

EQulS Supports Coal Combustion Residuals Requirements

Background

Potential environmental and human health risks associated with the disposal of coal combustion residuals (CCR), also referred to as coal ash, include contaminants leaking into groundwater or blowing into the air as well as catastrophic failure of coal ash surface impoundments. The "Disposal of Coal Combustion Residuals from Electric Utilities" final rule by the United States Environmental Protection Agency (USEPA) established comprehensive requirements for the disposal of CCR from coal-fired power plants. These requirements are found in the Resource Conservation and Recovery Act (RCRA) under the solid waste provisions, subtitle D, which provides the framework for the ideal management of non-hazardous and hazardous solid waste. More specifically, the ruling created requirements for new and existing CCR landfills and surface impoundments, which includes lateral expansions of any existing structure.

As outlined in the ruling, owners and operators must gain compliance in numerous areas and meet federal standards to reduce the risk of catastrophic failure, protect groundwater, and follow prescribed operating criteria. The final ruling presents requirements for record keeping, reporting, and internet posting of publicly available information. In addition, there are guidelines for inactive units, state programs, and closure and post-closure of CCR units.



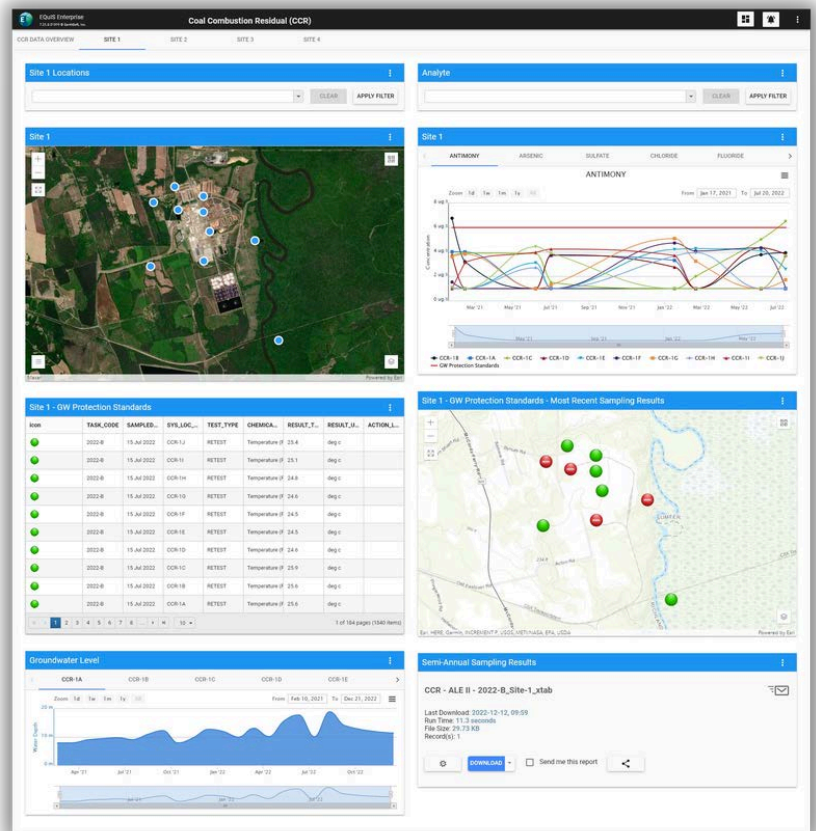
How can EQUS support federal CCR requirements?

The recordkeeping, notification and internet posting criteria mandates any owner or operator of CCR units to document compliance in the facility's operating record, and then notify the state of any decisions. They must also regularly maintain a website called "CCR Rule Compliance Data and Information" that contains this publicly available compliance information and ensure it is accessible to the general population. This information must be posted within 30 days of the initial data submission to the operating record and must be available online for no less than three years after its posting. The final ruling provides examples of these instances, such as corrective action reports, closure completion notifications, yearly groundwater monitoring results, and fugitive dust control programs.

EQUS® is the world's most widely used centralized environmental data management system (EDMS) and offers an automated end-to-end workflow solution. EQUS supports comprehensive environmental project workflows and provides solutions for a variety of CCR project requirements, such as CCR data gathering, requirements comparisons, and reporting.

EQUS Enterprise browser-based dashboards and visual approach makes self-reporting simple for CCR unit owners or operators, as it is easy to add new widgets or new facilities to an existing EQUS system. With EQUS Enterprise's workflow automation, users can upload and verify data with EQUS Data Processor (EDP) and automate reports and exports. Automatic email alerts and dashboard updates can be configured with EQUS Information Agents (EIAs), which can be date- or data-driven. Dashboards automatically update within seconds of new data arriving.

EQUS Collect and/or EQUS Data Gathering Engine (EDGE) feature digital data forms to collect CCR related data and process with EDP data quality checks. EQUS provides calculations derived from state or federal standards. Easily connect to data loggers or bar code scanners. EQUS also offers GPS location, mapping, and attached, georeferenced drawings, files and voice memos for field data collection activities. With EQUS, CCR unit compliance is much more automated and less expensive.



CCR Rule Workflow Automation

- ◆ Automated CCR report outputs (General and State-Specific)
- ◆ Automated data quality checks on incoming field and laboratory data (EQUIS and CCR-specific)
- ◆ Mobile field forms supporting CCR data collection (impoundment inspection, groundwater sampling, landfill monitoring, fugitive dust monitoring, etc.)
- ◆ Establish and compare data to groundwater protection standards (background or MCL)
- ◆ Out-of-the-box statistics reports (e.g., % Variance, Mann-Kendall, Student T, Sen's Slope, Standard Deviation, Confidence Intervals, Percentiles...)
- ◆ Automatic email alerts and dashboard updates with EQUIS Information Agents (EIAs)
- ◆ Data Visualization and Report Automation with EQUIS Enterprise dashboards
- ◆ Sub-surface data visualization supporting inter-well and intra-well analyses with Envirolnsite

Groundwater Sampling Results
CCR Annual Groundwater Monitoring and Corrective Action Report
Coal Combustion Residual Rule

Date Range: 6/5/2022 12:00:00 AM - 7/15/2022 12:00:00 AM

Analyte	Unit	CCR-1B		CCR-1B	
		05 Jun 2022		15 Jul 2022	
		Result	Q	Result	Q
Antimony	ug/l	3.77		3.93	
Arsenic	ug/l	16.1		20.1	
Barium	ug/l	2.1		1.1	
Beryllium	ug/l	1.26	B	1.36	B
Boron	ug/l	< 100	U	321	
Cadmium	ug/l	< 1.0	U	< 1.0	U
Calcium	ug/l	25500		23400	
Chloride	mg/l	6.5		6.5	
Chromium	ug/l	5.53		7.05	
Cobalt	ug/l	1.77		1.73	
Conductivity (FLD)	MS/CM	228		228	
Dissolved Oxygen (FLD)	mg/l	7.8		8	
Fluoride	mg/l	0.8		0.8	
Lead	ug/l	< 1	U	< 1	U
Lithium	ug/l	5.638		7.352	
Mercury	ug/l	5.23		2.97	
Molybdenum	ug/l	1.92		1.81	J
pH (FLD)	SU	7.8		6.8	
Selenium	ug/l	8.3		5.9	
Sulfate	mg/l	29.9		29.8	
Temperature (FLD)	deg c	26		25.6	
Thallium	ug/l	< 1.0	U	< 1.0	U
Total Dissolved Solids	mg/l	125		129	

Notes:
NA - Not Available
Q - Data Qualifier
J - Estimated Value
U - Concentration not detected
B / B3 - Analyte found in associated blank
GW-Protection Standards Exceedance

AutoSave CCR - Mann-Kendall Analytical Statistics

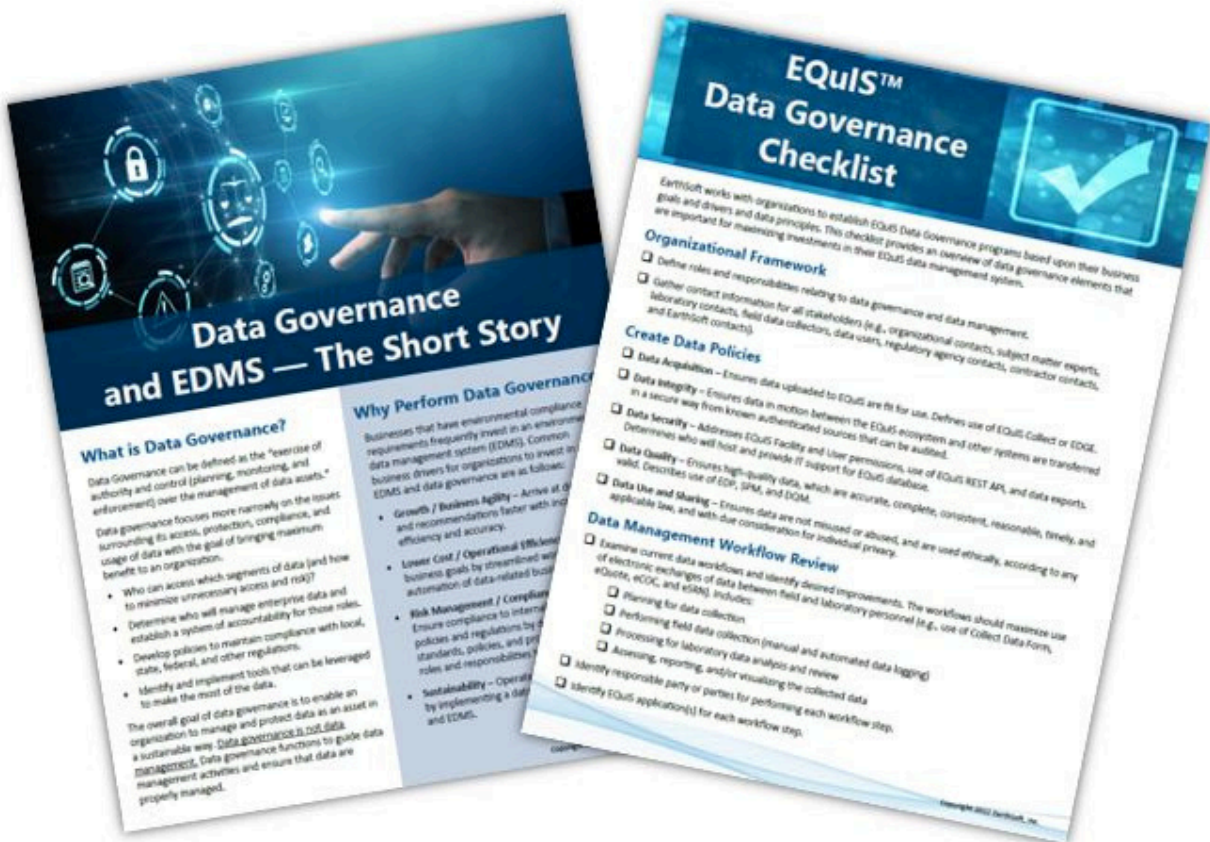
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CCR-1A (23-Jun-2021-15-Jul-2022)	Antimony (ug/l)	Arsenic (ug/l)	Barium (ug/l)	Beryllium (ug/l)	Boron (ug/l)	Cadmium (ug/l)	Calcium (ug/l)	Chloride (mg/l)	Chromium (ug/l)	Cobalt (ug/l)	Conductivity (FLD) (MS/CM)	Dissolved Oxygen (FLD) (mg/l)	Fluoride (mg/l)	Lead (ug/l)
3 CCR-GW-Protection Standards	10	10	2.5	1.0	100	1.0	11214	1.0	10	1.0				
4 Mean	2.98	7.36	1.39	1.05	121.25	1.43	16,333.25	1.83	1.1	1.77	227.25	7.54	0.88	3.50
5 UCL	3.37	12.69	1.95	1.09	136.83	1.80	21,483.36	2.06	1.28	2.88	231.36	7.73	1.00	4.95
6 Median	2.16	3.71	1.05	1.00	116.00	1.13	13,262.00	0.96	1.00	2.50	228.00	7.50	0.80	3.26
7 Standard Deviation	1.49	7.81	0.82	0.07	23.24	0.55	7,466.50	0.63	0.26	0.63	6.14	0.26	0.19	2.16
8 Coefficient of Variation	0.63	1.06	0.59	0.07	0.19	0.39	0.47	0.66	0.26	0.26	0.03	0.04	0.22	0.62
9 Skewness	0.07	1.49	2.66	1.10	0.66	0.83	1.17	0.96	0.26	0.26	0.21	0.24	0.64	0.83
10 Minimum	1.00	1.17	1.00	1.00	100.00	1.00	10,000.00	0.96	1.00	1.73	218.00	7.28	0.68	1.60
11 Maximum	4.00	23.69	1.86	1.17	193.00	2.31	26,518.00	2.06	1.28	3.10	236.00	8.00	1.20	7.63
12 Count (n)	8	8	8	8	8	8	8	8	8	8	8	8	8	8
13 Mann-Kendall S	-18	18	-2	2	-11	6	-27	-19	14	22	3	11	2	-25
14 80% confidence	Negative Trend	Positive Trend	Positive Trend	Positive Trend	Negative Trend	No Trend	Negative Trend	Negative Trend	Negative Trend	Negative Trend	No Trend	Positive Trend	No Trend	Negative Trend
15 90% confidence	Negative Trend	Positive Trend	No Trend	Positive Trend	Negative Trend	No Trend	Negative Trend	Negative Trend	Negative Trend	Negative Trend	No Trend	Positive Trend	No Trend	Negative Trend
16 95% confidence	Negative Trend	Positive Trend	No Trend	Positive Trend	No Trend	No Trend	Negative Trend	Negative Trend	Negative Trend	Negative Trend	No Trend	Positive Trend	No Trend	Negative Trend
17 99% confidence	No Trend	No Trend	No Trend	No Trend	No Trend	No Trend	Negative Trend	Negative Trend	Negative Trend	Negative Trend	No Trend	Positive Trend	No Trend	Negative Trend
18 Sen Slope	-0.004	0.008	0.0002	0.0002	-0.009	0.0000	-26.632	-0.008	0.001	-0.003	0.0000	0.0001	0.0000	-0.010

EQUS Data Governance

Recognizing a need within the environmental data market for guidance and standards, EarthSoft developed an EQUS Data Governance Initiative working in collaboration with strategic clients (industrials, governments, consultants, and laboratories). Improving management of an organization's environmental data as an asset is the overall goal of the initiative. EQUS data governance supports CCR unit owners or operators to:

- ◆ Maintain data integrity, control, consistency, usability, reliability, sustainability, and reproducibility
- ◆ Establish consistent documentation of the quality and validity for field and laboratory data compiled during investigations
- ◆ Prescribe procedures for collecting CCR Rule Groundwater Quality and Fugitive Dust monitoring data
- ◆ Integrate new data with previously collected and historical data
- ◆ Establish rules around sharing or providing electronic and/or hardcopy data to various stakeholders
- ◆ Enable use of project data in a consistent and easily shared format among internal and external parties (such as consultants and regulatory agencies)



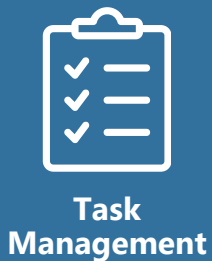
Technology Transition

EarthSoft's EQUIS is commercial off-the-shelf (COTS) software for environmental data management enabling utilities to collect, manage, report, and visualize CCR and other environmental data. EQUIS helps utilities assess environmental program performance, perform site-wide environmental monitoring, and confirm compliance with environmental standards across all media. EQUIS is a modular and scalable system that can be used with multi-site portfolios and meets the requirements of power users, casual users, and management. The cost to support EQUIS COTS software over multiple years is a fraction of the cost compared to legacy home-grown software.

EQUIS provides an end-to-end data management workflow that is well suited for the CCR compliance management requirements. This extends to operational and legacy cleanup sites, as EQUIS is used by the largest utilities to manage all environmental data across their site portfolios.



Cost Savings



Task Management



Data Collection



Extract, Translate, Load (ETL)



Data Quality & Qualification



Manage & Analyze



Visualize & Report

EarthSoft has worked with multiple utilities to migrate other data sources to a centralized EQUIS system. EarthSoft worked closely with each organization coordinating multiple divisions with EQUIS workflows, configuring software modules for complex field data collection, developing EQUIS Enterprise dashboards to gather and monitor field and analytical data, and configuring statistical reports and graphics. EarthSoft also works collaboratively with our environmental consultant Business Partners .



**Own the Workflow,
Make Better Decisions**

To learn more about how EQUIS workflow solutions can support owners or operators of CCR units, contact one of our representatives today. Please write info@earthsoft.com or visit www.earthsoft.com for further information.