Action Items

(AIs will be marked green when completed)

1. Cucinotta and Townsend –
    a. Provide a list of potential events to study

2. Cucinotta –
    a. BRYNTRYN code delivered to BU.
    b. HZETRN delivered in year 2 or 3 after updates complete

3. Desai & Heber –
    a. Ulysses and 1 AU data,
    b. Collect list of events with high energies, fluxes and hard spectra

4. Desai, Dietmar Krauss Varban & Cucinotta –
    a. How do we extrapolate to higher energies, spectral forms and time-evolution (cadence TBD)?

5. Desai, Hassler, Schwadron –
    a. Need for propagation transport model to Mars and in inner heliosphere
    b. Potential LWS focus topic
    c. Presentation and a paragraph for Lika, Arik, and possibly the LWS steering group

6. Hassler –
    a. GOES and MARIE data comparison to determine the probability of correlation between 1.5 AU and 1 AU data during favorable alignment
    b. When are alignments “favorable”

7. Posner, Desai, Myung-Hee –
    a. Stackplot of August 1972
        - Event
        - Dose

8. Posner and Hassler –
    a. Specify desired output from transport codes for RAD validation

9. Posner –
    a. discuss w/ Bernd about possibility of Wolfgang Droege as a team member

10. Posner –
    a. Expand on 2003 survey of the correlation between electrons and proton fluxes in SPE events

11. Schwadron –
    a. Revise EMMREM presentation and paper to reflect descopes

12. Schwadron –
    a. Outline publication discussing needed spaceweather tools for understanding, specifying and predicting the radiation environment
    b. What's relevant and what's not
    c. Themes
        - How do we extrapolate to higher energies
        - What are the needed forms of validation
        - What are needed tools to understand and develop predictive capabilities of the radiation environment
        - Dose associated with ESPs versus SEPs
        - Understanding long vs short term needs for prediction (future mission planning, probability assessments, strategic mission development)
        - How to leverage and enhance the dialogue between space science and mission operations communities

13. Spence and Townsend –
    a. Specify desired output from transport codes for CRaTER validation

14. Townsend –
    a. presentation of Doses and measured quantities

15. Townsend –
    a. Outline for Spaceweather Paper clarifying space radiation misconceptions
    b. (*Radiation Hazards for Space Scientists)
    c. Themes –
        - Radiation protection problem
        - Energy Dependence
        - Heavy Ions
        - Differences between SEP & GCR effects
        - Risk – uncertainties and biological impact
        - What is a reasonable radiation dose and what are the cost factors
        - How some shielding can increase the risk
        - EVAs – how long do you have to make the requirement (acute effects). What are the relevant risks

Prioritization of Activities

1. Time-dependent SPE Events

   INPUT Module
   - Time-dependence
   - Energy dependence
   - Spatial dependence and Propagation
     Schwadron: temporary prop. Monte code
     Droege: Analytic prop. Code
   - Observational proxies and correlations (electrons and protons)

- Automate input spectrum
- Feed excel spreadsheet
- BRYNTRYN
- Straightforward implementation
- How do you extrapolate to higher energies
- Use this as motivation for what is needed in the modeling
- Collect a set of studied events (time series)
- Alpha particles
- electrons
- protons
- Effects on electronics (low energies)
- Probability of High Fluence Events
- Cumulative Spectra
- Solar Heavy Ions

2. Output and Environment Characterization
- How do we compare code output with observations?
- How do we extrapolate across the energy ranges?
- What are the intrinsic uncertainties in the predictions?

3. HZETRN and GCRs
- 1years to 2 years out .. HZETRN
- How do we predict the GCR spectrum
- Energy-dependent isotopic composition
- Light-ion issues (3-D issue .. use of hybrid code)
- neutrons (backscattered neutrons)

4. Uncertainties in dose over long periods in GCR predictions

5. HETC-HEDS
- coupled to HZETRN
- supplement those parts of the problem that are inherently 3-D
- aid in the validation effort with the CRaTER data