Team Microfluidics/Arsenic in water: Primary Discussion Points

- Assumptions:
  - Mechanism is colorimetric with optical detection (shift from red to blue at 0.01 mg/L)
    - We will assume no need for microscope (free App – e.g., maglight, App that comes with the kit)
      - Correct App available (assumption)
  - Vision of deployment has to be more clear
    - Sold as a kit with the device, reagents, etc.
    - Sold to Well-owners, EPA, developing countries?
      - Could be good outreach for developing countries? IF they have the infrastructure and raw materials to run it…
  - science has been worked out already
    - 100 mL 50 nm is $900 0.01% ($0.18 per sample)
- The Joe Stetter Process:
  - First is customer vision
  - Second is Master Design Review Document
    - Engineering document of how to meet vision
  - Build and Test parameters, implementation
  - Evaluation of data to see how close you are
  - Revise MDRD

Team Microfluidics/Arsenic in water: Primary Discussion Points

- Factors impacting the reproducibility of the manufacturing method and final product
  - Need to worry about fouling (bio/chemical)
    - Single use, front end filtration
    - Determines cost
  - Injection molding/stamping would help fix the reproducibility issues
  - Include larger imaging area
- Factors to consider when choosing materials (e.g., cost, purity, source)
  - Material selection is good (EHS): Gold and silica
  - Cost of materials? (gold np) Is this the driver in cost?
    - 100 mL 50 nm is $900 0.01% ($0.18 per sample)
- The plan for testing, including field/test conditions, regulatory requirements, scope, etc.
  - What is the sensitivity? What other water chemicals can give false positives?
  - Need to test the stamped/molded material to ensure similar activity
  - Need to test the shape of the viewing port/collector to test fidelity
    - Can you see the difference between 10 ppb and 9? 10 and 1? Need to fully characterize fully (+/- acceptable range)
  - What is the error caused by variability in AuNP solution
  - Evaluation across large variety of well waters

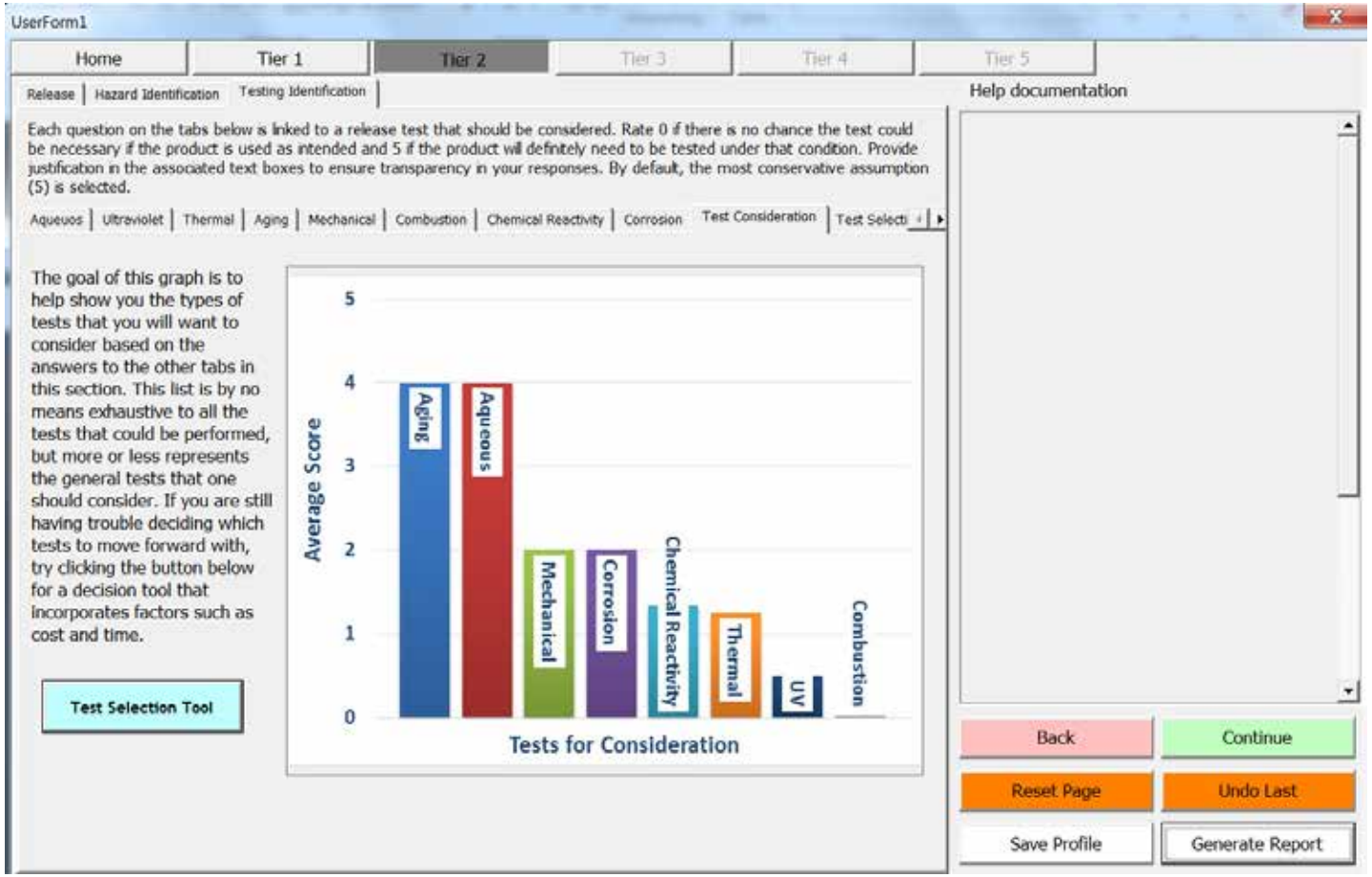
Team Microfluidics/Arsenic in water: Other Considerations (1 of 2)

- Factors impacting the scalability of the manufacturing method
  - 3D printing is less expensive for R&D, but may be too expensive for manufacturing
    - Probably cheaper to be stamped or injection-molded
    - That would fix tolerance issues.
- Limitations in terms of raw materials and processing technologies
  - Requirement of treating the flow channel surfaces
- Manufacturing cost drivers for this technology
  - Cost of gold ($0.18 per sample)
- Remaining technical issues hindering commercialization of this technology
  - Level of education for users? Homeowner in rural area?

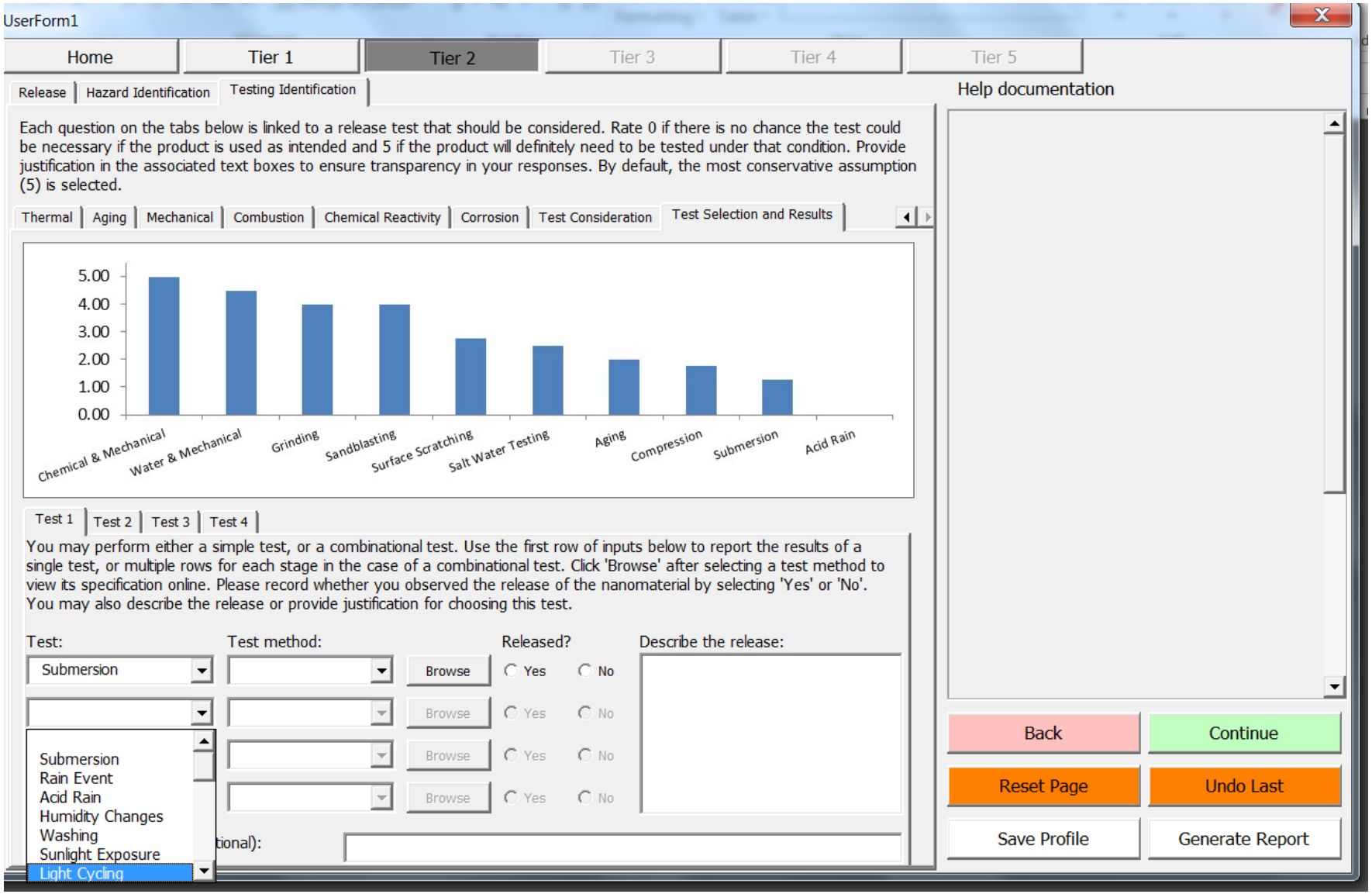
Team Microfluidics/Arsenic in water : Other Considerations (1 of 2)

- Factors that will influence the decision to manufacture in-house vs. contracting out
  - Cost
  - Reproducibility
- Life cycle considerations (e.g., device or effluent disposal)
  - Very small volumes
- Major safety concerns for manufacturing the sensor
  - See NanoGRID report
- Other (please specify)

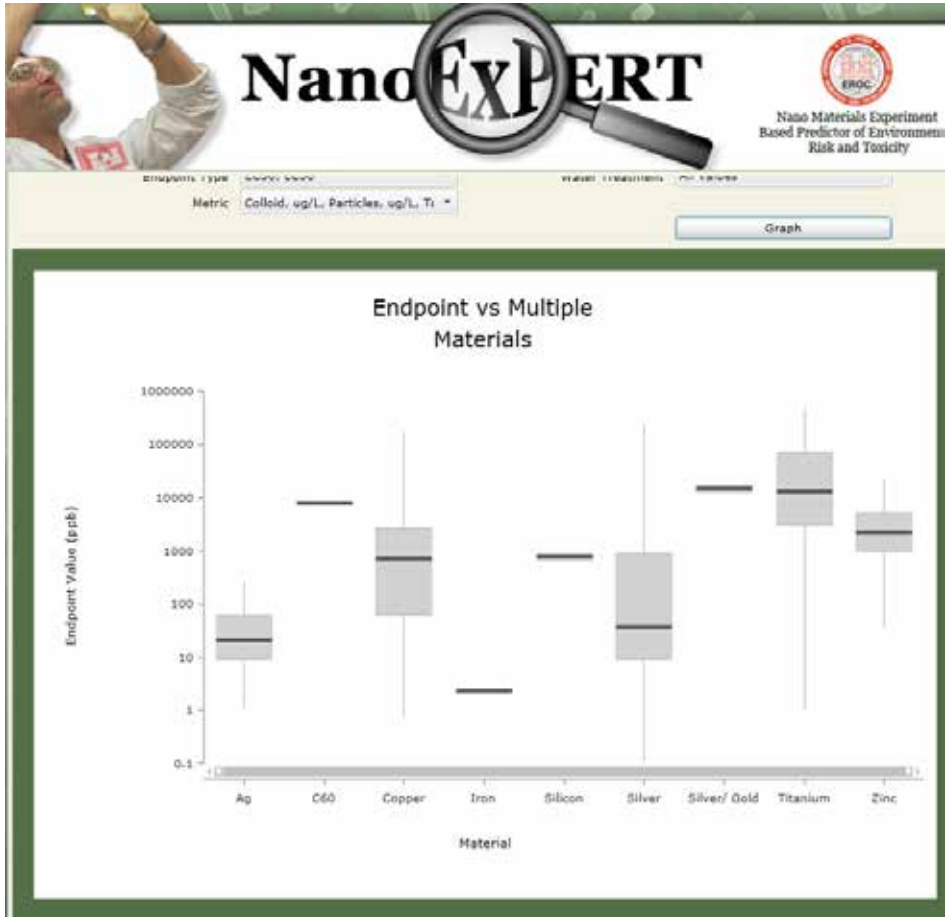
Test selection for durability



MCDA combinational testing output

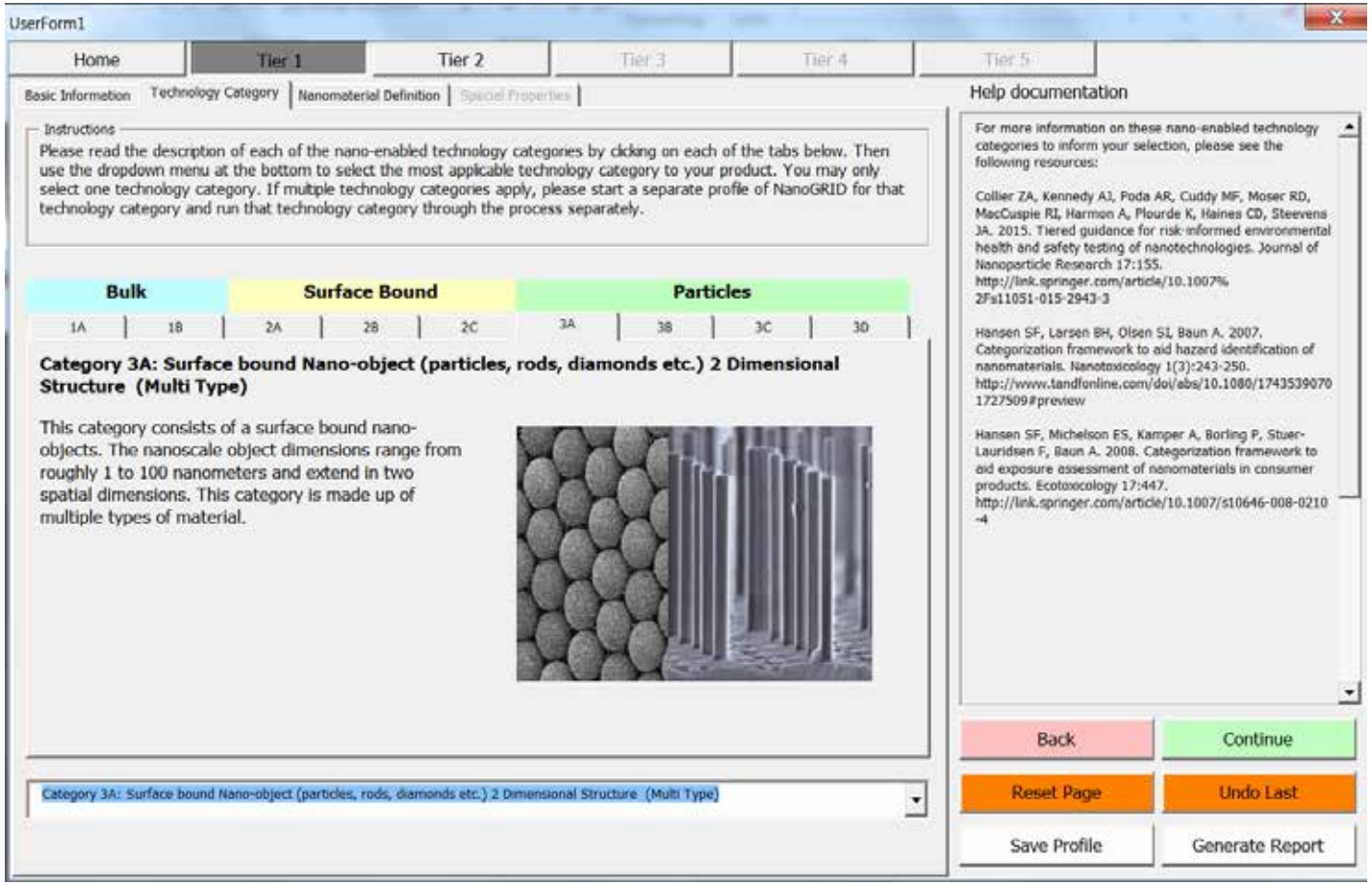


Tiers 2/4: environmental hazard screening: low; exposure may not be of concern; manufacturing occupation safety concern for silica before suspended

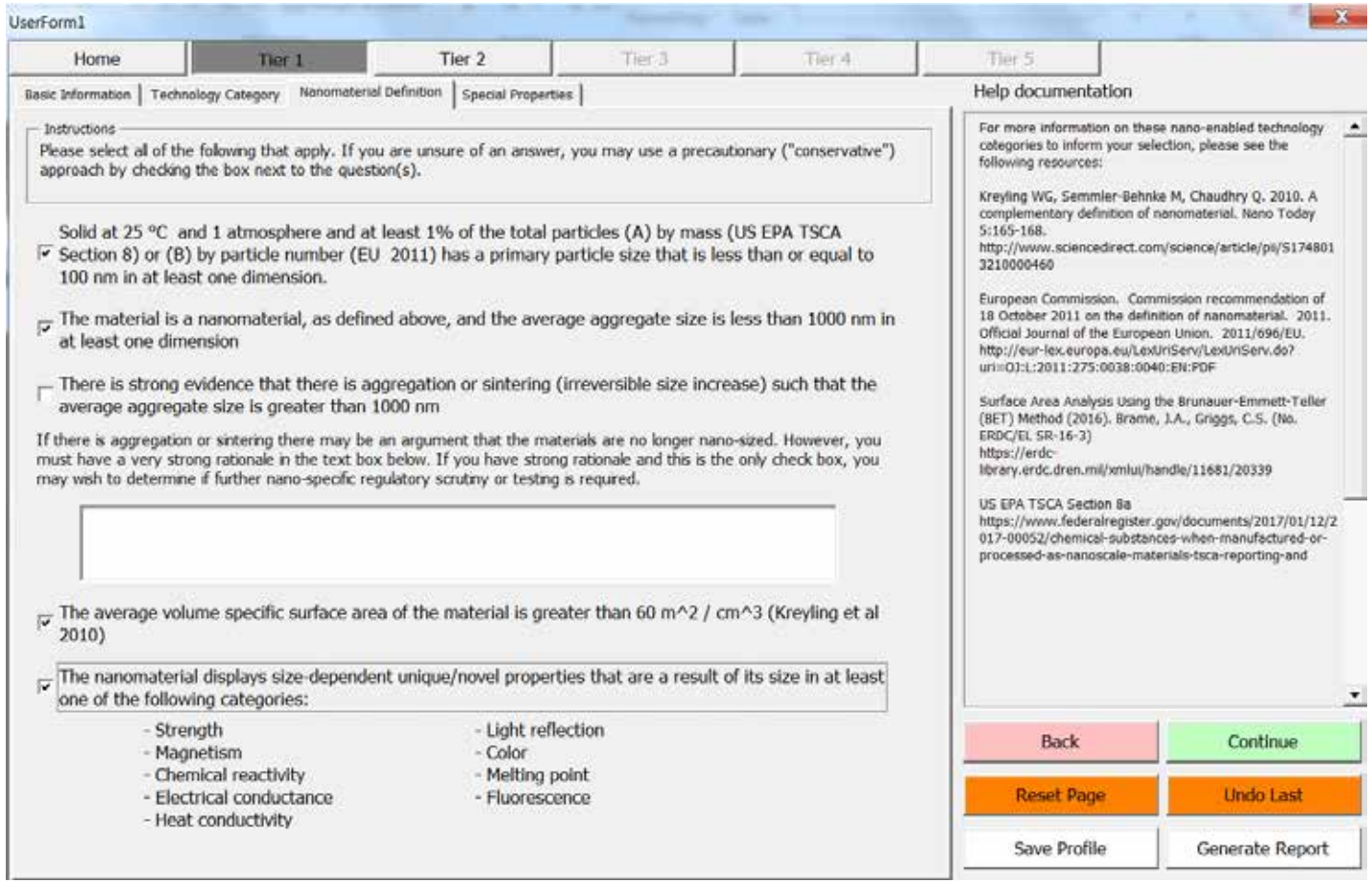


Gold sensor for As

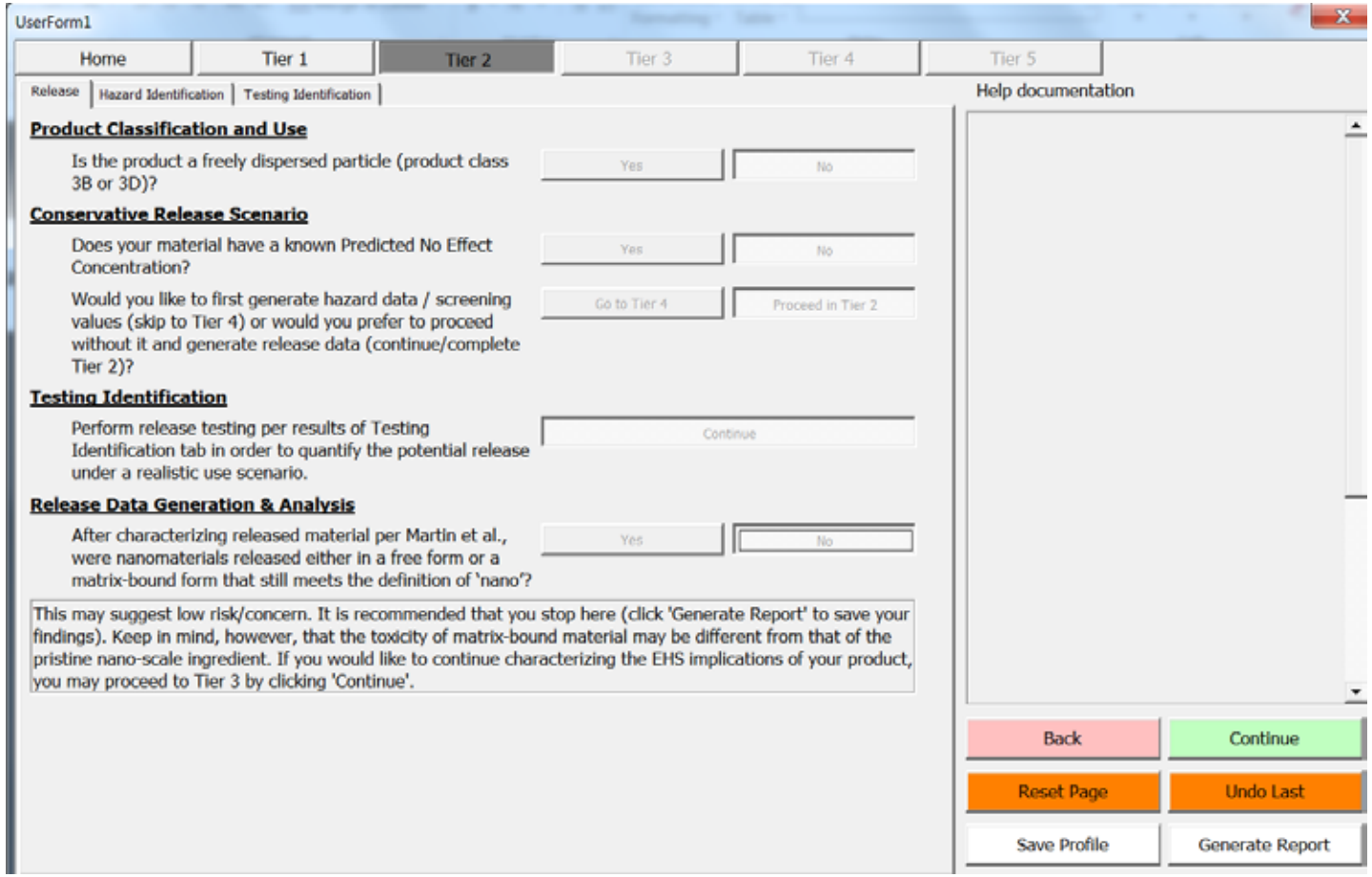
Use of nano-enabled technology structure category cannot be excluded from regulatory testing



Use of nanoparticle cannot be excluded from regulatory testing



Perform tests: Low release potential?



Hazard values entered for demonstration purposes: requires more thorough literature review