

SOUND GEOTHERMAL
Presents

**GeoExchange (Ground Source Heat Pump System) Workshop
& IGSHPA Certification School**

March 19 through 21, 2003
Department of Natural Resources, 1594 W. North Temple
Salt Lake City, UT 84101 in Room 1050

Presented by:
Sound Geothermal Corporation – Utah
Utah State Energy Office

IGSHPA Certified Instructor: Dr. Charles Remund
IGSHPA Certified Instruction: Cary Smith
Utah State Energy Office (Co-sponsor)

Materials:	Notepads, Calculator, Number 2 Pencils, Colored Pencils, High-Lighter Markers, Work Gloves (for fusion lab)
Dress:	Casual
Food:	Breakfast snacks and lunch will be provided.

General Course Description

8:30 am Wednesday, March 19, 2003

- 1 Introduction of course materials, manuals and instructor(s)**
 - GeoExchange concept, energy source, basic GeoExchange system and configuration
 - Heat pump operation
 - Domestic hot water options, hydronic applications
 - System materials and components
- 2 Marketing**
 - Who is involved with GSHP technology?
 - Benefits to home and business owners & utilities, demand reduction
 - Benefits to the HVAC contractors
 - Forced air systems, supplemental hot water generation
 - Radiant floor systems, process hot water applications
 - Water-to-water units, demand hot water from forced air systems
- 3 Soils and rock identification**
 - Properties of soils, classification
 - Field identification of fine-grained soils
 - Rock classification as related to thermal conductivity
 - Identification of rock types (petrology) for GeoExchange design purposes
 - Thermal conductivity values of specific rock types
- 4 Selecting, sizing and designing the ground source heat pump system**
 - Design procedure
 - Determination of heat loads
 - Importance of load calculation procedures
 - Energy calculations
 - Performance of air source heat pumps
 - Performance of ground source heat pumps

5:00 pm Break class

8:00 am Thursday, March 20, 2003

- Ground load calculations
- Equipment selection
- Air filtering
- Air distribution system
- Duct layout

5 Designing the Ground Heat Exchanger

- Steps in Ground Heat Exchanger Design (GHX)
- GHX configuration
- Standardized parallel system header design
- Selection of the GHX circulating fluid
- Pipe selection
- GHX sizing and design procedure
- Selecting the GHX circulation pump

6 Polyethylene Pipe Fusion

- PE pipe and why it is suitable for GeoExchange systems
- Composition and manufacturing process
- What is not acceptable for GeoExchange systems
- Fusion methods
- Sidewall fusion
- Socket fusion
- Butt fusion
- Demonstration and hands-on practice, butt/socket fusion lab

5:00 pm Break class

8:00 am Friday, March 21, 2003

7 Installation of the ground heat exchanger (GHX)

- How to properly evaluate a site and draw a site plan
- Types and uses for installation equipment
- Evaluation of drilling, trenching and backhoe costs
- Pipe installation considerations
- Header manifold tie-in to GHX

8 Grouting Procedures

- Importance of quality grouting implementation: environmental, economical, and thermal competency aspects, and responsibility of installation contractor
- Grouting materials
- Dry boreholes
- Grout placement methods
- Pumps, mixing

9 Flushing and purging the system

- Flushing debris, air purging, system flushing
- Verification of loop pressure and flow
- Error detection techniques
- Installation notes
- Antifreeze charging, pressurizing the closed loop system

10 Heat pump system start-up

- Performance checks: heating, cooling & desuperheater modes
- Performance check, water-to-water configuration (hydronic floor heat system)

11 Review for test

- Open question and review

12 Test

- Open book test, two hours

Sound Geothermal appreciates the support and cooperation of the Utah State Energy Office of Salt Lake City, UT to present this course, and your attendance to make this presentation possible. Thanks!