20 to 25 feet	0	2	0%
>25 feet	0	3	0%
Unknown	2	2	50%



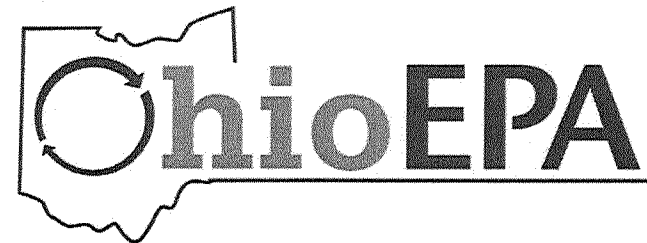
Sensitive Settings

- 31 C&DD facilities within or over Sensitive Settings.
- 25 (80%) have indication of impact to GW.
- 22 with an indication of contamination have less than 5' of separation and 18 of these have no engineering.
- Of 17 sites w/no impact on ground water only 6 are in a sensitive setting.



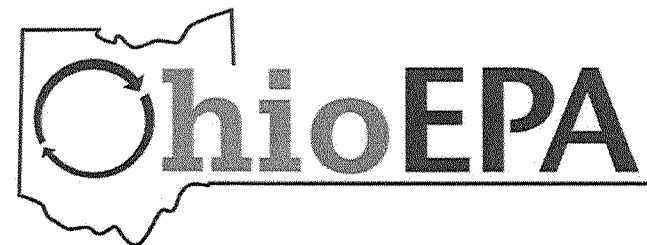
Impacts Relative to Engineering Controls

- 23 of the 30 sites indicating a ground water impact have no engineering controls.
- 11 of the 17 sites with no indication of ground water impact have engineering controls.



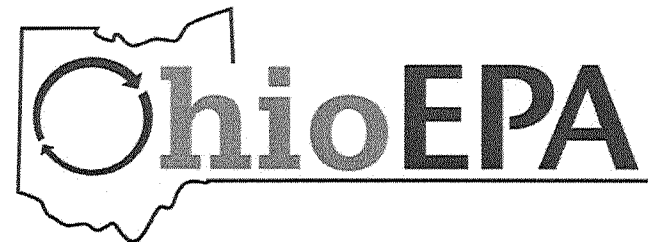
Conclusion

- Setting and Engineering important in predicting impacts of C&DD facilities on ground water quality.
- C&DD facilities probably impacting ground water quality in Ohio.



Actions Taken Since 2011

- Moved forward in drafting rule revisions.
- 10¢ / ton – for GW monitoring by Ohio EPA
- Evaluating individual sites to determine:
 - May be an impact of ground water quality and should be ordered to assess the impact.
 - Installation of wells and sampling by Agency is appropriate.
- Two sites required to assess impact.
- On 2 sites Ohio EPA has installed ground water wells and sampled.



Questions?

