Level I - Infrared for Building Applications
Level I Course Outline Training Dates September 13-16, 2011

Tuesday

8:00 a.m. - 5:00 p.m.

- Introductions
  - Course overview
  - Qualities of good data
  - Infrared camera basic
    - Controls
    - Menus
  - Hands-on practice
  - Heat transfer basics
- Thermal capacitance
- Conduction
- Convection
- Radiation
- State change
- Radiometric basics
  - Emissivity
  - Reflected background
  - Spatial and measurement resolution
  - Good measurement principles
- Hands-on practice

Wednesday

9:00 a.m. - 5:30 p.m.

- Principles of building inspections
  - Fundamentals
  - Conduction inspections
    - Seasonal differences
    - Interior vs. exterior
    - Patterns
  - Air leakage inspections
    - Pressure dynamics
    - Using blower doors
    - Air leakage patterns
  - Moisture inspections
    - Camera technique
    - Conditions
      - Evaporation and condensation
      - Conduction
      - Capacitance
- Building standards
- Report and analysis software
  - Up/downloading data
  - Review of field data
  - Analysis functions
  - Changing parameters
  - Creating reports

Thursday

8:00 a.m. - 5:00 p.m.

- Getting good data, review
- Infrared camera specifications
    - Field of view
- Spatial and measurement resolution
    - Thermal sensitivity
    - Calibration
- Radiometric theory
    - Material properties
- Surface characteristics
- Radiance
- Applied heat transfer
    - Thermal Capacitance
        - Steady state heat flow
        - Transient heat flow
    - Conduction and resistance
    - Convection and air leakage
    - Radiational cooling
- Moisture thermodynamics
    - State change values
    - Camera technique
    - Evaporation patterns
    - Condensation patterns

Friday

8:00 a.m. - 5:00 p.m.

- Applying thermography:
    - Large buildings
    - Special issues
    - Roof moisture surveys
        - Safety
        - Principles and inspection techniques
        - Patterns
    - Facilities electrical and mechanical systems
        - Safety
        - Principles and inspection techniques
        - Pattern
        - Common facilities equipment
- Certification testing
    - Basic exam
    - Specific exam
    - Practical exam

PROPOSAL FOR LEVEL I BUILDINGS INFRARED SPONSORED TRAINING
Prepared for: James Hammel / Building Performance Contractors Association (BPCA)
Prepared on: July 25, 2011

SCOPE:
The purpose of this training is to provide hands-on applications instruction in the use of thermographic imaging equipment for associates and members of the BPCA. This on-site training will focus on those applications relevant to the inspection needs the students, especially thermographers who will be inspecting buildings as well as those who are exploring the technology. While owning infrared equipment is not necessary, there are several hands-on simulations and exercises in the course and participants are encouraged, if they have a camera, to bring it to the course.

The participants, upon completion of the training, will have an understanding of the basic heat theory necessary for thermal work, will know how to best utilize the imaging equipment you have, and will be better able to employ the equipment to perform surveys. Completion of this course prepares participants to more fully apply the technology to both residential and commercial building applications including insulation, air leakage and moisture issues as well as inspections of commercial roof, electrical and mechanical systems.

FORMAT:
The training will consist of classroom lectures, group discussions, demonstrations and fieldwork for a group of up to sixteen (16) people as spelled out in the "fee" paragraph. Materials prepared especially for instruction in maintenance thermography will be used. Hands-on activities are emphasized so that participants use the equipment during a large portion of the training. Comprehensive training manuals, for use during and after the course, are included for each participant.

POST-COURSE SUPPORT:
The Snell Group provides post-course support to all graduates of our training courses. This can take many forms. Specifically included in the cost of this proposal are the following:

- Consultation by phone/fax or email
- Ongoing support of individual learning needs
- Review of program protocol and program results
- Critique of program documents
- Help with development of applications protocol
- Requests for information
- Image interpretation assistance
- Periodic mailings, including our newsletter
- Access to our reference library and body of graduate thermographers

These services are an important and integral part of this proposed training. We find that much of the process of gaining expertise can take place only after the initial course. Additional training, mentoring and program services are always available through The Snell Group. Level I - Infrared for Building Applications is designed to meet the proposed RESNET standards for thermographic inspectors and is also recognized for 16 CEUs from the Building Performance Institute. We are currently under review with ASHI, American Society for Home Inspectors for CEs on successful completion of the course.

CERTIFICATION:
Students are only required to take the general exam to successfully complete the course. Additionally, students will have the opportunity to take a three-part certification examination. It consists of two written portions and a practical where you must show proficiency with your infrared camera. The 40 question general exam will

evaluate your general knowledge in infrared theory and all the mainstream applications. The specific exam will be based on either your written procedures or on accepted ASTM, ISO, NFPA, NETA, IEEE, OSHA, EPRI, and BINDT methodologies. The practical exam will allow you to prove you have the skills necessary to perform testing in the field.

In the absence of having written procedures, each student will be given a copy of the applicable standard that applies to your work. You will also leave with a copy of a Written Practice. A Written Practice is a suggested guideline on how to organize and manage a certification program for your company. It is a straight forward document and process to set up a program, but it has critical importance in describing the educational experience and testing requirements for certification for your organization. As part of the course fee we will help you after the course to put in place a meaningful and effective written practice.

The curriculum and all instructors are overseen by ASNT Level III Certificate Holders.

DATES/LOCATION:
We will conduct this training at the Baldwinsville Public Library. Scheduled times are Tuesday September 13th thru Friday September 16th.

RESPONSIBILITIES:
BPCA will provide:

- Promotion of training and process individual registrations
- A suitable meeting space: Training room ideally should be at least 1,000 sq. ft. for 16. The room should be set up in a u-shape with 8 ft. tables with 3 people per table or 6 ft. tables, 2 people per table. We will also need 4 tables set up around the perimeter of the room for conducting experiments through out the class.
- Coffee breaks and lunches as needed.
- Personnel qualified to open and close electrical cabinets, operate various machinery, etc., as The Snell Group personnel maintain a strict "hands-off" policy for all equipment during field trip if applicable

The Snell Group will provide:

- One qualified trainer
- Audio-visual materials
- A multi-media projector, projection screen and easel with pad or a "white board."
- At least one imaging system and software; attendees should be encouraged to bring their own equipment (preferred ratio is 3 students: 1 camera)
- All training materials and demonstrations
- Comprehensive training manuals for each of up to sixteen (16) participants
  Prior to the course, we will work with you to arrive at the correct number of anticipated attendees and will ship adequate supplies for that number. If the number is increased after the initial shipping has occurred, we must ask that you pay for the additional shipping costs as well as a handling fee.
- A personalized Certificate of Completion or Certificate of Attendance for each participant (depending on whether they complete all course requirements – number of hours and general course exam). When this certificate is issued, every thermographer is assigned a unique certificate number to stay with them throughout their career and all subsequent training with The Snell Group.
- Post-course support and consultation, as outlined in this proposal.