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| **Environmental Enlightenment #222**By Ami Adini - July 20, 2015

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| This is a SHORT, LIGHT and SIMPLE newsletter. Its purpose is to rekindle, in the initiated, terminology they have once learned and enlighten the uninitiated on terms they may have heard but never knew the meaning of. |
| **How to Find Buried Objects: The Ground Penetrating Radar****http://amiadini.com/NewsletterArchive/150720-NL222/ee-68-2.jpg**The text in this article has been extracted from the United States Environmental Protection Agency’ materials. It has been shortened and simplified. For in-depth information go to US EPA *Contaminated Site Clean-Up Information at* <https://clu-in.org/characterization/technologies/gpr.cfm>http://amiadini.com/NewsletterArchive/150720-NL222/envEnl-68_clip_image001.jpg Ground penetrating radar (GPR) can be a very useful method for underground storage tank (UST) sites because it is appropriate for a broad range of investigations and is only rarely affected by cultural interferences (*e.g.*, buildings, fences, power lines). GPR uses high frequency electromagnetic waves (*i.e.*, radar) to acquire subsurface information. The waves are radiated into the subsurface by an emitting antenna.When a wave strikes a suitable object, a portion of the wave is reflected back to a receiving antenna.Measurements are continuously recorded, providing a profile of subsurface conditions. http://amiadini.com/NewsletterArchive/150720-NL222/ee-68-1.jpgThe GPR method utilizes antennas that emit a single frequency between 10 and 3000 MHz.Within this range, higher frequencies provide better subsurface resolution at the expense of depth of penetration. Lower frequencies in this range allow for greater penetration depths but sacrifice subsurface target resolution. In UST investigations, the working frequency range is generally 100 to 900 MHz. Frequencies above 900 MHz are typically used for investigations less than 2 feet below ground surface (bgs).http://amiadini.com/NewsletterArchive/150720-NL222/ee-68-3.jpg**GPR Profile Crossing 4 UST's**The depth of wave penetration is also controlled by the electrical properties of the media through which the waves travel. Electrically conductive materials (*e.g.*, many mineral clays and soil moisture rich in salts and other free ions) rapidly attenuate the radar signal and can significantly limit the usefulness of GPR. For example, in shallow, wet clays the depth of penetration may be less than 2 feet. In contrast, in dry materials such as clay-free sand and gravel, penetration depths can be as great as 90 feet. Penetration depths typically range between 3 and 15 feet bgs.GPR measurements are usually made along parallel lines that traverse the area of interest. The spacing of the lines depends on the level of detail sought and the size of the target(s) of interest.http://amiadini.com/NewsletterArchive/150720-NL222/ee-68-4.jpgTypically, an average walking pace of 2 to 3 miles per hour is used. Some very detailed investigations can be as slow as 0.1 mile per hour, and newer systems can be mounted on vehicles and used at speeds up to 65 miles per hour. Subsurface cultural interferences include densely packed rebar used in reinforced concrete, wire mesh (often used for concrete floors), and pipes and utilities.http://amiadini.com/NewsletterArchive/150720-NL222/ee-68-5.jpghttp://amiadini.com/NewsletterArchive/150720-NL222/ee-68-6.jpg |
| You can find past issues of our "Environmental Enlightenment" at [amiadini.com](http://www.amiadini.com/) Wealth of information about environmental site assessments in the real estate transactions and issues concerning assessment and cleanup of contamination in the subsurface soil and groundwater. |

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| Call me if you have any questions. There are **no obligations.**Ami Adini Environmental Services, Inc.Environmental Consultants & General Engineering ContractorsCalifornia Lic. #1009513 A B HAZ ASB**818-824-8102**; **mail@amiadini.com**[www.amiadini.com](http://amiadini.com/)Ami Adini is a veteran environmental practitioner with over 40 years of experience. He carries a Bachelor of Science degree (B.Sc.) in Mechanical Engineering including academic credits in Nuclear and Chemical Engineering and postgraduate education in these fields. His career includes design and construction of nuclear plant facilities, chemical processing plants and hazardous wastewater treatment systems. He is a former California Registered Environmental Assessor Levels I & II in the 1988-2012 registry that certified environmental professionals in the assessment and remediation of environmentally impacted land, and a Registered Environmental Professional (REP) since 1989 with the National Registry of Environmental Professionals (NREP). He is a California Business & Professions Code Qualifying Responsible Managing Officer (RMO) in the General Engineering Contractor classification with Hazardous Substance Removal and Asbestos certifications, and president of AMI ADINI ENVIRONMENTAL SERVICES, INC. (AAES), a general engineering contractor and consulting firm specializing in environmental site assessments, rehabilitation of contaminated sites and removal of environmental risks from real-estate transactions. (Contact Ami for a complete resume.) **AAES provides practical solutions to environmental concerns using the highest standards of ethics and integrity while providing its clients with maximum return on their investments.** |

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