

River Protection Program Supplemental Treatment Updated - DBVS Status

October 2007

U.S. Department of Energy



Office of River Protection



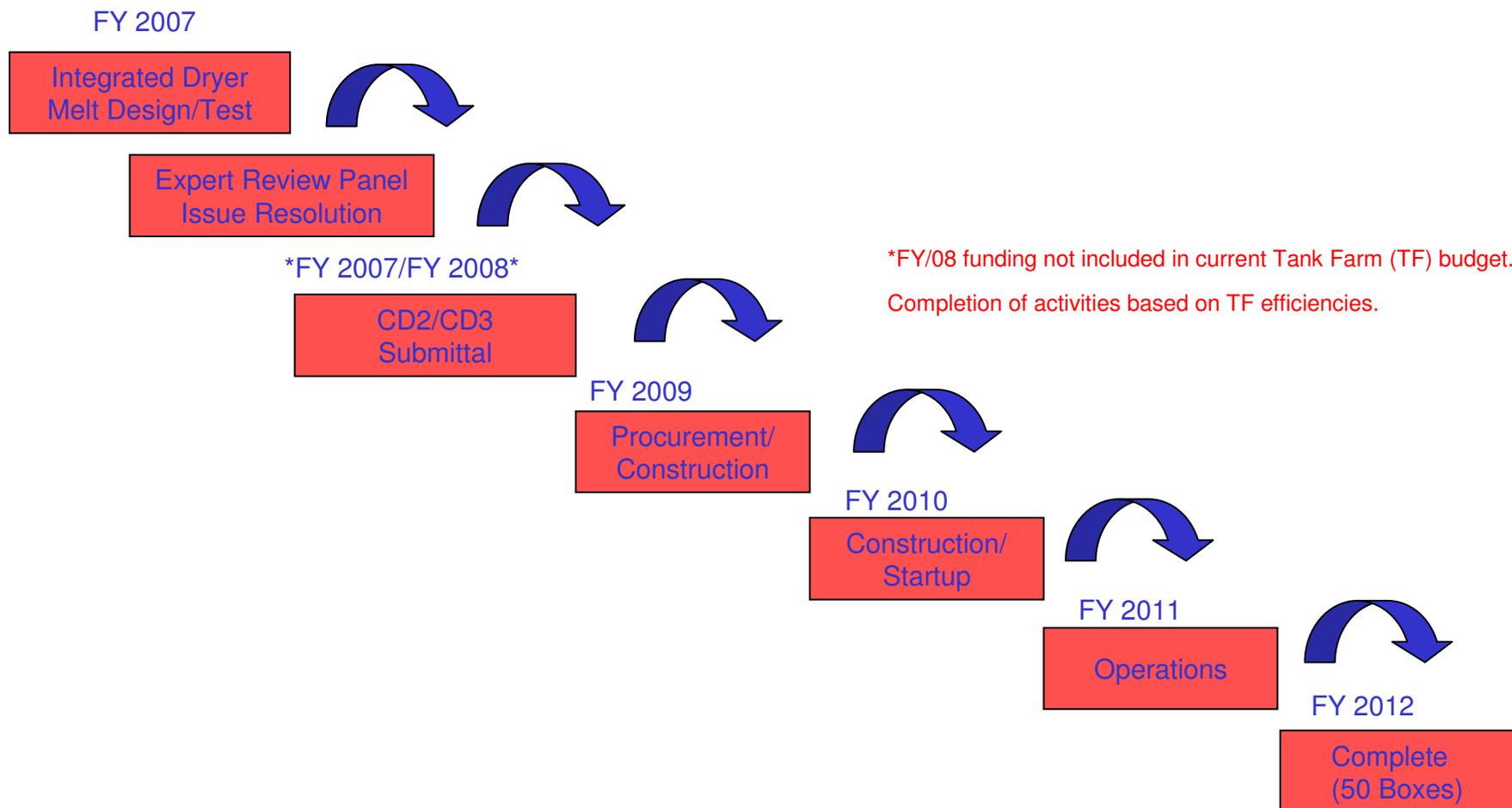
CH2MHILL

DBVS Background – Update since last meeting

- Integrated testing complete – analysis on-going
- Cost/Schedule baseline review complete - awaiting close-out of corrective actions
- Revised Baseline Cost
 - Total cost: \$229.73M (including \$13.05M contingency)
 - Cost-to-date: \$99.6M
 - Estimated cost to complete: \$120.26M
- Baseline ready for CD-2 approval

Hanford Supplemental Treatment Program DBVS Project

DBVS PROJECT EXECUTION SCHEDULE



Update DBVS Discussion Topics

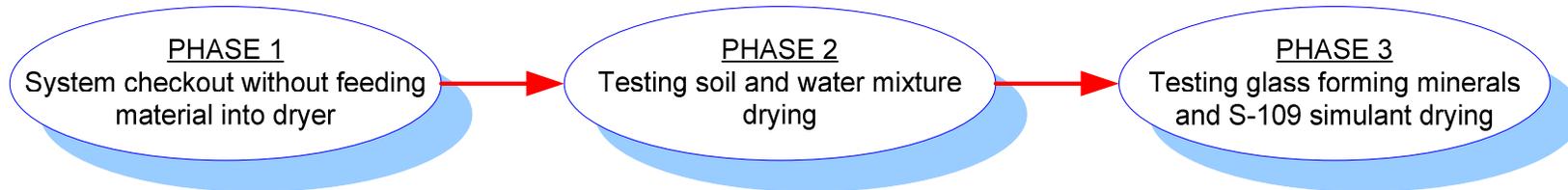
- Safety Basis
- 10,000 Liter Full-Scale Dryer Testing Results
- Integrated Dryer Melt Test Qualitative Results
- Design Modifications
- External Independent Review Status

Update DBVS Discussion Topics

- **Safety Basis Progress**
- As part of the preliminary safety analysis documentation review, four confirmatory tests
 - 1.) the cellulose material is non-combustible,
 - 2.) assumed flammable gas generation rate assumptions are valid,
 - 3.) organic nitrate reaction is not a hazard in the dryer, and
 - 4.) determine maximum moisture content of the feed to determine if steam could overpower the off-gas system. Confirmatory test results to be completed the week of October 15th.
- Provided an overview briefing on validation testing to four members of the HAB Tank Waste Committee
- As promised the final test report and supporting analysis will be provided to the HAB Tank Waste Committee when complete.

10,000 Liter Full Scale Dryer Testing

Phased Approach



Issues/Results

- Modified shaft vacuum seals from plastic lip seal to graphite packing rope for better seal longevity
- Conditioned support systems (vacuum pump, condenser, chiller, steam supply, and hydraulic power unit) and obtained system baseline data including thermal expansion
- Identified dryer mass limit that could be turned by the shaft rotation hydraulic system
- Optimized dryer sintered metal filter pulse-back settings
- Demonstrated bleed and feed operation
- Achieved minimal product criteria (e.g., moisture 3-5 wt%, greater than 50% pellets larger than 29 mesh)



10,000 Liter Full Scale Dryer Testing

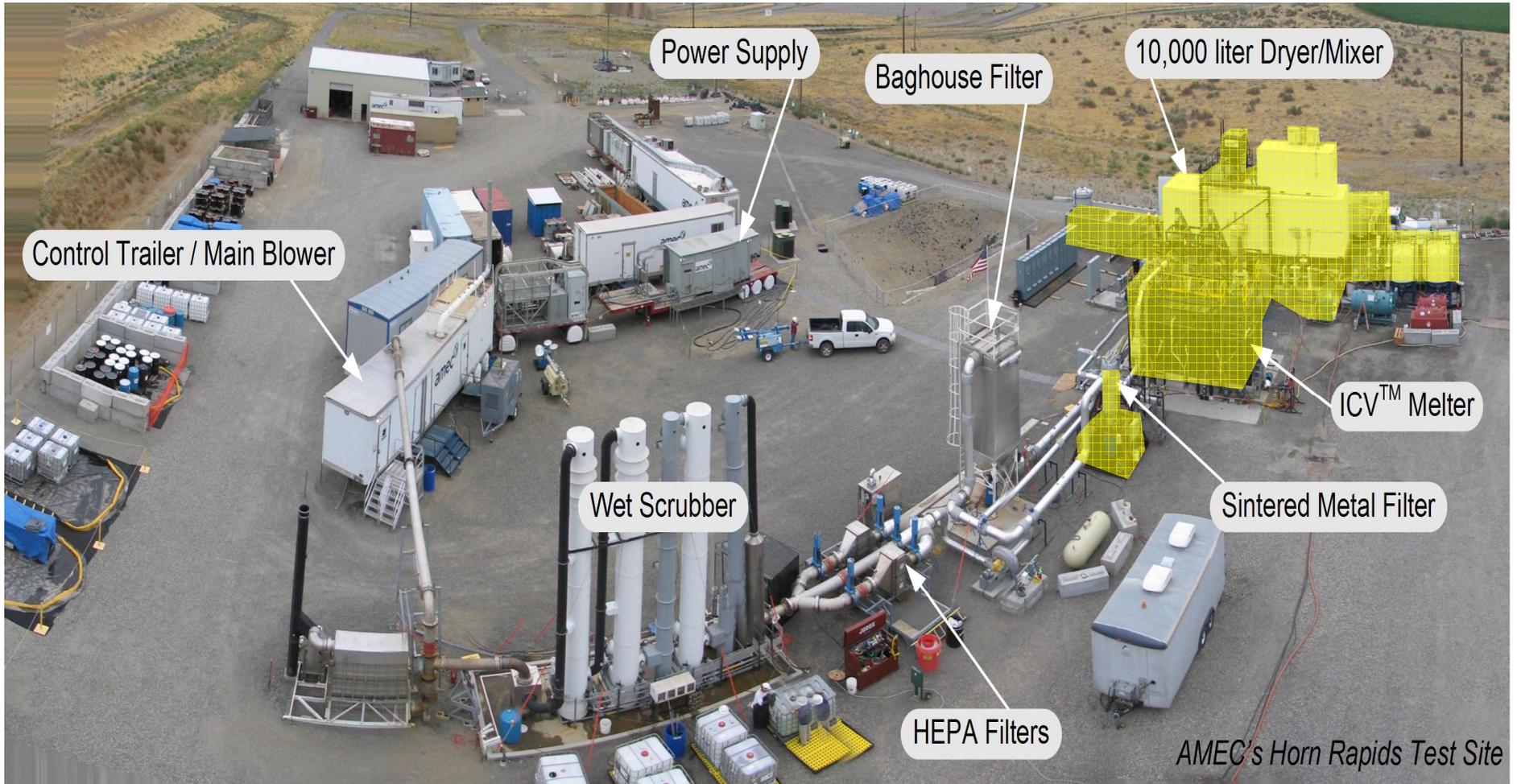
Test Objectives

	PARTIAL	MET
Dry prototypical melt feed (using S-109 simulant) while demonstrating stable moisture process control, stable dryer support system operation, and continuous/discrete liquid feed to dryer		✓
Obtain product and operating data to verify flowsheet design, and dried product assumptions		✓
Obtain dried product and dryer condensate data, including filter fines , to verify safety analysis assumptions (e.g., decontamination factor), behavior and fate of non radioactive constituents of potential concern (e.g., Re and I), and validate process flowsheet	✓	
Examine feasibility of indirect dryer product moisture monitoring (instrumentation)	✓	
Determine effects on dryer and dried product of extended (non-heated) dryer plow rotation		✓
Demonstrate viability of semi-continuous dried product discharge		✓

Conclusions and Recommendations

- Full Scale integrated testing was invaluable for DBVS design verification and operations strategy
- Dryer system performance supported test objectives
- System requires additional run time to maximize pellet formation to increase melt throughput and reduce dry material handling issues

Integrated Dryer/Melt Test Facility Layout



AMEC's Horn Rapids Test Site



DBVS Prototypic Equipment

Large Scale 38D Integrated Dryer/Melt Test

- Demonstrate Integrated System Operations
- Validate Prototypic Systems Operations
- Validate MIS Mitigation
- Demonstrate Glass Product Viability

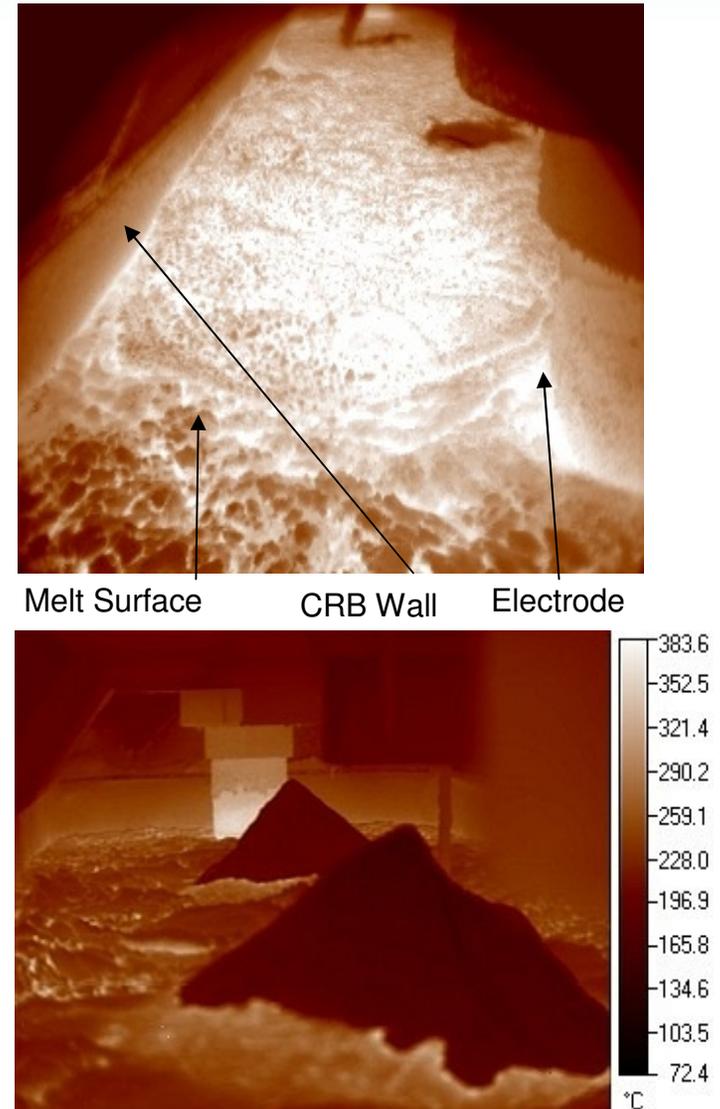
Integrated Dryer Melter Test Results Status

Objective	Success Criteria	Results
Demonstrate integrated dryer and melt system operations	Complete minimum of 20 feed discharge cycles from 10,000 liter dryer to the In-Container Vitrification	Exceeded Objective (30 feed discharge cycles)
Demonstrate resolution to the Molten Ionic Salt (MIS) issue	<p>Estimated Tc mass in Castable Refractory Block/Sand <3.7% of total fed (based on Re surrogate)</p> <p>No clumped salt (field observations)</p> <p>No MIS penetration beyond 50% of CRB depth (field observations/Scanning Electron Microscopy analyses)</p>	<p>Final results Dec 2007</p> <p>Objective Met: No clumped sand</p> <p>Objective Met: Penetration < 10% of wall thickness</p>
Demonstrate acceptable glass product	Meet Waste Treatment Plant Vapor Hydration Test and Product Consistency Test performance specifications	Final results Dec 2007

Test Run Summary

Run Stage	Details
Test Duration	Total Duration: 210.5 Hrs
Material Processed	100% of planned waste feed processed Pre-dried: 14,492 Kgs Integrated operations: 43,476 Kgs (30 feed cycles) Clean glass batch: 1,886 Kgs Total glass produced: 44,200 Kgs
Melt Temperatures Maintained	1250-1300 °C
Melt Power	300-650KW

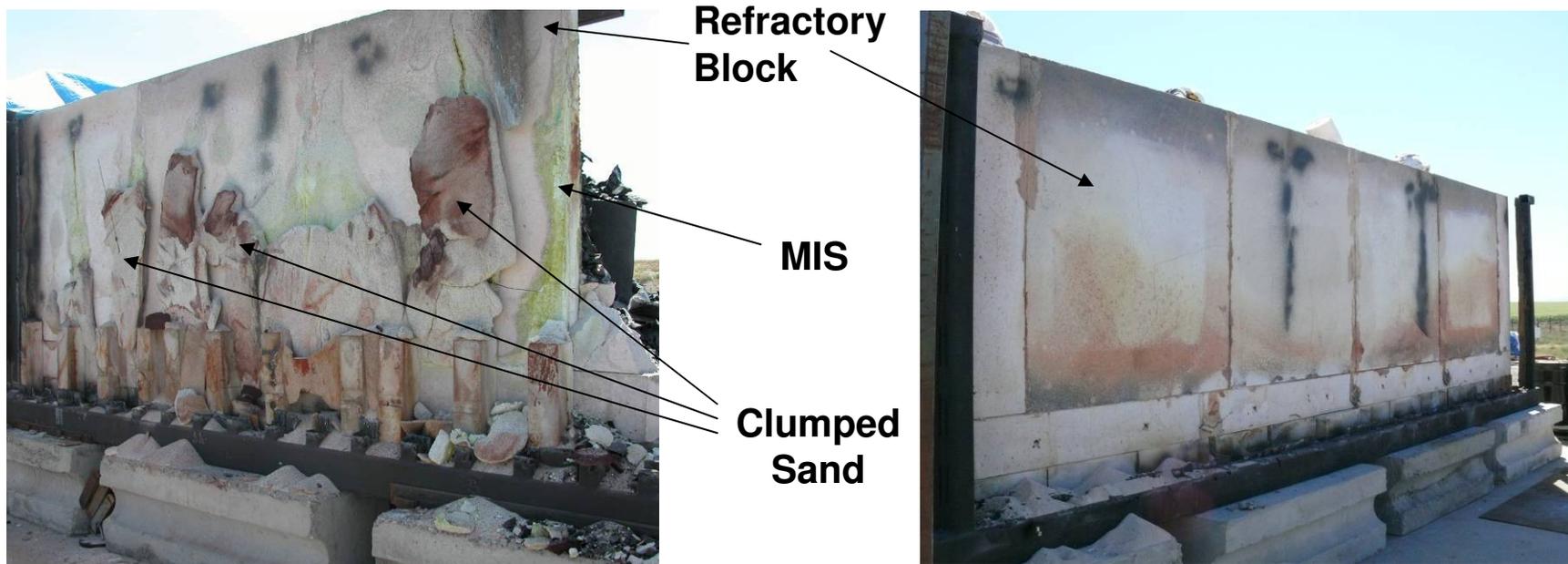
IR Camera Image of Melt Surface Near End of and during Test



Qualitative Results: Refractory Package

October 2006

September 2007



Comparison of October 2006 to September 2007
after partial disassembly.

Technical Risks Identified/Resolved



Risk Item	Risk Resolution	
Re / Tc in top layer	 <i>Resolved in Test 38B</i>	
Iron slag formation	 <i>Resolved in Test 38B1/38C</i>	
Hot Spot / Box shell	 <i>Resolved in Test 38C</i>	
Cs plating on hood / pipe	 <i>(EM-21) Resolved in Test 38C with cold cap management</i>	
Molten Ionic Salt (MIS)	 <i>Completed crucible/ES/LS scale mitigation tests using glass forming materials/ES and FS test completed</i>	
Integrated System Test	 <i>Successful dryer testing lab/engineering scale Integrated Dryer Melt Test (38D) demonstrated Feed system, drier, filter, melt, glass forming materials demonstrated</i>	

Integrated Dryer Melt Test Design Modifications

- Modify ICV off-gas pipe routing/mechanical cleanout design addition
- Revise recirculation loop waste feed to dryer with dedicated feed pump
- Modify dryer feed port(s)/dried waste feed airlock(s) design
- Additional instrumentation to improve process control (moisture/temperature)
- Modify ICV electrode seal(s) design

DBVS External Independent Review

- External Independent Review final report issued 8/20/07
- All Corrective Actions Complete for CD-2
 - 6 Open Items (programmatic in nature) to be Completed in Support of CD-3
- External Independent Review team concurs with corrective actions
- Package Ready for EM Approval of CD-2

Project Funding and Support

Presented Results to EM-1 (October 5, 2007)

Proposed FY08 Work-scope

- Complete Quantitative testing of Melt 38D
- Additional Confirmation Dryer Run Time
- Advancement of BV Waste Envelope Testing: Initiate glass formulation testing
- Safety Basis and Design Improvements
 - Complete PDSA/Final Design
- Expert Review Advisory Panel Follow Up:
 - Reconvene Core Area Expert Review Panel Members for technical progress follow-up