B114 Mineralogical Changes in Soil — A Great Tool to Forensic Explosive Investigator

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The study has been done keeping in view the difficulties faced by forensic experts in explosion cases. The presentation will impact the forensic experts as the resume of conclusion of mineralological and geochemical changes occurring at the time of explosion due to tremendous heat may be used in fingerprinting the explosive identification and time lapse even after several years.

When a high explosive is detonated to cause explosion, it produces a large quantity of gas and heat in a very short time resulting in development of a very high pressure. There is sustained shock wave and sufficiently effective blast pressure. During the explosion, the temperature developed may be as high as 5000 ºC. There is absorption and adsorption of volatile and nonvolatile constituents of explosive substances and their combustion products in different layers of soil. Thus, the soil at the site of explosion is likely to under go significant physical, chemical and mineralogical changes. Depending upon the type and quantity of explosives there would be variation in the resultant changes. The larger the explosive charge; the deeper will be the crater. The explosion will accordingly affect even the deeper layers (B Horizon) of the soil resulting in scattering of the affected soil to a larger area keeping the crater as center. Therefore, the debris collected from the site of explosion is usually available in large quantities. The first priority of examination of soil samples so collected from the site of explosion is to detect and identify the explosive used. A wide range of methods has been used by workers in the field for analysis of post explosion residues. It may not be possible to identify explosive materials if proper soil sample from the debris is not available due to scanty amount of explosive substances admixed with the soil. The explosive may not be identified from the available small quantity of soil carried by the suspect from the site of explosion in apparel, shoes and other belongings. It is still more difficult after considerable time lapse. A foolproof methodology is therefore warranted for the examination of soil samples to arrive at some significant forensic conclusions.

In view of the aforesaid discussion, a detailed study of post explosion soil samples [exploded with RDX] has been undertaken and mineralogical changes were studied by XRD and IR. A perusal of the XRD and IR data and summary of mineral phases identified points to some very relevant features about assemblages present in the preexplosion control sample (CS) and post-explosion samples and will be discussed at time of presentation.

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