ERM FORENSICS NOTES

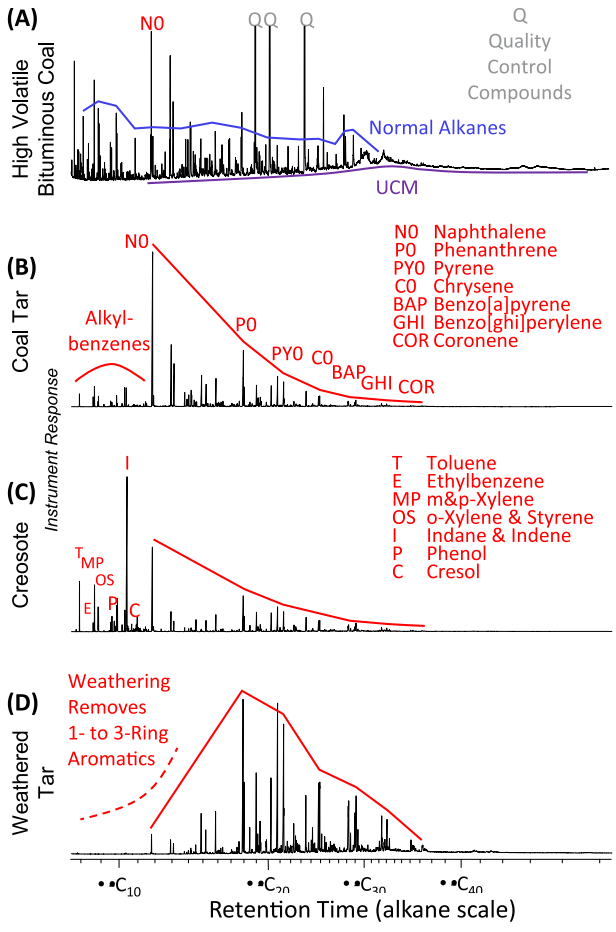
Manufactured Gas Plant Forensics

Source Identification Tools for Contaminated Groundwater, Soil, and Air

ERM, the world's largest specialist sustainability consultancy, acquired the Environmental Division of NewFields in April 2025. Bringing the NewFields Environmental Division into ERM has enhanced our ability to support clients in managing their environmental liabilities on a global scale.

ERM has provided the environmental forensics group the opportunity to strategically expand our existing technical offerings and services across a diverse array of industries including chemical, manufacturing, oil & gas, renewables, pharmaceuticals, energy and legal sectors and more. ERMs forensics group will continue to share technical ERM Forensics Notes like this to educate our clients on our capabilities past, present and for what's next in the future.

Manufactured Gas Plants (MGPs) generated gas for illumination and heating by destructive distillation of coal (A) or pyrolysis of petroleum. Plant operators purified the gas by condensing tar vapors as black, viscous oils throughout the facility (B). Many plants attempted to reprocess the tar into secondary products, such as solvents, creosote wood preservative (C), and pitch products. Unused tar and tar-contaminated media were discarded into local soils or waterbodies. Over time, tar residues weathered. Some solidified (D) after liquid, soluble, or vapor phase fractions migrated into proximal soil, sediment, groundwater, and soil gas. MGP residues occasionally created plumes of volatile (e.g., BTEX, styrene, and indane) and semivolatile (e.g., PAH, phenols, and amines) organic compounds.



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Chemical fingerprinting refers to a powerful collection of forensic methods (e.g., high resolution chromatography) for distinguishing MGP discharges from off-site sources of volatile and semi-volatile organic compounds (e.g., vehicular exhaust, marina piers, fire debris, coal, petroleum, pavement, urban fill, and others). However, it also considers site histories, maps, aerials, environmental reports, and historical lab data imbued with important contextual information for source attribution. For example, the MGP type helps identify its wastes in complex settings with multiple sources of VOCs and SVOCs. Coal carbonization and byproduct coke ovens generated coal tar, while carbureted water gas and oil gas plants generated petroleum tar. None of these plant designs converted all coal or petroleum feedstock to gas and tar; rather, small percentages of the feedstocks can be forensically isolated from the tar to distinguish the tar origin. Many MGPs evolved over time using one plant type during its early history and another type later. In this case, identifying the tar feedstock can help differentiate old from more recent discharges.

Multiple levels of increasingly more advanced analytical instrumentation can distinguish site-specific MGP signatures even at low concentrations that narrowly exceed risk-based cleanup levels. Coupling regulatory compliance data with advanced forensic testing helps delineate the origin of aromatic hydrocarbons throughout the area of alleged release. The synoptic use of standard regulatory methods and advanced forensic testing techniques enhances the development of more accurate conceptual site models, environmental remediation goals, and realistic cost allocations.

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