Environmental Factors Associated With Decommissioning That Can Impact Cost, Schedule and Reuse Options

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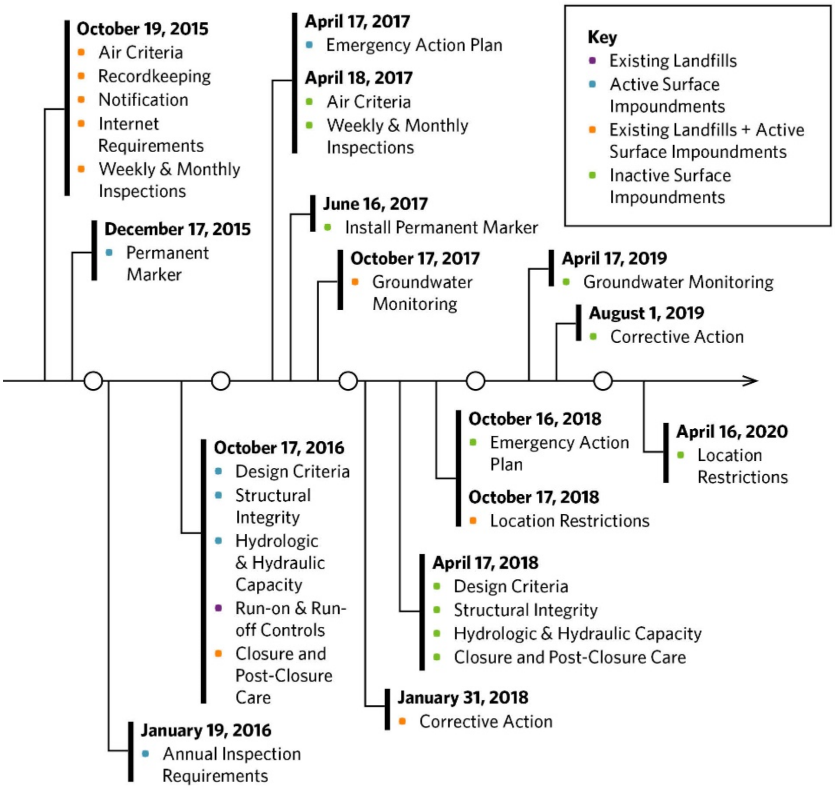
INTRODUCTION

With the uptick in coal-fired power plant decommissioning and passage of the CCR Rule[1], plant owners face unforeseen and sometimes competing fiscal and regulatory challenges when planning and budgeting for plant decommissioning. Prior to the CCR Rule, owners could focus efforts on plant decommissioning. However, the CCR Rule has now established distinct time frames for closure of CCR units, often causing an owner to work on multiple fronts simultaneously. This results in an increased need for strategic planning and coordination among multiple groups within the utility. In many instances groundwater underlying CCR-regulated facilities may have been impacted above state and/or federal standards for those constituents listed in the CCR Rule. Remediation of these impacts can take many forms, each of which operates on its own timeline. Depending on the unique geologic setting of a given site, the primary form of remediation may be management of CCR material within the ponds and dry stacks (i.e., limiting infiltration via engineered cap, CCR removal). However, if ash has been stored below the water table, additional passive and/or active remediation may be required depending on groundwater sampling results. The end use of the property will likely dictate the appropriateness of remedial efforts. If alternate power generation (e.g., combined cycle) is proposed, then monitored natural attenuation may be a candidate since access to the property would remain restricted and administrative land use controls would likely be acceptable. Early consideration of end usage is critical to the overall decommissioning planning and budgeting.

REGULATORY CONSIDERATIONS

As you are likely aware, the CCR Rule specifies certain milestone dates for closure of inactive and active impoundments. The following timeline illustrates key milestone dates for CCR owners.



As you can see, compliance with the CCR Rule encompasses many considerations. Among others, environmental factors must be taken into account as a CCR owner plans for impoundment closure and site decommissioning. Based on the milestones established in the CCR Rule, initial assessments of the CCR impoundment(s) should be completed (e.g., hazard potential, structural stability), written closure and post-closure care plans should be posted, and the results of eight rounds of detection groundwater monitoring should begin to be evaluated by October 2017. After October 2017, CCR owners are required to evaluate if detection monitoring results represent a statistically significant increase above background concentrations, and if so, implement assessment monitoring. By April 2018, closure activities shall begin for impoundments with documented groundwater impacts above background.

DECOMMISSIONING AND LAND USE CONSIDERATIONS

A critical element of successful closure is understanding that how you close a CCR impoundment and when you close a CCR impoundment are irreversibly linked. The CCR Rule allows for closure by removal of CCR material or by leaving material in place. This decision is typically based on regulatory factors such as groundwater position in relation to CCR and potential for groundwater impacts; economic and social factors such as comparative cost for capping versus removal, viability of finding a local disposal option, and safety of increased truck traffic on local roadways; and land use factors such as on-site availability for new landfill construction and long-term plans for property usage. Some CCR sites are already restricted in terms of greenfield space to construct a CCR landfill. Other sites are being redeveloped with natural gas-fired combined cycle plants, further limiting available space for landfill development or handling of CCR outside of existing impoundments. This paper seeks to highlight several considerations that a CCR owner should address when planning for impoundment closure and site decommissioning, as they pertain to environmental factors and end use of the property.

ELIMINATION OF BASIN INPUTS

If a coal plant is taken offline and the basin(s) is to be closed, cessation of ash sluicing to a basin is a known and planned process. However, other inputs to a basin, such as stormwater runoff and/or facility wastewater (e.g., cooling tower blowdown, oil/water separator effluent, sanitary waste, or service water/fire protection tank overflow), may be overlooked or not prioritized. This presents a problem since many fossil plants utilize their ash basin(s) as an integral part of the facility stormwater/wastewater treatment and conveyance system under the National Pollutant Discharge Elimination System (NPDES). If inputs to the impoundment are to cease, then the CCR owner must plan for alternate conveyance, and possibly treatment, of stormwater early in the process.

Without identification of the existing site stormwater/wastewater flow quantity, quality, and associated conveyance structure type and location, any appropriately scheduled and budgeted decommissioning and/or closure activities associated with a CCR impoundment may be affected. Conceptually, there are several strategies to pursue during the planning process, including rerouting of flows, reduction of flows via operation optimization, utilization of pump and haul vendors, or installation of temporary or permanent treatment systems. Selection of alternate conveyance and/or treatment options is dependent upon review of existing conditions such as size and type of collection areas (e.g., yard sumps or drainage areas identified on the site Spill Prevention, Control, and Countermeasures (SPCC) Plan), site piping/flow paths, water quality, and pump types. If possible, reuse of existing pipes and pumps for alternate conveyance, based upon existing sizing and the identification of total flow volume of the site, is financially advantageous. It is common that a combination of these strategies, often in phased implementation, is appropriate. Typically, alternate treatment based on stormwater/wastewater quality is determined prior to conveyance strategies since the size and location availability of treatment options can be a predetermined factor. For example, if the site NPDES wastewater effluent limitation is known, then the degree of treatment necessary prior to discharge can be determined. Depending on if mechanical or chemical treatment processes are needed, the reuse of an existing outfall or installation of an additional treatment system may be confirmed. The treatment design factors, including type (mechanical/chemical), location, size/spacing, access, and operations and maintenance considerations, drive how and where the flows are conveyed. Another consideration in treatment design selection is the procurement process of equipment if additional pumps, tanks, or mobile treatment units are selected. In cases where the effluent limitation cannot be met, pump and haul strategies or NPDES permit modifications may be necessary, with schedule impacts. It is reasonable to expect that modification of an existing NPDES permitted outfall may take six months to a year.

In addition, if site closure or redevelopment includes construction of a new stormwater retention basin as a treatment strategy, then siting of the new basin must consider both the historic and future land use. This can be a challenge for smaller or otherwise fully developed sites. For example, a stormwater basin should not be sited in an area with other environmental concerns. Often, fossil facilities may have other non-CCR areas of concern such as underground storage tank farms, gypsum stacks, or C&D landfills. Adding increased recharge via a stormwater basin may serve to mobilize contaminants, creating a problem that could have been avoided by coordination among various groups within the utility and early recognition of future use. The installation schedule of these alternate conveyance and/or treatment options should: 1) leverage site outage time frames for switchover from the use of the CCR impoundment to the selected closure strategy and 2) consider the time necessary to permit a new outfall, if required.

CORRECTIVE ACTION CONSIDERATIONS

In the event groundwater impacts are identified as part of the detection program and corrective action is required, understanding the planned end use of a fossil facility can play a key role in the magnitude and type of corrective action proposed for groundwater cleanup. Others at this conference have shared or will share their experiences remediating CCR-impacted groundwater. These approaches can be passive or active, but in all cases, understanding how the site will be used after closure of the impoundments can factor into the effectiveness of proposed remedial strategies and possible long-term operation and maintenance requirements.

Administrative and Engineering Controls

As an example, some utilities are moving from coal-fired to cleaner burning natural gas-fired combined cycle plants. This move can be advantageous to remedial efforts if construction is sequenced such that the new plant can assist with engineering controls for impacts left by the old plant. More specifically, if an asphalt parking lot for the combined cycle plant can be situated over residual CCR-impacted soil, it can serve as a cap to limit infiltration, dermal contact and inhalation of impacted particulates. In this instance, consideration must be given when decommissioning is initiated as to how impervious surfaces will be used and how that impacts stormwater management and proposed site uses.

Also, if the CCR owner intends to divest the property after closure and decommissioning, then remediation standards or goals will come into play. Regardless of future use, if the property is sold, the CCR Rule requires recordation on the deed that indicates CCR was stored on the property. If sold for industrial purposes, deed recordation and a land use covenant may be sufficient to restrict activities on-site, thereby avoiding potentially costly active remediation (e.g., excavation and disposal). If the property is to be granted to a municipality for beneficial reuse as open space, then remedial goals may be more stringent to protect public health and capping of the impacted areas may be required.

Co-mingled Plumes

Other important considerations are the presence, nature, and extent of other source areas on-site. More specifically, understanding how other contaminants may affect treatment of CCR-related contaminants can be key to successful remediation. For example, if a hydrocarbon plume is present on-site and is being treated via anaerobic bioremediation, then mixing of treated anaerobic groundwater with CCR-impacted groundwater may counteract the precipitation of the aluminum, iron, and manganese that is already present in the groundwater. The reverse of this situation is also possible, where remediation of the CCR-impacted groundwater hampers or negates remediation of groundwater impacted by other sources/contaminants. Thus, understanding the nature and extent of all contaminant sources prior to remediation of CCR-impacted groundwater can save a CCR owner considerable time and effort after impoundment closure.

Space Considerations

As mentioned previously, available space on a CCR site can factor heavily into decisions regarding closure, decommissioning, and remediation. Specific to the remediation component, available space must be considered when evaluating both passive and active remedies. If monitored natural attenuation is to be considered, then the more real estate between the source area and the point of compliance, the better. In other words, if closure of impoundments can involve moving CCR material away from compliance points, then the natural materials and processes will have more space (and consequently more travel time) to attenuate the CCR-impacted groundwater.

Similarly, if active remediation appears necessary based on the results of detection monitoring, then closure and redevelopment plans must account for the planned remedy, whether it be placement of an extraction system and well network, installation of a permeable reactive barrier, or in-situ treatment. This must be taken into consideration as part of the decommissioning planning process in an effort to avoid implementing decommissioning strategies that impede and/or restrict the ability to install and operate the optimum remedial strategy.

THINGS TO CONSIDER

- When to eliminate non-CCR flows (e.g., stormwater) into a basin?
    - Considerations/complexities of stormwater rerouting.
- Groundwater monitoring and corrective action
    - Will decommissioning and proposed end use of property impact the migration of existing groundwater plumes and/or ability to successfully remediate residual groundwater contamination?
- Plant decommissioning
    - Are other sources of groundwater contamination present (e.g., USTs, coal storage areas) that will need to be addressed as part of CCR groundwater corrective action?
    - Will proposed decommissioning activities impact effectiveness of groundwater corrective action strategies and/or exacerbate the need for corrective action (e.g., enhanced infiltration as part of structure demolition and removal)?
    - Can the grading and stormwater management plans proposed as part of decommissioning be designed to enhance corrective action effectiveness (e.g., limiting infiltration) and reduce runoff to sensitive receptors?

CONCLUSIONS

As discussed above, closure of impoundments in accordance with the CCR Rule and facility decommissioning must be carefully planned and executed on a site-wide basis. Further, consideration of known and potential environmental factors early in the process can aid in decisions regarding the need for and type of post-closure remediation.

REFERENCES

[1] USEPA. Hazardous and Solid Waste Management System; Disposal of Coal Combustion Residuals From Electric Utilities; Final Rule. 40 CFR Parts 257 and 261. April 17, 2015.