The document outlines various considerations and research priorities for changing the wall materials in the DIII-D tokamak to enhance its relevance to future fusion reactors, particularly ITER. Key points include:

1. **Material Selection and Validation**:
   - Emphasis on selecting wall and divertor materials that are reactor-relevant while maintaining unique features of DIII-D.
   - The goal is to make a significant leap in validating these materials, not just incremental advancements.
2. **Core-Edge Integration**:
   - Focus on achieving compatibility between core and edge plasmas, especially with non-carbon walls.
   - Key deliverables include demonstrating stable advanced divertor scenarios and managing impurity transport effectively.
3. **Research Deliverables**:
   - Develop and refine wall conditioning techniques (e.g., boronization, siliconization).
   - Study tungsten (W) interactions, including sputtering, transport, and core-edge integration.
   - Evaluate alternative materials like advanced W alloys and liquid metal components.
4. **Diagnostics and Maintenance**:
   - Develop new diagnostics to monitor plasma-material interactions and fuel retention.
   - In-situ maintenance methods for assessing and repairing W components.
5. **Scenario Development**:
   - Explore non-ELMing (edge localized mode) scenarios and integrate them with W walls.
   - Develop strategies for mitigating risks in ITER's high Q scenarios, such as low-Z coatings and material injections.
6. **Material Properties and Performance**:
   - Address erosion, fuel recycling, and heat flux handling of divertor materials.
   - Test effects of different materials on plasma contamination, detachment, and edge temperature control.
7. **Reactor-Relevant Research**:
   - Apply key physics developed on DIII-D to a reactor-relevant environment.
   - Study material degradation, redeposition, and accumulation in different locations on the walls.
   - Understand the impact of new wall materials on momentum and power balance in the scrape-off layer (SOL) and divertor.
8. **Alternative Wall Solutions**:
   - Consider less conventional materials like silicon carbide (SiC) and their compatibility with high-performance core plasmas.
   - Explore materials that can handle extreme heat fluxes, minimize erosion, and facilitate tritium recovery.

Overall, the document stresses the importance of selecting and testing wall materials that can support high plasma performance, manage impurities, and withstand the harsh conditions of fusion reactors, thereby advancing the understanding and development of fusion power technology.