Summary of ARC Decision Points & Deliverables

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Tables of decision points and deliverables for the ARC Program Areas: Moisture Damage, Fatigue, Engineered Materials, Vehicle-Pavement Interaction, and Validation

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Table 1: Summary of Decision Points and Deliverables for the Moisture Damage Program Area

Name of Deliverable	Type of Deliverable	Description of Deliverable	Original Delivery Date	Revised Delivery Date	Reason for changes in delivery date
M1a-5: Propose a novel testing protocol (UWM)	Draft Report	Development and Implementation of the Bitumen Bond Strength test for Moisture Damage Characterization	1/10	3/11	Additional analysis/verification on the BBS test is included: operator sensitivity data, validation with TSR mixture testing and comparison with contact angle measurements
	Final Report	Report in 508 format on the use of the Bitumen Bond Strength test for Moisture Damage Characterization	1/11	9/11	Additional analysis/verification data is included and therefore additional time is required
M1b-2: Work of Adhesion at Nano-Scale using AFM	Test Method	A method to determine surface roughness of aggregate and fines based on AFM	12/30/11		N/A
M1b-3: Identify mechanisms of competition between water and organic molecules for aggregate surface	Draft Report	Final report documenting the testing protocol and findings of experiments on asphalt-aggregate interactions	10/31/10	10/31/11	Program activity delayed in order to redirect critical manpower to PANDA development
	Final Report		4/30/12		
M1c: Quantifying Moisture Damage Using DMA	AASHTO procedure	AASHTO procedure for preparing Fine Aggregate Matrix (FAM) specimens for the DMA testing	9/30/10	Complete	N/A
	Draft Report	Use of the method to characterize various mixtures with comparison to field performance	12/31/10		
	Final Report		3/31/11	6/30/11	Report to be made 508 compliant
M2b-1: Measurement of diffusion of water through thin films of asphalt binders and FAM	Draft Report	Mechanism and model for the diffusion of moisture through films of asphalt binder, methods to measure diffusivity in binders and mortars, and the influence of wet-dry cycles on the cumulative moisture induced damage.	6/30/10	Complete	
	Final Report		9/30/11	12/31/11	The dissertation was completed at TAMU and needs editing for 508 format
M2b-2: Work of Cohesion at Nano-Scale using AFM	Test Method	A method to determine ductile-brittle properties via AFM measurements	12/30/11		N/A

Name of Deliverable	Type of Deliverable	Description of Deliverable	Original Delivery Date	Revised Delivery Date	Reason for changes in delivery date
M3a: Aggregate Surface Characteristics	Research report	Report on methods and experimental findings and utility of methodology and findings	6/30/10	Complete	
	Research report	Describes implementation of findings into PANDA and expands experiments to characterization for four aggregates used for validation experiments	6/30/11		
M4a: Micro-mechanics Model (TAMU)	Draft Report	Numerical micromechanical model of moisture-induced damage in asphalt mixtures. This report will include the algorithm and modeling method.	Sep-11		
	Final Report		Sep-11	Mar-12	
M4a: Micromechanics Model Development (Moisture Damage) (UNL)	Models and Algorithm	Cohesive zone modeling with moisture damage of asphalt mixtures considering mixture microstructure: modeling methodology, constitutive theory, testing protocols, test data, model simulation/calibration/validation, and user-friendly manuals.	3/31/11	No change	N/A
	Draft report		06/30/11		
	Final report		12/31/11		
M4a: Lattice Micromechanics Model (NCSU)	Draft Report	Documenting development of lattice micromechanical model	2/14/12		N/A
	Final Report	Documenting development of lattice micromechanical model	8/14/12		
M4a: Model to Bridge Continuum Damage and Fracture (NCSU)	Final Report		2/14/12	2/14/12	N/A
M4c: Unified Continuum Model (TAMU**)**	Models and Algorithm		6/30/11	12/31/11	Model needs to be updated based on calibration with experimental measurements
	Draft Report	Draft Report on the moisture-damage modeling	9/30/11		
	Final Report (M5, M4c, F1b-1, F1c, F1d-8, F3c, and V3c)	Report in 508 format that describes a comprehensive and integrated approach to assessing moisture damage on three scales; binder and aggregate components, fine aggregate matrix with DMA and in the full mix – Alternative to more sophisticated PANDA approach	03/31/12	6/30/12	N/A

Name of Deliverable	Type of Deliverable	Description of Deliverable	Original Delivery Date	Revised Delivery Date	Reason for changes in delivery date
M5: Moisture Damage Prediction System	Protocol	Protocol for implementation of component selection	6/30/11		
	Experimental method	Experimental method for measuring moisture damage resistance of full mixture	9/30/11		
	Draft Report (M5, M4c, F1b-1, F1c, F1d-8, F3c, and V3c)	Report in 508 format that describes a comprehensive and integrated approach to assessing moisture damage on three scales; binder and aggregate components, fine aggregate matrix with DMA and in the full mix – Alternative to more sophisticated PANDA approach	12/31/11		
	Final Report (M5, M4c, F1b-1, F1c, F1d-8, F3c, and V3c)		3/31/12	6/30/12	Preparation of a comprehensive report.

Table 2: Summary of Decision Points and Deliverables for the Fatigue Program Area

Name of Deliverable	Type of Deliverable	Description of Deliverable	Original Delivery Date	Revised Delivery Date	Reason for changes in delivery date
F1a: Cohesive and Adhesive Properties (TAMU)	Draft Report	Draft Report on Cohesive and Adhesive Properties, 508 compliant	11/11	N/A	N/A
	Final Report		6/30/12		
F1b-1: Nonlinear viscoelastic response under cyclic loading (TAMU)	Models and Algorithm	A constitutive model that accounts for the nonlinearity and three - dimensional stress state of the material including a method to obtain model constants for asphalt binders.	3/31/09 6/30/10 12/31/11	3/31/12	It is more efficient and informative if the three different final reports, models and algorithms are consolidated into a single final report. The work at UT Austin that will make up the final report is 60% complete.
	Draft report		12/31/08 12/31/11		
	Final report		6/30/08 3/31/12	6/30/12	
F1b-2: Viscoelastic properties under monotonic loading (TAMU)	Draft Report	Documentation of PANDA Models and Validation Including the Method for Analysis of Viscoelastic Properties	11/11	N/A	N/A
	Final Report (M5, M4c, F1b-1, F1c, F1d-8, F3c, and V3c)		3/12	N/A	N/A
F1c: Aging (Unified Continuum Model for Aging)	Draft Report	Draft Report on the aging modeling	03/12	N/A	N/A
	Final Report (M5, M4c, F1b-1, F1c, F1d-8, F3c, and V3c)		3/31/12	6/30/12	
F1c-2. Experimental Design	Report	Experimental Design Report	1/09	Complete	N/A

Name of Deliverable	Type of Deliverable	Description of Deliverable	Original Delivery Date	Revised Delivery Date	Reason for changes in delivery date
F1d – 1,2,3,4,5a,5b,8: Healing (TAMU)	Models and Algorithm	A mathematical model for self-healing at the micron scale, partial validation of this model, measurement of properties related to this model, measurement of overall healing as a function of damage and rest period, and micro to nano scale evaluation of properties that influence fracture and self-healing	06/30/11	3/31/12	It is more efficient and informative if the different final reports, models and algorithms are consolidated into a single final report. The final report is based on two theses: the thesis from Texas A&M University is complete and work for the thesis from UT Austin is 70% complete.
	Draft report		06/30/10 06/30/11 12/31/11		
F1d-6: Evaluate relationship between healing and endurance limit of asphalt binders (UWM)	Draft Report	Report summarizing major findings for evaluation of healing of binders by means of cyclic testing with rest periods	12/11	N/A	N/A
	Final Report	Final report in 508 format on healing characterization of binders and its relation to fatigue performance	1/12	6/12	Final report submission date moved back to allow at least 6 months between draft and final report submission.
F1d-8: Coordinate Form of Healing Parameter with Micromechanics and Continuum Damage Models (TAMU)	Draft Report (M5, M4c, F1b-1, F1c, F1d-8, F3c, and V3c)	Draft Report on the self-healing modeling	12/11		
	Final Report (M5, M4c, F1b-1, F1c, F1d-8, F3c, and V3c)	Report on the self-healing modeling	3/12	6/12	

Name of Deliverable	Type of Deliverable	Description of Deliverable	Original Delivery Date	Revised Delivery Date	Reason for changes in delivery date
F2a-5: Analyze data and propose mechanisms (UWM)	Draft Report	Report summarizing major findings for the effect of modification on asphalt binder performance at high and intermediate temperatures.	10/11	N/A	N/A
	Final Report	Report in 508 format summarizing major findings for the effect of modification on asphalt binder performance at high and intermediate temperatures	1/12	4/12	Final report submission date moved back to allow at least 6 months between draft and final report submission.
F2d: Structural Characterization of Micromechanical Properties in Bitumen using Atomic Force Microscopy	Protocol for Measuring Viscoelastic Properties Using AFM	Protocol for preparing samples and taking measurements in AASHTO format – Protocol development complete, AASHTO format planned for 5/30/11	7/31/10	N/A	N/A
	Evaluation of Impact of Aging and Moisture Conditioning	Complete	12/15/10	N/A	N/A
	Final Research Report		2/28/12	N/A	N/A
F2e-2: Selection of Testing Protocols (UWM)	Draft Report	Report on the development and implementation of the Binder Yield Energy (BYET) test and the Linear Amplitude Sweep Test (LAS)	4/09	Complete	N/A
	Final Report		7/09		
	Draft Report		4/10		
	Final Report		7/10		
F2e-4: Verification of Surrogate Fatigue Test (UWM)	Draft Report	Correspond to reports in F2e-2	10/10	Complete	N/A
	Final Report		1/11		
F2e-6: Recommendations for Use in Unified Fatigue Damage Model (UWM)	Draft Report	Report summarizing major findings for each subtask. The report includes: evaluation of correlations between binder and mixture fatigue performance, comparison between binder fatigue testing procedures, verification/validation of LAS test	11/11	N/A	N/A
	Final Report	Final report in 508 format on the development and implementation of the Linear Amplitude Sweep (LAS) Test. It includes the latest AASHTO standard.	1/12	5/12	Final report submission date moved back to allow at least 6 months between draft and final report submission.

Name of Deliverable	Type of Deliverable	Description of Deliverable	Original Delivery Date	Revised Delivery Date	Reason for changes in delivery date
F3b-1: Micromechanics Model Development (Fatigue)	Models and Algorithm	Cohesive zone fracture modeling of asphalt mixtures considering inelasticity, nonlinearity, rate-dependent fracture, and mixture microstructure: modeling methodology, constitutive theory, testing protocols, test data, model simulation/calibration/validation, user element (UEL) codes in ABAQUS, and user-friendly manuals. Multiscale modeling of asphaltic mixtures and pavements: modeling methodology, constitutive theory, and parametric analyses of the model.	3/31/11	No change	N/A
	Draft report		06/30/11	No change	N/A
	Final report		12/31/11	No change	N/A
F3c: Development of Unified Continuum Model	PANDA Workshop	Workshop on PANDA Models and Validation Results	8/11	N/A	N/A
	Draft Report	Documentation of PANDA Models and Validation	11/11	N/A	N/A
	Final Report		3/12	6/30/12	N/A
	UMAT Material	PANDA Implemented in Abaqus	3/12	N/A	N/A

Table 3: Summary for Decision Points and Deliverables for the Engineered Materials Program Area

Name of Deliverable	Type of Deliverable	Description of Deliverable	Original Delivery Date	Revised Delivery Date	Reason for changes in delivery date
E1a- Model and Algorithm (TAMU)	Model and Algorithm	The model and algorithm for testing and analysis of damaged asphalt mixtures in tension		09/01/11	
E1a- Continuum Damage Permanent Deformation Analysis for Asphalt Mixtures (TAMU)	Final Report	Ph.D. dissertation at TAMU that describes the viscoplastic mechanism for permanent deformation of the asphalt mixtures and provides the testing protocols and analysis methods to acquire the input parameters of the PANDA program.	12/31/2010	12/31/2011	Time is needed to make the product compatible with the PANDA program
E1a- Develop a RDT DMA Testing Protocol (TAMU)	Technology Transfer	This new testing protocol is stress controlled repeated tension testing method and will be used to replace the previous torsional DMA testing method	08/15/2010	02/15/2011	New DMA Machine Arrive Late
E1a- Standardize Testing Procedure for Specifications (TAMU)	AASHTO Specification	Develop a Standard Specification to use as a comparative test to evaluate fracture properties, healing and moisture damage of FAM	4/30/11	09/30/2011	Expanded scope
E1a- Develop a New DMA Testing Protocol for Compression (TAMU)	AASHTO Specification	Develop a Standardized testing method to use as a comparative test to evaluate compressive properties of FAM		09/15/2011	
E1b1-5: Standard Testing Procedure and Recommendation for Specifications (UWM)	Draft Report	Report on final conclusions and proposed procedures and specifications	7/11	N/A	N/A
	Final Report		1/12	3/12	Final report submission date moved back to allow at least 6 months between draft and final report submission.
E1b-2i. Literature review (UWM)	Draft Report	Review of previous work on indentation and closed formed solution to the indentation problem.	7/09	Complete	N/A
E1b-2iii. Preliminary testing and correlation of results (UWM)	Draft Report	The use of indentation test for characterization of asphalt binders.	1/10	Complete	N/A

Name of Deliverable	Type of Deliverable	Description of Deliverable	Original Delivery Date	Revised Delivery Date	Reason for changes in delivery date
E1b-2iv. Feasibility of using indentation tests for fracture and rheological properties (UWM)	Draft Report	Report on Finite element simulations of the indentation test and correlations with DSR results.	1/11	10/11	Postponed due to significant delays in receiving the modified test setup from the machine shop.
	Final Report		4/11	4/12	
E1c-1ii. Effects of Warm Mix Additives on Mixture Workability and Stability (UWM)	Draft Report	Report of reviewed relevant literature and studies (to be combined with final report)	10/08	Complete	N/A
	Final Report		1/09		N/A
	Draft Report	Impacts of WMA Additives on Asphalt Binder Performance and Mixture Workability	4/11	N/A	N/A
	Final Report		1/12	N/A	N/A
E1c-1v. Field Evaluation of Mix Design Procedures and Performance Recommendations (UWM)	Draft Report	Report on WMA Field Evaluation of Mix Design Procedures and Performance	10/11	N/A	N/A
	Final Report		1/12	4/12	Final report submission date moved back to allow at least 6 months between draft and final report submission.
E1c-2: Improvement of Emulsions' Characterization and Mixture Design for Cold Bitumen Applications	Practice	Mix design method for cold-in-place recycling (CIR) that is consistent with the Superpave technology and that can be used to define the optimum combination of moisture content and emulsion content.	12/11	N/A	N/A
	Practice	Mix design method for cold mix asphalt (CMA) that is consistent with the Superpave technology and that can be used to define the optimum combination of moisture content and emulsion content.	03/12	N/A	N/A
E1c-2i: Review of Literature and Standards (UWM)	Draft Report	Review of Literature and Standards that will be combined with the final draft reports (to be combined with E1c-2vii and E1c-2ix final reports)	7/08	Complete	N/A
	Final Report		10/08		
	Draft Report		4/09		
	Draft Report		7/09		
	Draft Report		1/10		
E1c-2iii: Identify Tests and Develop Experimental Plan (UWM)	Draft Report	Reports outlining the required tests and experimental plan for the study (to be combined with E1c-2vii and E1c-2ix final reports)	4/09	Complete	N/A
	Draft Report		10/09		N/A
E1c-2v. Conduct Testing Plan (UWM)	Draft Report	Report on the results and analysis of tests run in accordance to test plan (to be combined with E1c-2vii and E1c-2ix final reports)	10/09	Complete	N/A

Name of Deliverable	Type of Deliverable	Description of Deliverable	Original Delivery Date	Revised Delivery Date	Reason for changes in delivery date
E1c-2vii. Validate Guidelines (UWM)	Draft Report	Draft report of the performance and Rheological and Bond Properties of Emulsions (to be combined with E1c-2vii final report)	7/09	Complete	N/A
	Final Report	Final report of the performance and Rheological and Bond Properties of Emulsions	4/11	10/11	Final report submission date moved back to allow at least 6 months between draft and final report submission.
E1c-2ix. Develop CMA Performance Guidelines (UWM)	Draft Report	Draft and final report of the performance guidelines of Cold Mix asphalt pavements	10/11	N/A	N/A
	Final Report		1/12	4/12	Final report submission date moved back to allow at least 6 months between draft and final report submission.
E2a-4: Write asphalt modification guideline/report on modifier impact over binder properties (UWM)	Draft Report	Report summarizing effect of modification on low, intermediate, and high temperature performance of asphalt binders. It includes guidelines for modification and cost index for different modification types	10/11	N/A	N/A
	Final Report	Report in 508 format that addresses comments/concerns from Draft Report	1/12	4/12	Final report submission date moved back to allow at least 6 months between draft and final report submission.

Name of Deliverable	Type of Deliverable	Description of Deliverable	Original Delivery Date	Revised Delivery Date	Reason for changes in delivery date
E2b-1: Develop a System to Evaluate the Properties of RAP Materials (UNR with UWM input)	Draft Report	Report on Test Method to Quantify the Effect of RAP and RAS on Blended Binder Properties without Binder Extraction (To be combined with E2b1-b draft and final reports) (UWM input)	4/09	Complete	N/A
	Final Report		4/09		N/A
	Practice	Recommend the most effective methods for extracting RAP aggregates based on their impact on the various properties of the RAP aggregates and the volumetric calculations for the Superpave mix design.	12/10	04/11	Additional testing and verifications were required for some of the reported data
	Draft report	Report on the developed testing and analysis procedure system to estimate the RAP binder properties from binder and mortar testing including fracture results.	10/11	N/A	N/A
	Final report		04/12	N/A	N/A
E2b-1.b: Develop a System to Evaluate the Properties of the RAP Binder (UWM)	Draft Report	Report on the developed testing and analysis procedure system to estimate the RAP binder properties from binder and mortar testing including fracture results.	10/11	N/A	N/A
	Final Report		1/12	4/12	Final report submission date moved back to allow at least 6 months between draft and final report submission.
E2b-3: Develop a Mix Design Procedure	Draft report	Report summarizing the laboratory mixing experiment.	02/12	N/A	N/A
	Final report		08/12	N/A	N/A
E2b-4: Impact of RAP Materials on Performance of Mixtures And E2b-5: Field Trials	Draft report	Report summarizing the laboratory and field performance of field mixtures.	02/12	N/A	N/A
	Final report		08/12	N/A	N/A
E2c-2: Conduct Mixtures Evaluations	Draft report	Approach to identify critical conditions of HMA mixtures	09/11	N/A	N/A
	Final report		03/12	N/A	N/A
E2c-3: Develop a Simple Test	Draft report	Report summarizing the evaluation of mixtures from the Flow Number Task Force group.	11/11	N/A	N/A
	Final report		05/12	N/A	N/A
E2c-4: Develop Standard Test Procedure	Practice	Recommended practice to identify the critical condition of an HMA mix at the mix design stage to avoid accelerated rutting failures of HMA pavements.	12/11	N/A	N/A

Name of Deliverable	Type of Deliverable	Description of Deliverable	Original Delivery Date	Revised Delivery Date	Reason for changes in delivery date
E2c-5: Evaluate the Impact of Mix Characteristics	Draft report	Report summarizing the impact of mixture characteristics on the critical condition of the HMA mixes	02/12	N/A	N/A
	Final report		08/12	N/A	N/A
E2d-2: Identify the Causes of the Thermal Cracking	Draft report	Report summarizes the testing and findings for materials from LTPP sections.	12/11	N/A	N/A
	Final report		06/12	N/A	N/A
E2d-3: Identify an Evaluation and Testing System (UNR with UWM input)	Draft report	Low Temperature Cracking Characterization of Asphalt Binders by Means of the Single-Edge Notch Bending (SENB) Test (UWM input)	04/11	N/A	N/A
	Final report		10/11	N/A	N/A
E2d-4: Modeling and validation of the Developed System (UNR with UWM input)	Draft report	Thermal cracking characterization of mixtures by means of the unified Tg-TSRST device. (UWM input)	10/11	N/A	N/A
	Final report		04/12	4/12	Final report submission date moved back to allow at least 6 months between draft and final report submission.
	Model	Model that can effectively simulate the long-term properties of HMA mixtures in the intermountain region and assess the impact of such properties on the resistance of HMA mixtures to thermal cracking.	03/12	N/A	N/A
E2d-5: Develop a Standard (UNR with UWM input)	Draft standard	Draft standards for the use of the SENB, binder Tg and the Tg-TSRST device. (UWM input)	10/11	N/A	N/A
	Final standard		01/12	4/12	Final report submission date moved back to allow at least 6 months between draft and final report submission.
	Draft standard	Draft standard for the use of the TSRST with cylindrical specimens compacted using the SGC.	03/11	09/11	Delayed due to issues with specimens breaking at the edge.
	Final standard		01/12	N/A	N/A

Table 4: Summary for Decision Points and Deliverables for the Vehicle-Pavement Interaction Program Area

Name of Deliverable	Type of Deliverable	Description of Deliverable	Original Delivery Date	Revised Delivery Date	Reason for Changes in Delivery Date
VP2a-4: Run parametric studies on tire-pavement noise and skid response (UWM)	Draft Report	Draft report on proposed design guideline for noise reduction, durability, safety and costs	1/10	10/11	Software issues with the KUNDT tube for noise measurements. In addition, the laser spot size and variability necessitated a system re-design.
VP2a-7: Proposed optimal guideline for design to include noise reduction, durability, safety and costs (UWM)	Final Report	Final report on proposed design guideline for noise reduction, durability, safety and costs	1/12	4/12	Final report submission date moved back to allow at least 6 months between draft and final report submission.
VP3a-4: Overall Model	Software	Release of version 2.0 of the 3D-Move pavement response model	06/11	N/A	N/A
	Draft report	Summarizing *3D-Move Analysis* software	12/11	N/A	N/A
	Final report		06/12	N/A	N/A
	Software	Release of final version of the 3D-Move pavement response model	03/12	N/A	N/A

Table 5: Summary for Decision Points and Deliverables for the Validation Program Area

Name of Deliverable	Type of Deliverable	Description of Deliverable	Original Delivery Date	Revised Delivery Date	Reason for changes in delivery date
V3a-1: Evaluation of the PG-Plus practices and the motivations for selecting the "plus" tests. (UWM)	Draft Report	Detailed analysis of PG and PG+ tests	10/08	9/11	Extended time was needed to start the joint effort between Western Cooperative Test Group (WCTG), the Rocky Mountain Asphalt User-Produce Group (RMAUPG), and UW-Madison which is generating data from PG and PG+ tests run in more than 40 different laboratories.
	Final Report	Report on 508 format on benefits of PG+ and new ARC tests in comparison to PG tests. Repeatability of PG+ and newly developed ARC procedures	12/08	3/12	
V3a-2: Detailed analysis of all PG-Plus tests being proposed or in use today, documentation of benefits and costs of these tests, and comparison with new tests (UWM)	Draft Report	Refer to Draft Report for V3a-1	4/09	9/11	
V3a-4: Development of specification criteria for new tests based on field evaluation of construction and performance (UWM)	Draft Report	Refer to Draft Report for V3a-1	7/09	9/11	Refer to Draft Report for V3a-1
V3a-5: Interviews and surveys for soliciting feedback on binder tests and specifications (UWM)	Draft Report	Report summarizing collaboration between Western Cooperative Test Group (WCTG), the Rocky Mountain Asphalt User-Produce Group (RMAUPG) and UW-Madison	12/11	N/A	N/A
	Final Report	Report in 508 format on Development and maintenance of database for evaluation of PG, PG+, and new ARC tests.	1/12	6/12	Final report submission date moved back to allow at least 6 months between draft and final report submission.

Name of Deliverable	Type of Deliverable	Description of Deliverable	Original Delivery Date	Revised Delivery Date	Reason for changes in delivery date
V3b-3: Select LTPP Sites to Validate New Binder Testing Procedures (UWM)	Draft Report	Report summarizing characterization of LTPP binders by means of the Linear Amplitude Sweep (LAS), Single Edge-Notch Beam (SENB) and Bitumen Bond Strength (BBS) tests.	12/11	N/A	N/A
	Final Report	Final report in 508 format on validation/verification of fatigue, thermal cracking, and moisture damage procedures using LTPP binders.	1/12	6/12	Final report submission date moved back to allow at least 6 months between draft and final report submission.
V3c: Validation of PANDA (TAMU)	PANDA Workshop	Workshop on PANDA Models and Validation Results	8/11	N/A	N/A
	Draft Report	Documentation of PANDA Models and Validation	11/11	N/A	N/A
	Final Report (M5, M4c, F1b-1, F1c, F1d-8, F3c, and V3c)	Documentation of PANDA Models and Validation	3/12	6/30/12	N/A
	UMAT Material	PANDA Implemented in Abaqus	3/12	N/A	N/A
	Software	Standalone Software to support the use of and future utility and flexibility of PANDA	3/12	N/A	N/A

Table 6: Summary for Decision Points and Deliverables for the Technology Transfer Program Area

Name of Deliverable	Type of Deliverable	Description of Deliverable	Original Delivery Date	Revised Delivery Date	Reason for Changes in Delivery Date
TT1a: Development and Maintenance of Consortium Website	Progress report	Upload quarterly progress report and newsletter	07/11	N/A	N/A
	Newsletter	Upload newsletter	07/11	N/A	N/A
	Progress report	Upload quarterly progress report and newsletter	10/11	N/A	N/A
	Newsletter	Upload newsletter	11/11	N/A	N/A
	Progress report	Upload quarterly progress report and newsletter	01/12	N/A	N/A
	Newsletter	Upload newsletter	03/12	N/A	N/A
	Progress report	Upload quarterly progress report and newsletter	04/12	N/A	N/A
TT1b: Communications	Newsletter	Publish newsletter	07/11	N/A	N/A
	Newsletter	Publish newsletter	11/11	N/A	N/A
	Newsletter	Publish newsletter	03/12	N/A	N/A
TT1d: Development of Materials Database	Workshop	Training for “super users” and “sub users” on how to use the materials database and validation section and to evaluate the potential errors, bugs and the ease of use of the database system.	04/11	N/A	N/A
	Database	Materials database software	03/12	N/A	N/A
TT1f: Workshops and Training	Workshop	Training for “super users” and “sub users” on how to use the materials database and validation section and to evaluate the potential errors, bugs and the ease of use of the database system.	04/11	N/A	N/A
	Workshop	PANDA software training	8/11	N/A	N/A