

Nate Bixler
Sandia National Laboratories



U.S. DEPARTMENT OF
ENERGY



Sandia National Laboratories is a multi-program laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under contract DE-AC04-94AL85000. SAND NO. 2011-XXXXP

Objectives

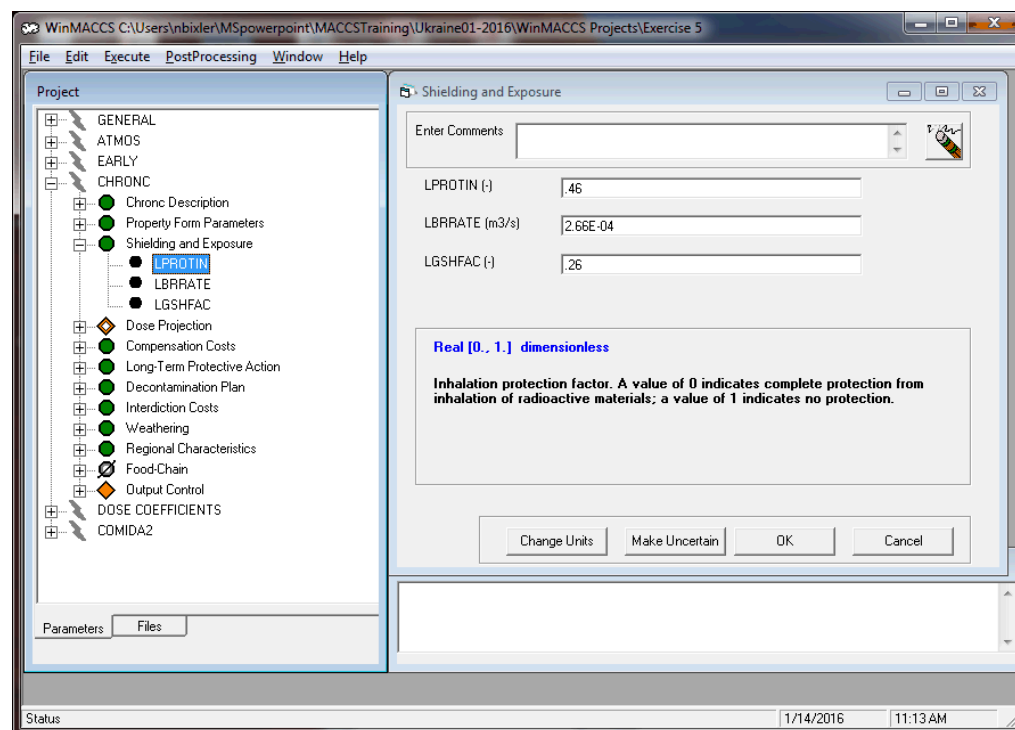
- Learn concepts and choices for long-term consequences
- Differential parameter that depend on site or accident scenario from those that do not

CHRONC Models and Parameters

- Shielding and exposure
- Dose projection
- Compensation costs
- Long-term protective actions
- Decontamination plan
- Interdiction costs
- Weathering
- Regional characteristics
- Outputs

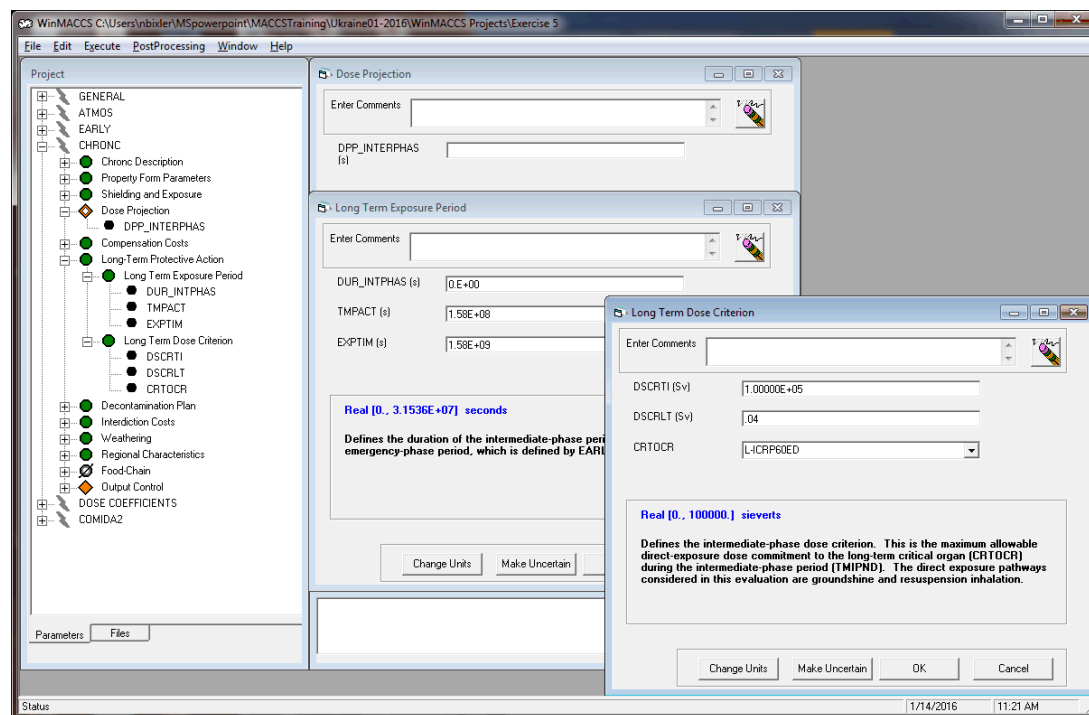
Shielding and Exposure Parameters

- Long-term parameters
 - Inhalation protection factor
 - Breathing rate
 - Groundshine shielding factor
- Values are commonly the same as normal activity values during the emergency phase



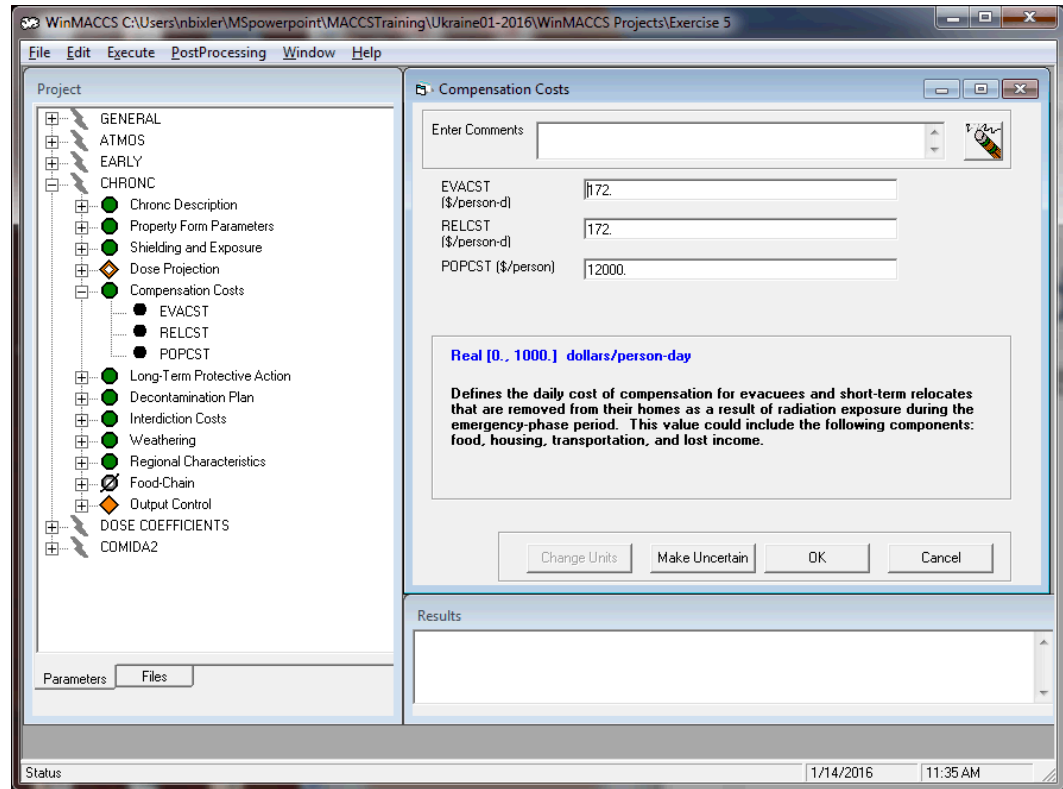
Phase and Dose-Projection Periods

- Dose-projection period for intermediate phase
- Duration of intermediate phase
- Dose-projection period for long-term phase
- Duration of long-term phase
- Dose limits
 - Intermediate phase
 - Long-term phase (habitability)
 - Critical organ for intermediate and long-term phases



Compensation Costs

- Emergency-phase per diem cost for evacuation and relocation
- Intermediate-phase per diem cost for relocation
- One-time relocation cost for long-term phase
- Values need to be revised periodically



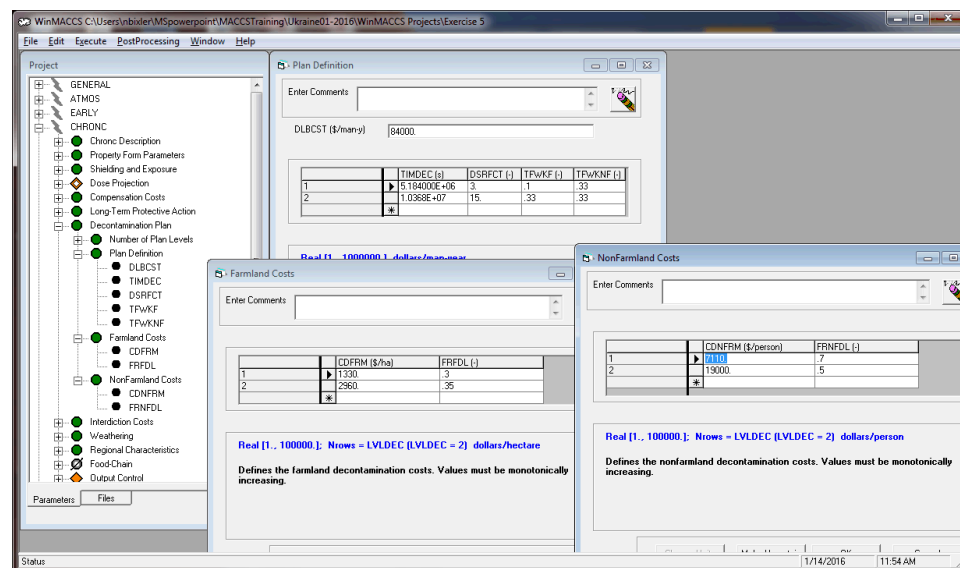
Decontamination Plan

■ Plan definition

- Time to decontaminate
- Dose reduction factor
- Fraction of time worker spends in nonfarm area
- Fraction of time worker spends in farm area

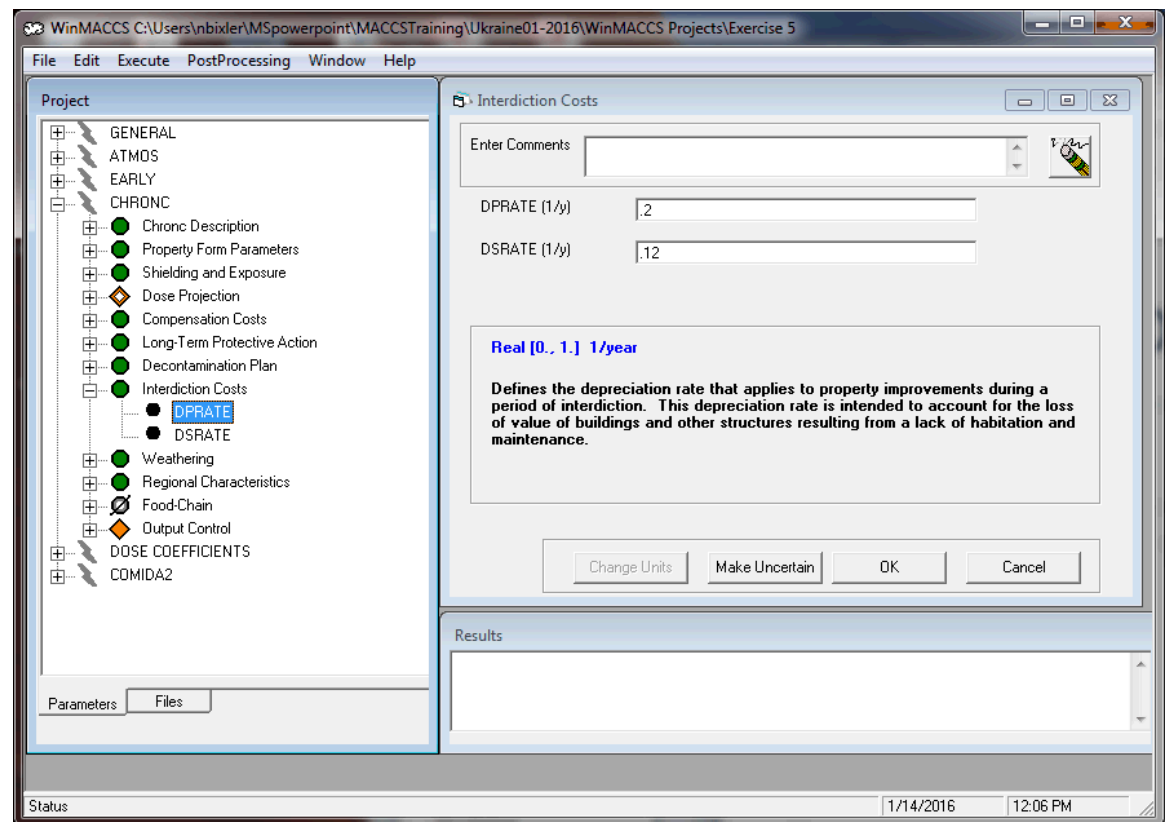
■ Farmland and nonfarmland costs

- Cost per area or per person to decontaminate
- Fraction of costs from labor



Interdiction Costs

- Depreciation rate for interdicted property
- Expected rate of return on property



Weathering

- Groundshine weathering parameters

- Linear coefficient
- Decay rate

- Resuspension

- Linear coefficient
- Decay rate

The screenshot displays the WinMACCS software interface. The main window shows a project tree on the left with categories like GENERAL, ATMOS, EARLY, and CHRONC. The 'Weathering' folder is expanded, showing 'Groundshine Weathering Terms' and 'Resuspension Weathering Terms'. Two dialog boxes are open: 'Groundshine Weathering Coefficients' and 'Resuspension Weathering Coefficients'.

Groundshine Weathering Coefficients Dialog:

	GWCOEF (-)	TGWHLF (s)
1	0.5	1.6E7
2	0.5	2.8E9
	*	

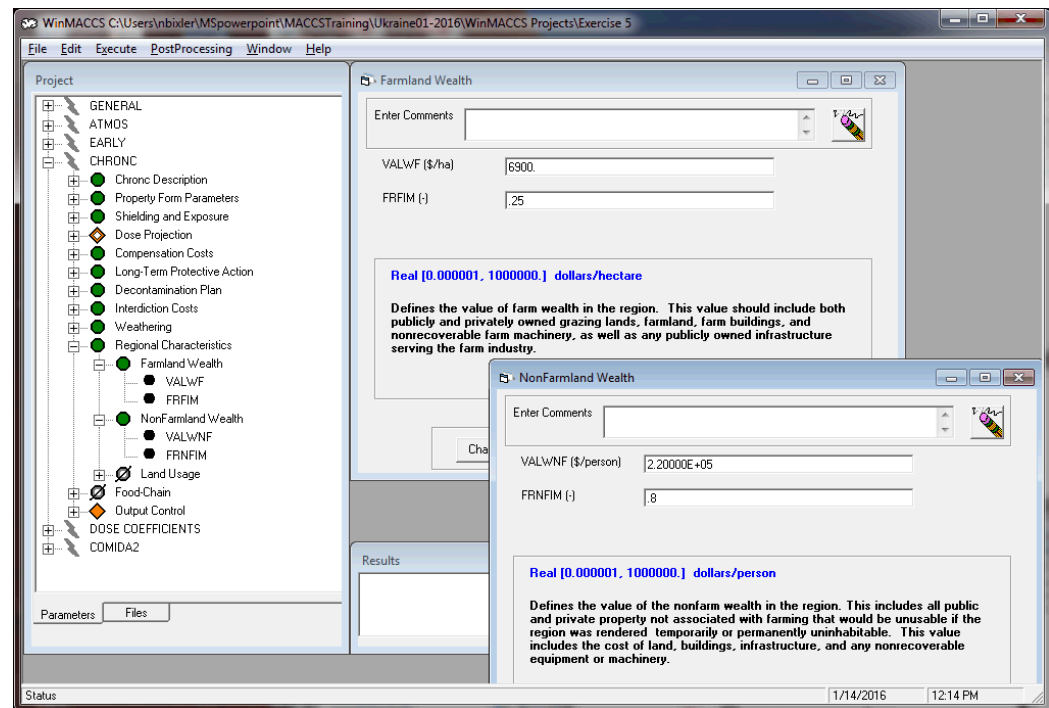
Resuspension Weathering Coefficients Dialog:

	RWCOEF (1/m)	TRWHLF (s)
1	1.0E-5	1.6E7
2	1.0E-7	1.6E8
3	1.0E-9	1.6E9
	*	

Below the tables, the 'Resuspension Weathering Coefficients' dialog includes the text: "Real [1E-20, 1.]; Nrows = NRWTRM (NRWTRM = 3) 1/meter" and "Resuspension weathering equation coefficient."

Regional Characteristics

- Farmland and nonfarmland wealth
 - Value of property per area or per person that would need to be recreated
 - Fraction of value due to improvements



Outputs

- Population dose
 - By organ over a distance interval
- Economic cost results
 - Breakdown of economic costs over a distance interval
- Action distance results
 - Extent to which remedial actions are required
- Impacted area/population
 - Areas and number of people affected by emergency, intermediate, and long-term phase actions
- Individual food ingestion doses
 - Breakdown of doses from food types and water
- Impacted population results

Summary

- CHRONC models treat decontamination, interdiction, condemnation of property
- Most parameters do not require frequent reexamination
- A few parameters are site specific
 - Shielding and exposure
 - Property values and possibly other costs
- Intermediate-phase duration may depend on magnitude of release