

# Closed-Loop Ground Source Heat Pump Installation Workshop

October 13-16, 2014

Holiday Ballroom 1

Hilton Baltimore, MD

**Day 1 - Monday, October 13**

<b>7:45 AM</b>	<b>Registration</b>	
<b>8:00 AM</b>	<b>Welcome to IGSHPA</b>	
<b>8:10 AM</b>	<b>Introduction &amp; Overview</b>	<b>Garen Ewbank</b> Ewbank Geo Testing, LLC
	1) The Case for Ground Source Heat Pumps 1–1	
	2) Residential and Light Commercial Space Conditioning System 1–2	
	3) The Ground Source Heat Pump Concept 1–20	
	4) Heat Pump Operation 1–28	
	5) GSHP System Materials and Components 1–33	
	6) Brief History of GSHP Systems 1–35	
	7) Example REF: Ch 1 (RLC) (IG) p 1-19	
<b>10:00 AM</b>	<b>Break (Holiday Ballroom 5)</b>	
<b>10:15 AM</b>	<b>Thermal Properties of Soil and Rock</b>	<b>Garen Ewbank</b> Ewbank Geo Testing, LLC
	1) Identify the types of soils and rocks	
	2) Variation in physical and thermal properties of soils and rocks	
	3) Introduction to ground Formation Thermal Conductivity measurement REF: Soil and Rock: Field Manual (SR) pages 3-13, 23-39	
<b>12:00 PM</b>	<b>Lunch (Holiday Ballroom 5)</b>	
<b>1:00 PM</b>	<b>Selecting a GSHP for Heating and Cooling Loads</b>	<b>Peter Tavino</b> Litchfield Geothermal
	1) Overall System Design Procedure	
	2) Heating and Cooling Design Load Calculations	
	3) Indoor Air Quality	
	4) Selection of Water-to-Air GSHP Equipment	
	5) Air Distribution System	
	6) Building/Zone Energy Analysis using Bin Method REF: Ch 3 (RLC) (IG) p 31-39	
<b>2:15 PM</b>	<b>Piping Materials, Properties &amp; Flow Characteristics</b>	<b>Peter Tavino</b> Litchfield Geothermal
	1) Understand piping materials used in GHEX	
	2) Physical, thermal properties, Pressure ratings,	
	3) Flow characteristics and head loss, Flow rates for flushing	
	4) Understand antifreeze mixtures and properties to GHEX design REF: Ch 4 (RLC) (IG) p 40-61	
<b>3:15 PM</b>	<b>Break (Holiday Ballroom 5)</b>	
<b>3:30 PM</b>	<b>Design of Closed-Loop Ground Heat Exchanger</b>	<b>Brian Urlaub</b> Enertech, Inc
	1) Selection and Layout of the GHEX, type, Headering System	
	2) Design a Vertically-Bored GHEX	
	3) Design a Horizontally-Trenched GHEX REF: Ch 5 (RLC) (IG) p 63-115	
<b>5:00 PM</b>	<b>Adjourn</b>	