

Electronic Filing: Received, Clerk's Office 08/4/2021 P.C.#2

From: [Vincekoers](#)
To: [Brown, Don](#)
Cc: vincekoers@aol.com
Subject: [External] Comments in Re: Sub-Docket A
Date: Wednesday, August 4, 2021 1:42:54 AM

Vincent Koers
603 West Woodlawn
Danville IL 61832

August 5, 2021

Mr. Don Brown
don.brown@illinois.gov

Re: Sub-Docket A...

Dear Mr. Brown

We are enclosing comments about our concerns that the processes being considered in identifying "Coal Ash remnants" may overlook the degree to which components of the waste have migrated somewhat from the containment area of the ponds, and the need to develop and include protocols to properly measure for, identify and remove all of the objectionable ash and combustion products and materials deposited within the areas adjacent to the pond proper.

Our concern about the "coal ash waste (CAW)" that is planned to be removed from the Middlefork Site (and elsewhere), is the lack of an adequate definition of exactly what wastes have been deposited into the site as CAW.

We can envision that someone with a digging machine will de-water the site, dredge out the coarse grit, and reaching the bottom of the grit, declare the job done.

Over the years, toxins, including carcinogens, both water soluble and non-soluble, have become part of the waste flow deposited into the ponds, as well as around the property, before environmental equipment was finally installed on the plant. Toxic materials are partially contained within the coarser materials, but also contained within extremely small fines, both soluble and insoluble in water, that will also have leached into the sides and bottoms of the pond sites, invading the apparent earth boundaries.

One needs to understand that there was more waste CREATED in the combustion process than there was coal ash waste, per ton of coal burned. Per ton of coal, there was some 200 pounds of "coal ash," accompanied by another 285 pounds of materials created within the combustion process that was a recombination of the pyrolytic reactions taking place within the cauldron as the coal burned.

The complete eradication of ALL of the wastes within the area should be the goal of the removal process, and should include protocols that would:

1. Identify and develop test protocols for ALL of the expected classes of chemical families anticipated to exist due to the combustion process, and

Electronic Filing: Received, Clerk's Office 08/4/2021 P.C.#2

2. Penetrate these apparent pond boundaries within any waste pit, or upon the surface around pits, taking test samples, and testing for the classes of materials contained in the attached essay.

We would expect that testing would document that the adjacent earth would be found to be contaminated, and would indicate the removal of perhaps another 2-3 feet of boundary material, followed by repeat of testing probes, and further removal, until no further contamination is found.

While one might expect the energy agencies involved might argue that this boundary material is not coal ash, it is material contaminated by the coal ash deposition process, and contains chemical contamination largely created not necessarily from the coal directly, but from the coal combustion process, where entirely new compounds, not contained within the native coal, have been created. And these finer combustion materials are largely far more environmentally unfriendly than the "coal ash" itself.

Further, there is the native contents of the coal itself, the minerals, metals, and radioactive products, Uranium and Thorium, both significantly present, and expected to remain toxic, for thousands of more years, that are part of this waste and which must be removed and properly disposed of.

It is vital that we take steps to insure that we fully understand the wastes contained within the area, and that the process of removal results in the elimination of all of the waste, not just the coarse grit.

Our analysis indicates that the 3.3 million yards of material said to have been emplaced would contain 2.3 million tons of ash and another 3.3 million tons of coal tars and exotic chemicals, largely PAHs and other carcinogenic components that are particularly troublesome within the environment. The net tonnage of all of the wastes is some 5,617,755 tons of materials.

Our calculations include that more of this material has been lost into the river over the years than anyone cares to admit, and that the recovery operations will fall well short of these numbers.

All of the toxins should be tested for, and shown to no longer exist, before a cleanup is allowed to be considered complete.

A remaining question is what is to become of the evacuated hole in the ground adjacent to the river. This should be backfilled with solid dirt fill capable of resisting erosion from the forces of either the river or groundwater seepage within the hole, assuming there is communication noted with river water.

Sincerely yours,

Vince Koers

vincekoers@aol.com

217-304-8142, 217-443-0060

ATTACHMENT...

Understanding Organics in Coal Combustion Residue

By Vincent Koers, MS, Indiana Wesleyan University

Summary: Within the public agencies responsible for controlling pollutants resulting from burnt coal, the agencies' testing and storage policies have largely focused on one class of chemical contamination, that arising from inorganic chemicals, contained within coal ash. Ironically, coal is not an inorganic chemical; it is a complex amalgam of organic chemicals and minerals, which when combusted release some elements back into nature unchanged, primarily the inorganic content, arsenic and several heavy metals.

With a public concerned about these pollutants and seeking to understand public health issues relating to the safe storage of burnt coal and its components, it is critical that agencies give attention to the organic portion of the CCR, the organic wastes created and released from the burning of coal, which to date have been largely ignored. Yet these organic wastes contain much more powerful risks to human and land and aquatic animal health.

As state and federal agencies develop laws and rules to control the storage of coal residue, it is important to also develop testing protocols to identify organic chemicals, to understand how they can be safely stored, in lined waste management units (WMU) with monitoring procedures to track the stability of storage sites.

For what benefit might it be, to move some portion of coal ash waste from a problem site, only to leave anthracene, wet ammonium sulfate, ammonia liquor, and light oils, containing toxic polycyclic aromatic hydrocarbons (PAHs), proven to be human carcinogens?⁽³⁴⁾

We believe that U.S. EPA and other agencies should be changing their criteria to assess the testing and control programs currently in place, and examining the need for a side by side assessment of Organic compounds with the current Inorganic assessment and testing programs to establish the degree of presence of all of the coal tar-generated products in the CCR waste system.

COAL ASH AND COAL TAR – THE BASICS OF COAL COMBUSTION...

Coal Combustion Residue (CCR) is one of several designations describing coal ash, and Coal Combustion Waste (CCW), for wastes resulting from operation of electric coal-fired generation facilities which are largely similar, although they might vary in some detail. Coal ash is one prominent such designation, described as consisting of several segments of the coal ash wastes coming from electrical generation plants, typically segregated by where in the coal destruction process the material is collected prior to emplacement in an ash disposal site (WMU), and frequently delineated as fly ash, bottom ash, boiler slag, flue gas desulphurization (FDG) sludge, and fluidized bed combustion (FBC) wastes.^[16, 34]

Waste Management Units (WMU) is EPA jargon for any device used to contain wastes, and includes many different forms, such as ponds, landfills, and surface impoundments. Throughout this review, different authors use a variety of terms to describe such units, both lined and unlined.

Coal ash waste includes components of the coal tar wastes, including benzene, cresols and creosotes, and many other polycyclic aromatic hydrocarbons (PAHs). The total amount of PAHs found in one study in the fly ash was much higher than that in the raw coal and in the gas phase. Three and four ring aromatic compounds (referring to the number of benzene rings in the compound, and thus its complexity) were the major PAHs from pyrolysis (combustion) conditions, while naphthalene (two rings) was the dominant compound in bed ash collected from oxygen-rich combustion conditions.^[26]

Only naphthalene was detected in the ash bed of the fluidized bed collector (FBC) system. In the atmosphere, PAHs are mainly associated with aerosols (dispersions or suspensions of solid particulates), liquid drops, or both. However, if there is a lean oxygen condition in the fluidized bed combustor, more PAHs will be created and emitted with fly ash. Insufficiency of oxygen creates soot, which is carcinogenic.^[26]

Many of the wastes are conveyed wet by a slurry transport into the ponds, or WMUs, although dry transport is practiced in certain sites. Some 300 PAHs have been identified, with estimates of some 10,000 yet to be identified.^[28]

Fractions formed under burning undergo cyclization reactions leading to polycyclic compounds that can exist in gaseous and in solid phases. Depending on the surrounding temperatures and their molecular volume, they can exist in the gas phase (<4 ring PAHs), in the solid phase (>6 ring PAHs), or in both phases (4 and 5 ring PAHs) in the air depending on their molecular mass.^[26]

PAHs adsorbed on solids (fly ash and bed ash) also can cause air pollution when they evaporate into the atmosphere. To better understand how to control and reduce the emissions of PAHs during coal combustion and pyrolysis, the identification of PAHs, their concentration and modes of emission must be known.

For environmental reasons, it is necessary to know the amount and distribution of PAHs so that appropriate treatment procedures may be followed. The study reported in this paper focuses on the

effect of operating conditions on PAH production in fly ash.^[26]

Because such wastes have been, perhaps erroneously, classed as non-hazardous wastes by U.S. EPA and others, there are generally no actual physical liners, as generally understood in typical landfill parlance, in most coal ash WMUs. Instead, existing earth voids have been traditionally filled, or sometimes low spots in the terrain, or old in-ground mine sites, or perhaps dug pits, with the intention of retaining the wastes in an open-air environment in the WMU, frequently adjacent to a river or other cooling-water source for the generating plant. Rainfall generally adds to the water content in the WMU, and groundwater inclusion into pond bottoms is virtually universal in the vast majority of Illinois coal ash pond facilities.

These generating plants burn one of three kinds of coal, either lignite, bituminous, or anthracite.^[1] Lignite, or brown coal is the lowest rank of coal, used almost exclusively as fuel for electric power generation. It is also the most harmful to health.^[17]

Coal tar is created through thermal destruction (pyrolysis) of coal.^[1] According to the U.S. EPA, ten percent of the coal used, by weight, becomes coal ash.^[18] Coal tar is a mixture of many different chemicals with only partially understood constituents, and each chemical identified has its own liabilities being contributed to the environment.

Coal tar consists of a brew of thick tar, including benzene, naphthalene, toluene, and anthracene, wet ammonium sulfate, ammonia liquor, and light oils, containing toxic polycyclic aromatic hydrocarbons (PAHs), many of which have been proven to be human carcinogens, and others which are suspected carcinogens.⁽³⁴⁾ Only a fraction of the chemical agents present have been isolated and tested, but the CDC and U.S. EPA have known of the problems for decades, since the mid-1970's or before, of the potential presence of carcinogens and toxics in the coal ash and ash ponds, or waste management units (WMU), yet have failed to comprehensively test for their presence.⁽³⁴⁾

Each of the three types of coal provide a known amount of coal tar within the coal conversion process, typically 285 lbs. per ton for bituminous coal, assumed to be in use at the Middle Fork site.^[23] A different coal type would provide a different, but similar result.

The 285 lbs. per ton of coal tar waste created in the process is in addition to the 200 lbs. of coal ash waste generated by each ton of coal burned, leaving additions to the WMU site of 485 lbs. of waste per ton of coal burned, once the emissions equipment was added to plants in the middle 1980's. Prior to this, some of the 285 lbs. of coal tars may have partially gone up the stack directly into the environment, with the balance adhering to the ash, and moving with the coal ash into the WMU.^[28]

This 285 lbs. of coal tar volume generated includes some 5% Benzene, and thousands of other, largely unknown, compounds.^[2] Most likely, any given site only used one of the coal types, so the quantity per site may well vary. The type of coal used may have changed over time, but the process remains much the same. And the amount of coal tar generated at any site becomes an astounding number, as we will show later in Figure 2.

Not all of this coal tar transits into the WMUs, as before the requirements for pollution control devices, much of it went up the stack, into areas around the facility, typically in an elliptical tear-drop shape extending downwind from the stack location. Some tars likely evaporated into the working environment atmosphere, creating hazards for the workers, and some may have gotten carried home on worker's clothing to further contaminate their families. And much was dependent on the quality of the plant control mechanisms – poor controlling of the process produced more soot, and more PAHs. After the pollution controls were in place, a high percentage of the coal tars created likely made it into the WMUs, for whatever its ultimate fate.

Coal tars are a miasma of some 10,000 different compounds, of which perhaps 300 have been identified, as of 2017. [22,28] Each of these can interact with each other, and with the clays and soil acids once the wastes are emplaced in ponds, to create yet other chemicals within the ash pits that may not have existed in the primary generating facility.[3,4,22] Often, these reactions require the presence of a catalyst to take place, and the soil clays present in the ponds can sometimes fulfill that requirement.

In the Figure 1 diagram below, we show the commercial processes for refining the coal tar into a wide range of consumer products, some of which are being withdrawn from the marketplace due to their effects on the public health. We do not further consider the commercial work with the coal tar residues or tar pitch volatiles, which are beyond the scope of this analysis, except to say that they can easily become yet other avenues introducing PAHs and other detrimental components into circulation within our environment.

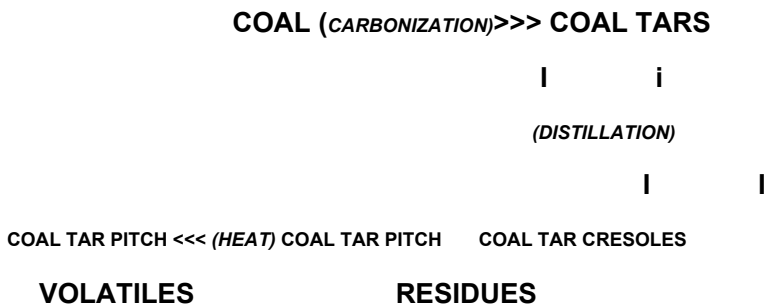


Figure 1

WHAT MAKES COAL ASH AND COAL TAR SO DANGEROUS?

With an imperfect combustion control process in a coal-burning plant, soot generation is a significant hazardous factor, and “Chimney Sweep’s Carcinoma” or “soot wart” became the first recognized form of occupational cancer, first identified in 1775, and tied to the use of young children to clean small chimneys throughout England and Europe. Soot wart was primarily a British phenomenon,[13] eventually tied to cultural differences in how chimneys were cleaned across Europe.[14] Boys as young as 4 were conscripted to enter very small confines, and the soot encountered concentrated on their scrotum due to perspiration and poor hygiene.[15]

Causes of soot wart was confirmed in 1922 with the isolation of weak carcinogens in soot.^[11,12]

In the early 20th century, workmen engaged in the handling of coal tar were prone to develop cancers of the skin. Investigations proved certain hydrocarbons isolated from coal tar caused skin cancer in mice, and the most important causes isolated were methylcholanthrene, 1,2,5,6-dibenzanthracene, and 3,4-benzpyrene.^[10] In the 1930's, researchers isolated several polycyclic hydrocarbons from soot that were potent carcinogens, including, among many others, 1,2,5,6-dibenzanthracene, 1,2,7,8-dibenzanthracene and 1,2-benzpyrene.

Human DNA consists of sequences of adenine, thymine, cytosine, and guanine, and there were indications that benzpyrene interacts with deoxyguanosine within the DNA, damaging it and potentially starting the degenerative processes that can lead to cancer.^[3] Once accepted into a human, PAHs are changed by all tissues in the body into many different substances, some of which are more harmful than the original PAHs.^[29]

Decades later, a malady similar to soot wart was seen to occur amongst gas plant and oil shale workers, and it was later found that constituents of tar, soot, and oils, now known as polycyclic aromatic hydrocarbons, or PAHs, were found to cause cancer in laboratory animals. The related cancer, mule skinner's carcinoma, occurring in weaving loom operations, was blamed on the carcinogenic content of shale oil that was used to lubricate the rapidly revolving mule spindles in weaving equipment.

The main concern with this class of compounds is that some members of the class are known mutagens or carcinogens. PAHs have a strong electrophilic character, and interact with biological nucleophiles in metabolic processes. The result of such interactions may obstruct their regular functions and can promote carcinogenesis, potentially across all life forms, due to transformation of PAHs into diol epoxides of aromatic rings inside the organism. To date, (as of 2000), U.S. EPA has prioritized 16 PAH compounds as hazardous air pollutants; these compounds are:

Acenaphthene, Acenaphthylene, Anthracene,
Benzo[a]anthracene, Benzo[a]pyrene, Benzo[b]fluoranthene, Benzo[ghi]perylene,
Benzo[k]fluoranthene, Chrysene, Dibenzo[a,h]anthracene,
Fluoranthene, Fluorine, Indeno[1,2,3-cd]pyrene, Naphthalene,
Phenanthrene, and Pyrene ^[26]

Most PAH formations are associated with soot emissions during the incomplete combustion of fossil fuels, such as startup and shut down of processes of combustion facilities including troubleshooting, and is a consequence of the pyrolytic (heating) process that precedes combustion. Also, due to the thermion process and by cyclization, and aromatization reactions, other aromatic clusters can be developed. Restated, system variations can and will produce significantly different products of combustion.

Recent studies of 25 ash WMUs near current or former generation plant sites In Illinois have proven that ground water contamination exists in 23 of the sites surrounding the ash WMUs. This demonstrates a nearly universal problem with either leakage from the site, or infusion into the site

by fluctuating groundwater due to alternating wet-dry periods, or both.

Since U.S. EPA's creation in 1970, reporting on coal ash and water contamination at Illinois generating facilities has been restricted to reporting only ions of the inorganic elements common historically to a landowner and any well-related problems with natural interferences with or into drinking water, despite the fact that U.S. EPA's 2000 listing of 16 compounds noted above. Further, since U.S. EPA directs and funds much of the research nationally, nearly all of the national studies follow this lead, showing only the inorganic positive ionic elements searched for, and found, in the waters and biota studied.

Rarely is any connection to the organic chemical morass of PAHs and other chemicals also tested for, and the products they produce within the generation facilities, and their adjacent WMUs, and the implications about what else awaits in the ash bed which may prove quite ominous. By rarely, we mean that not once have we found the levels of PAHs having been tested for, in association with coal ash WMUs, and reported in the literature. Such tests of organic chemicals appear to be unreported or non-existent.

As of 2008, U.S. EPA had identified creosote in at least 46 of the 1613 hazardous waste sites that have been proposed for inclusion on the EPA National Priorities List (NPL). However, the number of sites tested of the total is not currently known.^[28] The untested portion of the 1613 sites do not include any of the hundreds of coal ash sites. Even hazardous waste sites are not being fully vetted to determine the potential ash waste PAH contamination.

The International Agency for Research on Cancer (IARC) has classified cresotes as a probable human carcinogen. The IARC classified coal tar and coal tar pitches as carcinogenic to humans, while the EPA has classed creosote as a probable human carcinogen.^[28] Yet it is not tested for in coal ash containment situations.

WHAT EXACTLY IS CONTAINED IN THE COAL ASH AND COAL TAR?

Noted earlier was that coal ash waste includes components of the coal tar wastes created in the combustion of coal, including benzene, soots, cresols and creosotes, and many other polycyclic aromatic hydrocarbons (PAHs). Also included are naphthalene, anthracene, toluene (methyl benzene), 3 isometric xylenes, (dimethyl benzenes), and many other polynuclear hydrocarbons. Included also are oxygen-containing compounds, phenol and cresol, and nitrogen compounds like pyridine, quinoline, ammonia, and aniline,^[5] and many other carcinogenic and toxic components of the ash and tar.

Further, there are the inorganic, but no less destructive minerals and heavy metals that are both toxic and sometimes carcinogenic, including arsenic and others. Also, coal ash contains uranium and thorium, and is reported to be more radioactive than some nuclear waste.^[20] While the quantity of the radiation is small, it can continue to accumulate and it contributes to other radiation loads individual organisms are receiving, and can be moving into wildlife and food stocks for humans and other species.

Benzene was first isolated from coal tar in 1845, and the nature of the tars found varies with the temperatures encountered in the process, and with the variations encountered in the control processes of the generating facility.^[5] Benzene is somewhat toxic, as are most aromatic compounds, and humans need to avoid inhalation of vapors or contact with skin. Mild poisoning produces nausea and giddiness, while high concentrations may cause death.^[6] Many of the coal tar constituents are also known carcinogens.^[7, 8, 19]

Major components within coal tar include naphthalene, anthracene, phenanthrene, and fluorine. Naphthalene is present in coal tar at some 5%, while anthracene is present typically at .5%.^[9] While some sources minimized the usefulness of fluorine circa 1950, it proved later to be a valuable component in manufacturing refrigerant gasses and nuclear bomb components, particularly within Allied Chemical Corporation. Fluorine is particularly toxic to humans.

WHAT DO STUDIES SHOW?

A review of related studies indicates that the science of wide-spread chemical pollution was well-known, and being studied from the 1920's on. In the late 1970's, studies explored both the mutagenicity of components in coal ash, and the potential of its affecting human viral responses in significant ways to the detriment of the general population, and also studied workers in certain related industries, in addition to recognition of the same problems by the CDC in 1983.^[30, 31, 32]

By the time of the formation of the U.S. EPA in 1970, as a result of several prominent national environmental debacles, the potential dangers of carcinogens were well known in the scientific community. But U.S. EPA's position appears to be to officially ignore the coal tar dangers when considering the future of coal ash deposits throughout the United States.

A U.S. EPA government study of risk assessments of various potentially toxic chemicals, published in April of 2010 found the type of lining, or the absence of a liner, was critical in the occurrence of certain health incidents. For instance, arsenic was the constituent with the highest health risk for landfills. Clay lined landfills presented 90th percentile arsenic III cancer risks as high as 1 in 5,000 and thallium HQ as high as 2. When landfills were unlined, they additionally presented arsenic III cancer risks as high as 1 in 2,000 and a maximum of thallium HQ of 3.^[35]

F

Surface impoundments were far worse than landfills. When surface impoundments were unlined, they also showed risk above the HQ criteria for lead and selenium, and arsenic excess cancer risks were as high as 1 in 50, and cobalt had HQs as high as 500. Waste types have a much larger effect when managed in surface impoundments than when managed in landfills, likely due to higher waste leachate concentrations, and the higher hydraulic head from the impounded fluids.^[36]

This study's conclusion was that there are risks to managing the CCR/CCW wastes in unlined surface impoundments and unlined landfills, and that certain contaminants, such as arsenic, in the wrong types of WMU units may present lifetime cancer risks above EPA's range of concern to highly exposed groundwater users.^[37]

“BENEFICIAL USE” CREATING OR SPREADING PAH CONTAMINATION?

One area of concern receiving a lot of press lately is the presence of PAHs in several variations of road construction and seal coating processes, with emphasis on these compound's eventual movement into rivers and lakes. While PAH's and their cousins are frequently considered insoluble in water, which is only partly true, they can move as small particles even when they are not fully dissolved.

The work of Peter Van Metre, Barbara Mahler, and a number of associates is of particular interest on the topic of coal tar based pavement sealants. Van Metre and his associates have studied several aspects of the movement of sealant PAHs from parking lot sealing sites into adjacent bodies of water, for the last 40 years or so, and several of their studies reflect importantly on the movement and dispersal of these toxic and carcinogenic compounds.

One such study considered the PAH content in dust swept from seal-coated parking lots. The study found an amazing, and unexplained difference in PAH content from sample to sample. For six central and eastern cities, with seal-coated, and unseal-coated lots, median dust concentrations from seal-coated and unseal-coated sites were 2200 mg/kg and 27 mg/kg, respectively.

In three western cities, dust from seal-coated and unseal-coated lots were both very low, and very similar, at 2.1 mg/kg for seal-coated and 0.8 mg/kg for unseal-coated pavements.^[27]

Van Metre and his associates fail to satisfactorily explain the wide variation in readings, nor the difference in seal-coated lots in the east and west. Although he does not refer to this, we are aware of activities in some locations seeking beneficial uses of coal ash products, and wonder if some of the commercial seal-coating products in use have been “supplemented” with additional recycled ash (and thus more PAHs), accounting for this difference? Beneficial use, spreading the wastes, and the PAHs, more widely across the landscape, seems very problematic.

Remember Times Beach, Missouri? A local entrepreneur spread waste oils on dirt roads, and near horse farms and barns, ultimately killing scores of horses and other farm animals, and sprayed the waste materials on local roads, which later proved to contain dioxin. It took eight years for the EPA to track down the complete story of the contamination, and Times Beach is a ghost town today.^[33]

Van Metre's work does point toward the eventual dissipation of the quantity of PAHs found over time, in one case, once the source of contamination is quelled.^[24] It is unclear what the mechanism is, be it dispersal due to mechanical separation, or dissolution due to particle disintegration.

The city of Austin, Texas banned the use of PAH-containing sealants in Austin in 2006. In 2013, Van Metre revisited Austin, and studied the sum concentration of the 16 EPA Priority Pollutant PAHs in dated core intervals and surficial bottom sediment. Samples collected from sites in the lower lake declined about 44% from the period from 1998-2005, compared to the period from 2006-2014, and by 2012-2014, the decline was about 58%.^[24]

PAHs are a ubiquitous contaminant in urban environments. Studies found PAH concentrations to be some 65 times higher in runoff from lots with coal tar emulsion sealcoat compared to unsealed asphalt and cement lots.^[25] While the compounds have a penchant to be relatively non-soluble in water, there is some water solubility in the known polycyclic aromatic compounds (PAC), and little

is known of the other 9,700 unknown ones. Contamination of water bodies by this body of potentially hazardous chemicals has to be considered a reasonable possibility. [22]

There are extensive reports blaming PAHs for contamination of U.S. Lakes, which would speak to their being significant contributions to bodies of water, and thus more that slightly soluble in water. This, of course, is troubling for ash ponds and their adjacent rivers.

SITE SPECIFICS - CCR CALCULATIONS AT THE MIDDLE FORK COAL ASH SITE

To this point, our comments herein have been applicable generically to most all generating stations with adjacent coal ash pits for WMUs. For any particular site, the type of coal used, and the quantity over time, along with other operational variables, are likely all different, yet very similar. In the following paragraphs, we calculate the estimated quantity of wastes at one specific site, in a manner that can be duplicated at other sites by using local data.

At the Dynegy Vermilion River Middle Fork former generation plant, closed in 2011, records show 3.3 million cubic yards of ash were deposited into the various ponds while the plant operated. The weight of coal ash is 52#/cubic foot, or 1404# per cubic yard.^[21] For details, see the next page, Figure 2, a Summary of Total Waste Generated...

The weight of the 3.3 million cubic yards of coal ash waste in the various ponds is 2,316,600 tons. U.S. EPA suggests ash is 10% of the original coal weight, suggesting the plant burned coal weighting 23,166,000 tons, apparently put through the generating plant.

In addition to this ash waste, there is a toxic and cancerous coal tar waste generated, consisting of four different segments, Coal tar, Ammonium Sulphate, Ammonium liquor, and a light oil. These together are generated by the coal combustion process, and total another 285 lbs. per ton of coal consumed,^[2] generating another 3,301,155 tons of coal tar.

These wastes also include a potential spillages of naphthalene into the waste ponds of 165,058 tons, and anthracene of 16,506 tons, plus a plethora of tonnage of other yet-to-be-identified toxic and carcinogenic materials, as part of the above coal tar tonnage, into the ponds, the ground water, and the Middle Fork River.

Some of the coal processing at this plant site was done before environmental rules included pollution control devices, and thus more toxics escaped through the stack than in later years of operation. But the bulk of the material should have passed into the ponds.

As these materials are typically insoluble in water, they may remain there. Portions of them may also remain in the sediment of the Middle Fork River, waiting for a testing program to find and address their presence.

PAHs are a basis for listing certain hazardous wastes under the Resource Conservation and Recovery Act (RCRA); they are listed as constituents for groundwater monitoring and are monitored in hazardous wastes (other than in coal ash wastes) as part of the RCRA land disposal restrictions.

PAHs are regulated under the Emergency Planning and Community Right to Know Act (EPCRA) standards of 40 CFR Subpart J. EPCRA requires owners and operators of certain facilities that manufacture, process, or otherwise use these chemicals to report annually their release of those chemicals to any environmental media.^[28]

Was this required and complied with by any of the electric generation industry coal tar generators?
Is the industry exempt?

Our concern is insuring that, along with the acknowledged inorganic chemical components of coal ash, agencies need to acknowledge and quantify the organic products of combustion of the millions of tons of coal that was burned over the decades of operation of the various area facilities, and which likely, in part, currently reside in coal ash SWM units and adjacent groundwaters and streambeds of the waters of the state. These contaminants remain, further fouling our ground water and the lakes and rivers fed by both the groundwater pools, and by the seepages from ash ponds into our ground waters and our rivers.

In summary, we believe that U.S. EPA and others should be changing their criteria to assess the testing and control programs currently in place, and examining the need for a side-by-side assessment of organic compounds alongside the current inorganic assessment and testing programs to establish the degree of presence of all of the coal tar generated products in the CCR waste system.

References

1. Roberts, L (2014), "Coal Tar" In Wexler, Philip (ed.) Encyclopedia of Toxicology, 3rd ed. Oxford: Academic Press, pp 993-95.
2. Astle, Melvin, & Selton, J. Reid, Organic Chemistry, 2nd ed., Case Institute of Technology, Cleveland, OH 1959, p 412 & 435.
3. Coal Tar Pitch, (PDF), IARC – From the original 21 May 2016.
4. Betts, W.D. (1997)"Tar and Pitch," Kirk-Othmer Encyclopedia of Chemical Technology (5th ed.) New York; John Wiley & Sons.
5. Astle, op. cit., p 412.
6. Ibid, p 437.
7. "Coal Tar – National Library of Medicine HSDB Database," toxnet.nlm.nih.gov
8. "EUR-Lex-32013R1272-EN-EUR-Lex," eur-lex.europa.eu. No 1272/2008 of the European Parliament.
9. Astle, op. cit., pp 586 & 600.
10. Ibid, p 608.
11. Waldron, H. A., "A Brief History of Scrotal Cancer," British Journal of Industrial Medicine, 40 (4) pp 390-401, 1 Nov 1983.
12. Passey, R. D., "Experimental Soot Cancer," The British Medical Journal, 2-(3232): pp 1112-13.
13. Waldron, op. cit., p 393
14. Ibid, p 390.
15. Ibid, p 391.
16. World Coal Association "Environmental impact of Coal Use" Archived 23 February 2009 at the Wayback Machine
17. "Lignite coal - health effects and recommendations from the health sector" (PDF). Health and Environment Alliance (HEAL).
18. "Coal". epa.gov. 5 February 2014. Archived from the original on 20 July 2015.
19. "Coal Ash: Toxic – and Leaking". psr.org. Archived from the original on 15 July 2015.
20. Hvistendahl, Mara (13 December 2007). "Coal Ash Is More Radioactive than Nuclear Waste." Scientific American.

Electronic Filing: Received, Clerk's Office 08/4/2021 P.C.#2

21. See: https://www.simetric.co.uk/si_materials.htm
22. "Background and Environmental Exposures to Creosote in the United States" (PDF). *cdc.gov*. September 2002. pp 17-24. 25 January 2017.
23. Liu, Kunlei; Xie, Wei; Zhao, Zheng-Bao; Pan, Wei-Ping; and Riley, John T: "Investigation of Polycyclic Aromatic Hydrocarbons in Fly Ash from Fluidized Bed Combustion Systems, *Environmental Science & Technology*, v.34, No. 11, 2000, pp 2273-79.
24. About Coal Tar and Polycyclic Aromatic Hydrocarbons (PAHS), www.truthaboutcoaltar.com/about_coal_tar.html.
25. Van Metre, P.C.; Mahler, B. J.; 2013, PAH Concentrations in Lake Sediments Decline Following Ban on -Based Pavement Sealants in Austin, Texas; *Environ. Sci. Technol.*, v 48, (13), pp7222-28.
26. Van Metre, P.C.; Mahler, B. J.; Wilson, J. T.; Musgrove, S; Burbank, T. L.; Ennis, T.; Bashara, T. J.; 2010, Based Parking Lot Sealcoat; An Unrecognized Source of PAH: *Environ. Sci. Technol.*, v 44, pp 894-900.
27. Van Metre, P.C.; Mahler, B. J.; Wilson, J. T.; 2009, PAHs Underfoot: Contaminated Dust from Seal coated Pavements: *Environ. Sci. Technol.*, v 43 (1), pp 20-25.
28. "Toxicological Profile for Creosols." September, 2008, U.S. Department of Health and Human Services, 283 pages, *cvc.gov*.
29. "Topological Profile for Polycyclic Aromatic Hydrocarbons, August 1995, U. S. Department of Health and Human Services; *cvc.gov*.
30. "Lignite Fly Ash and the Interferon System," *MMWR / CDC*, October 1983, <https://www.cdc.gov/mmwrhtml/00000156.html>
31. Chrisp, C. E., Fisher, G. L., Lammert, J. E., Mutagenicity of Filtrates from Respirable Coal Fly Ash, *Science*, 6 Jan 1978, v 199, Issue 4324, pp 73-5
32. Natusch, D.F.S., Potentially Carcinogenic Species emitted to the Atmosphere by Fossil-Fueled Power Plants, *Environmental Health Perspectives*, February 1978, v 22, pp79-90.
33. Powell, William, "Remember Times Beach: The Dioxin Disaster, 30 Years Later." *St. Louis Magazine*, 3 Dec 2012, <https://www.stlmag.com>
34. "Human and Ecological Risk Assessment of Coal Combustion Wastes, U.S.EPA, April 2010, Draft EPA document prepared under contract EP-W2-09-004, p. ES-1.
35. *Ibid*, p. ES-4.
36. *Ibid*, p. ES-5
37. *Ibid*, p. ES-10