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To: Chris Scruton (CEC)
From: Steve Wiel
Subject: **Cool Roof Colored Materials**: Monthly Progress Report for February 2004
CC: Hashem Akbari, Paul Berdahl, Andre Desjarlais, Bill Miller, Ronnen Levinson

A summary of the status of Tasks and Deliverables as of January 31, 2004 is presented in Attachment 1.

HIGHLIGHTS

- Planning for March 4, 2004 PAC meeting is well-underway. The meeting agenda and presentation materials have been prepared and shared with industrial partners and PAC members.
- We continue to work with tile, granule, and shingle manufacturers to develop cooler products. Our recent efforts have focused on increasing granule and shingle reflectance, with particular attention to helping manufacturers produce cool shingles for a demonstration site in colors that match conventional (hot) shingles.
- The Sacramento Builders Exchange (SBE) newspaper recently highlighted the “Cool Roofs” demonstrations at Cavalli Hills as their feature story.
- We are still searching for two new houses to demonstrate cool-colored asphalt shingles on their development in Sacramento.

Tasks

- 1.1 Attend Kick-Off Meeting
This Task is completed.
- 1.2 Describe Synergistic Projects
This Task is completed.
- 2.1 Establish the Project Advisory Committee (PAC)
This Task is completed.
- 2.2 Software Standardization
(No activity.)
- 2.3 PAC Meetings

Planning for March 4, 2004 PAC meeting is well-underway. The meeting agenda and presentation materials have been prepared and shared with industrial partners and PAC members.

2.4 Development of Cool Colored Coatings

2.4.1 Identify and Characterize Pigments with High Solar Reflectance

We are using measurements of the optical properties of tints (mixtures of colors with white) to develop a model predicting the performance of mixtures. We continue to revise our pigment characterization draft paper, and hope to complete it in March.

2.4.2 Develop a Computer Program for Optimal Design of Cool Coatings

See Task 2.4.1.

2.4.3 Develop a Database of Cool-Colored Pigments (No activity.)

2.5 Development of Prototype Cool-Colored Roofing Materials

2.5.1 Review of Roofing Materials Manufacturing Methods

Jerry Vandewater (MoneriLifetile) provided us new information on concrete tile manufacturing processes. We are still working to arrange a visit to a cedar shake roof-manufacturing plant.

2.5.2 Design Innovative Methods for Application of Cool Coatings to Roofing Materials

We continue to work with tile, granule, and shingle manufacturers to develop cooler products. Our recent efforts have focused on increasing granule and shingle reflectance, with particular attention to helping manufacturers produce cool shingles for a demonstration site in colors that match conventional (hot) shingles.

2.5.3 Accelerated Weathering Testing

Akbari had further discussions with our industrial partners the development of a plan for accelerated testing of cool colored materials.

2.6 Field-Testing and Product Useful Life Testing

The Sacramento Builders Exchange (SBE) newspaper recently highlighted the “Cool Roofs” demonstrations at Cavalli Hills as their feature story. The SBE is published weekly in support of California’s construction industry in the central valley. The SBE also ran an advertisement in its Feb. 26th volume 19 issue to help LBNL and ORNL find a second building firm for demonstrating composition shingles on two adjacent homes of identical footprint.

2.6.1 Building Energy-Use Measurements at California Demonstration Sites

ORNL personnel completed the instrumentation and data acquisition setups for three of four demonstration homes in Cavalli Hills. Each data acquisition system (DAS) is placed on an exterior wall near the power panel of the demo home (Fig. 1). Electrical conduit was run from the wall into the NEMA enclosure housing the DAS to protect instrument wires. Wim Boss of SMUD also installed an electrical box on each house; the boxes house power meters for monitoring the whole house and HVAC system powers. SMUD sent a high-lift to Cavalli Hills to help ORNL install a weather station on the back gable of the C-style home having a painted metal roof (see Fig. 2). The station monitors wind speed, wind direction, the outdoor air temperature and relative humidity. Pyranometers were installed near the station on the respective north and south facing roofs of the C-style home in order to monitor the global irradiance incident on each roof section.



Fig. 1. Example of DAS, instrument wiring and electrical box for power meters.



Fig. 2. Weather station installed 3-ft above ridge of C-style home.

Construction crews were working on the fourth house this period; however, we were not able to install instrument wiring. We will return in early April to run wiring and install sensors in the fourth house. The fourth house will have the painted metal shingle with cool-colored pigments.

ORNL will coordinate Joe Riley's (ARC) work for applying a topcoat finish with cool-colored pigments to the one of the two installed tile roofs. Riley has agreed to complete the work in April while ORNL personnel are at the demonstration site.

2.6.2 Materials Testing at Weathering Farms in California

Samples at the weathering sites are being recalled for measurement of reflectance. A set of samples from US tile, Shepherd Color Company and MonierLifetile will be sent to LBNL for check of reflectance measures using their spectrometer.

2.6.3 Steep-slope Assembly Testing at ORNL

Layout of the type, number and location of instruments for the concrete and tile roof assemblies was prepared this period and is ready for implementation. Three of the assemblies, MCA's clay tile and MonierLifetile's Espana and Sentry slate tiles have direct nailed, batten and counter-batten constructions, respectively. We will begin to instrument the test roofs once all calibrations are completed on the heat flux transducers.

2.6.4 Product Useful Life Testing

Akbari discussed with our industrial partners the development of a plan to design an experiment for testing the useful life of cool colored materials.

2.7 Technology transfer and market plan

2.7.1 Technology Transfer

(No activity.)

2.7.2 Market Plan

(No activity.)

2.7.3 Title 24 Code Revisions

(No activity.)

Management Issues

- None.

Attachment 1

Project Tasks and Schedules (Approved on May 16, 2002)

Task	Task Title and Deliverables	Plan Start Date	Actual Start Date	Plan Finish Date	Actual Finish Date	% Completion as of 02/29/2004
1	Preliminary Activities					
1.1	Attend Kick Off Meeting <i>Deliverables:</i> <ul style="list-style-type: none"> Written documentation of meeting agreements and all pertinent information (Completed) Initial schedule for the Project Advisory Committee meetings (Completed) Initial schedule for the Critical Project Reviews (Completed) 	5/16/02	5/16/02	6/1/02	6/10/02	100%
1.2	Describe Synergistic Projects <i>Deliverables:</i> <ul style="list-style-type: none"> A list of relevant on-going projects at LBNL and ORNL (Completed) 	5/1/02	2/1/02	5/1/02	5/1/02	100%
1.3	Identify Required Permits	N/A		N/A		
1.4	Obtain Required Permits	N/A		N/A		
1.5	Prepare Production Readiness Plan	N/A		N/A		
2	Technical Tasks					
2.1	Establish the project advisory committee <i>Deliverables:</i> <ul style="list-style-type: none"> Proposed Initial PAC Organization Membership List (Completed) Final Initial PAC Organization Membership List PAC Meeting Schedule (Completed) Letters of Acceptance 	6/1/02	5/17/02	9/1/02		100%
2.2	Software standardization <i>Deliverables:</i> <ul style="list-style-type: none"> When applicable, all reports will include additional file formats that will be necessary to transfer deliverables to the CEC When applicable, all reports will include lists of the computer platforms, operating systems and software required to review upcoming software deliverables 	N/A		N/A		

Project Tasks and Schedules (contd.)

Task	Task Title and Deliverables	Plan Start Date	Actual Start Date	Plan Finish Date	Actual Finish Date	% Completion as of 02/29/2004
2.3	<p>PAC meetings <i>Deliverables:</i></p> <ul style="list-style-type: none"> Draft PAC meeting agenda(s) with back-up materials for agenda items Final PAC meeting agenda(s) with back-up materials for agenda items Schedule of Critical Project Reviews Draft PAC Meeting Summaries Final PAC Meeting Summaries 	9/1/02	6/1/02	6/1/05		50% (3/6)
2.4	Development of cool colored coatings					
2.4.1	<p>Identify and Characterize Pigments with High Solar Reflectance <i>Deliverables:</i></p> <ul style="list-style-type: none"> Pigment Characterization Data Report 	6/1/02	6/1/02	12/1/04		~85%
2.4.2	<p>Develop a Computer Program for Optimal Design of Cool Coatings <i>Deliverables:</i></p> <ul style="list-style-type: none"> Computer Program 	11/1/03	11/1/03	12/1/04		~10%
2.4.3	<p>Develop a Database of Cool-Colored Pigments <i>Deliverables:</i></p> <ul style="list-style-type: none"> Electronic-format Pigment Database 	6/1/03	7/1/03	6/1/05		~15%
2.5	Development of prototype cool-colored roofing materials					
2.5.1	<p>Review of Roofing Materials Manufacturing Methods <i>Deliverables:</i></p> <ul style="list-style-type: none"> Methods of Fabrication and Coloring Report 	6/1/02	6/1/02	6/1/03		~95%
2.5.2	<p>Design Innovative Methods for Application of Cool Coatings to Roofing Materials <i>Deliverables:</i></p> <ul style="list-style-type: none"> Summary Coating Report Prototype Performance Report 	6/1/02	6/1/02	12/1/04		~50%
2.5.3	<p>Accelerated Weathering Testing <i>Deliverables:</i></p> <ul style="list-style-type: none"> Accelerated Weathering Testing Report 	11/1/02	10/1/02	6/1/05		~5%

Project Tasks and Schedules (contd.)

Task	Task Title	Plan Start Date	Actual Start Date	Plan Finish Date	Actual Finish Date	% Completion as of 02/29/2004
2.6	Field-testing and product useful life testing					
2.6.1	Building Energy-Use Measurements at California Demonstration Sites <i>Deliverables:</i> <ul style="list-style-type: none"> • Demonstration Site Test Plan • Test Site Report 	6/1/02	9/1/02	10/1/05		70%
2.6.2	Materials Testing at Weathering Farms in California <i>Deliverables:</i> <ul style="list-style-type: none"> • Weathering Studies Report 	6/1/02	10/1/02	10/1/05		46%
2.6.3	Steep-slope Assembly Testing at ORNL <i>Deliverables:</i> <ul style="list-style-type: none"> • Whole-Building Energy Model Validation Presentation at the Pacific Coast Builders Conference • Steep Slope Assembly Test Report 	6/1/02	10/1/02	10/1/05		45%
2.6.4	Product Useful Life Testing <i>Deliverables:</i> <ul style="list-style-type: none"> • Solar Reflectance Test Report 	5/1/04		6/1/05		
2.7	Technology transfer and market plan					
2.7.1	Technology Transfer <i>Deliverables:</i> <ul style="list-style-type: none"> • Publication of results in industry magazines and refereed journal articles • Participation in buildings products exhibition, such as the PCBC Brochure summarizing research results and characterizing the benefits of cool colored roofing materials 	6/1/03	6/1/02	6/1/05		~ 10%
2.7.2	Market Plan <i>Deliverables:</i> <ul style="list-style-type: none"> • Market Plan(s) 	5/1/05		6/1/05		
2.7.3	Title 24 Code Revisions <i>Deliverables:</i> <ul style="list-style-type: none"> • Document coordination with Cool Roofs Rating Council in monthly progress reports • Title 24 Database 	6/1/02	5/16/02	6/1/05		~ 10%

Project Tasks and Schedules (contd.)

Task	Task Title	Plan Start Date	Actual Start Date	Plan Finish Date	Actual Finish Date	% Completion as of 01/31/2004
VII	Critical Project Review(s) <i>Deliverables:</i> <ul style="list-style-type: none"> Minutes of the CPR meeting 					
XII (C)	Monthly Progress Reports <i>Deliverables:</i> <ul style="list-style-type: none"> Monthly Progress Reports 	6/1/02	6/1/02	6/1/05		58% (21/36)
XII (D)	Final Report <i>Deliverables:</i> <ul style="list-style-type: none"> Final Report Outline Final Report 	3/1/05		10/1/05		
	Final Meeting <i>Deliverables:</i> <ul style="list-style-type: none"> Minutes of the CPR meeting 	10/15/05		10/31/05		

