

APPENDIX C

TEST DATA ~ FOAM ON TOP OF JP-5 AT 25°C

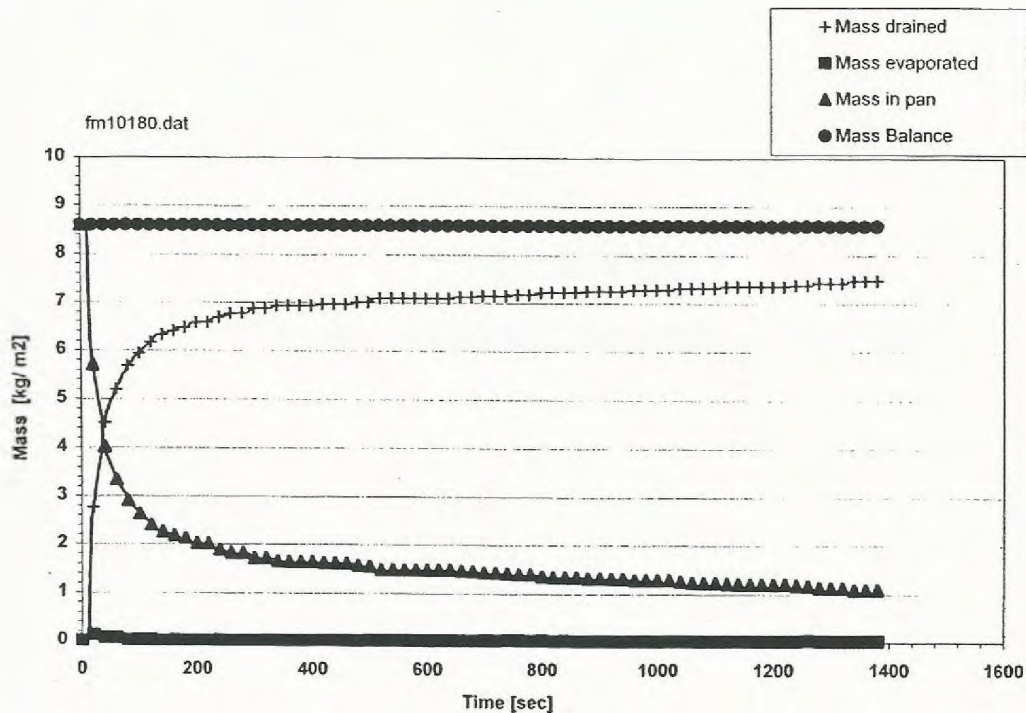


Fig. C1- Mass data in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.3, irradiance= 0kW/m², initial foam height= 28mm.

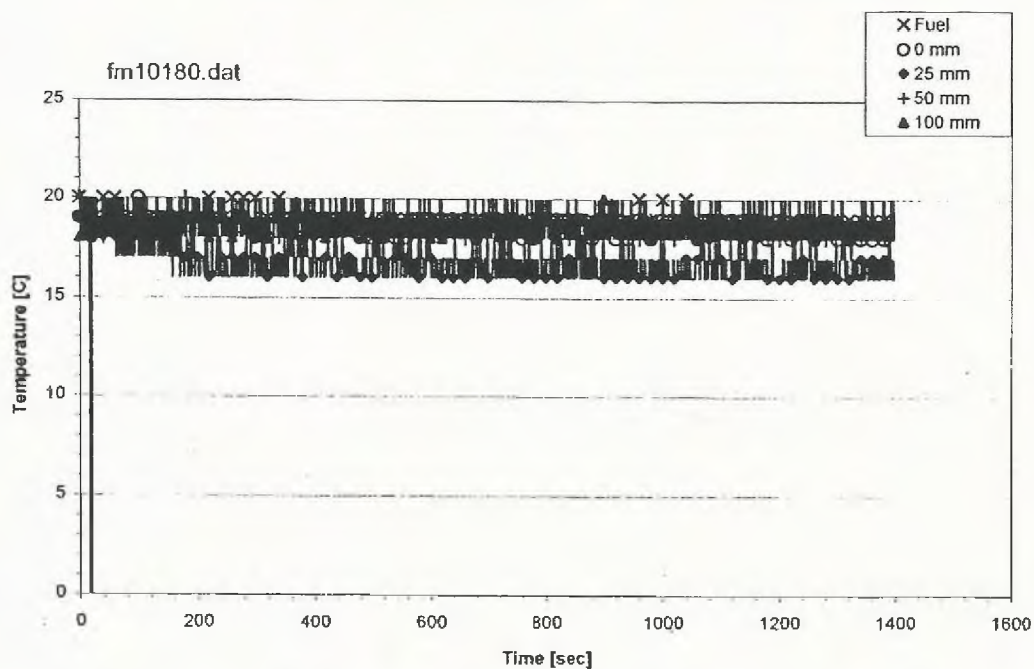


Fig. C2- Foam temperature in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.3, irradiance= 0kW/m², initial foam height= 28mm.

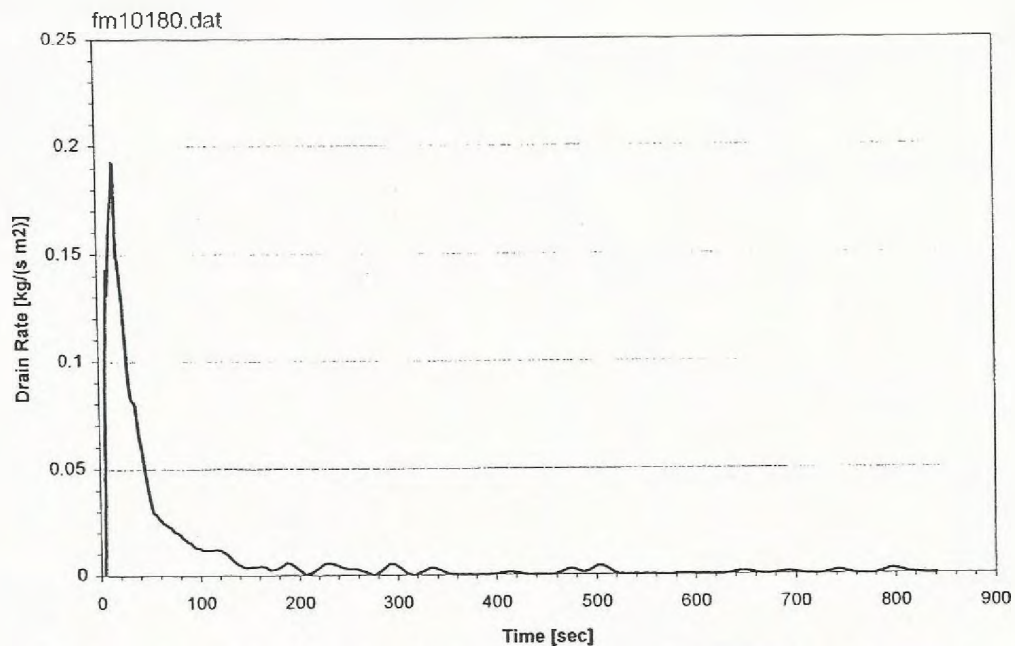


Fig. C3- Drain rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.3, irradiance= 0kW/m², initial foam height= 28mm.

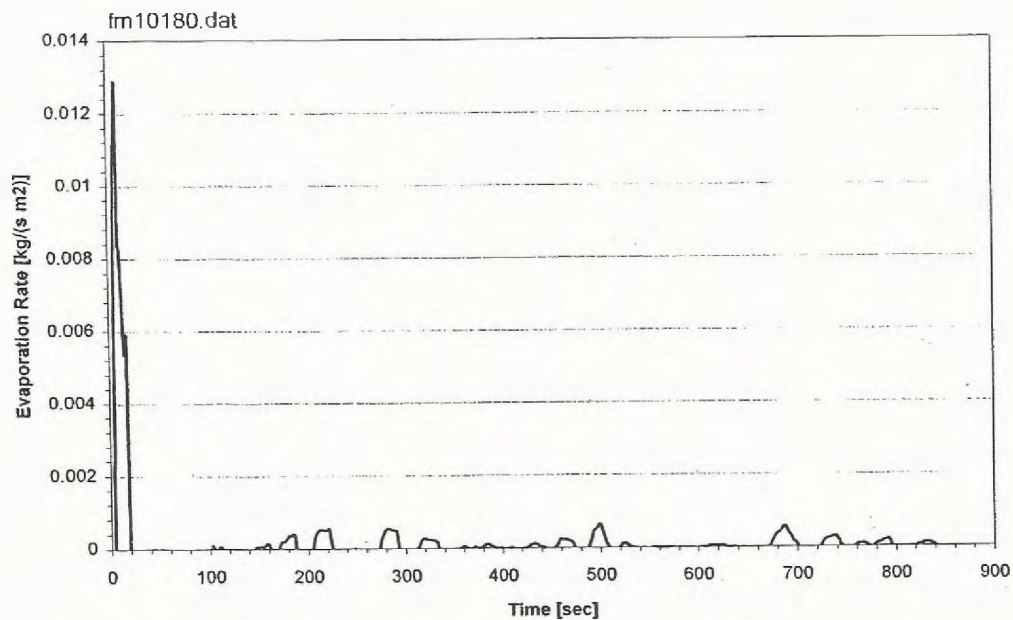


Fig. C4- Evaporation rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.3, irradiance= 0kW/m², initial foam height= 28mm.

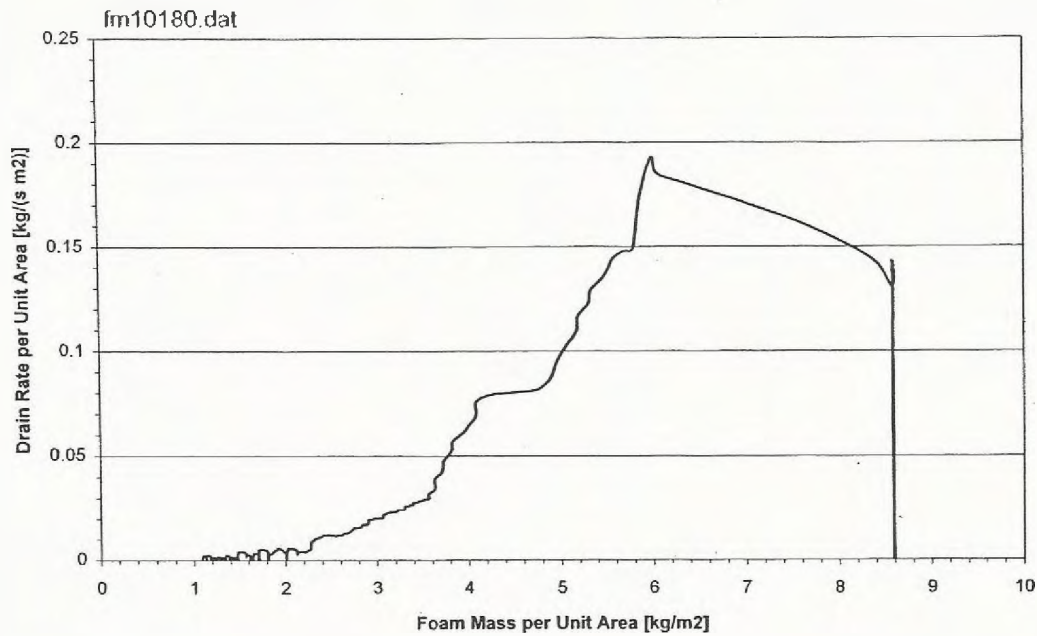


Fig. C5- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.3, irradiance= 0kW/m2, initial foam height= 28mm.

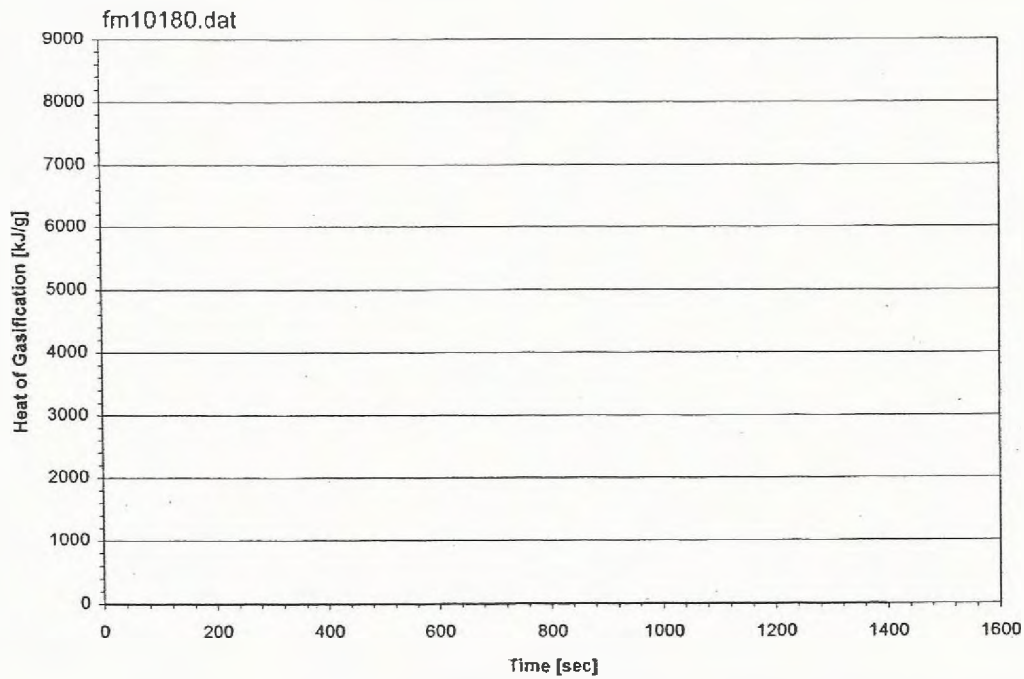


Fig. C6- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.3, irradiance= 0kW/m2, initial foam height= 28mm.

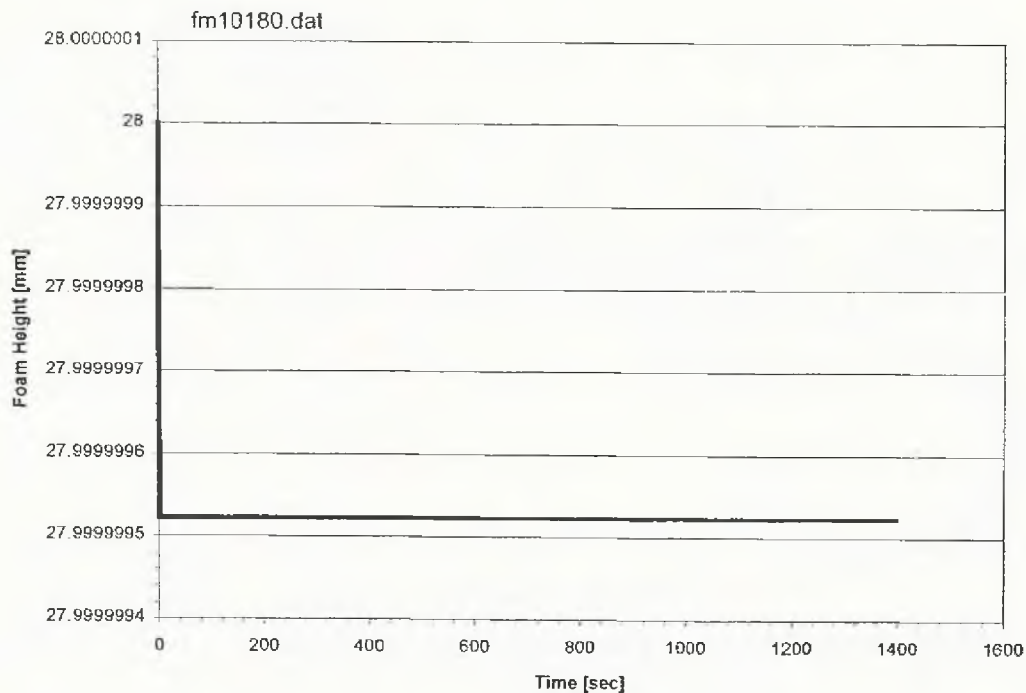


Fig. C7- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.3, irradiance= 0kW/m2, initial foam height= 28mm.

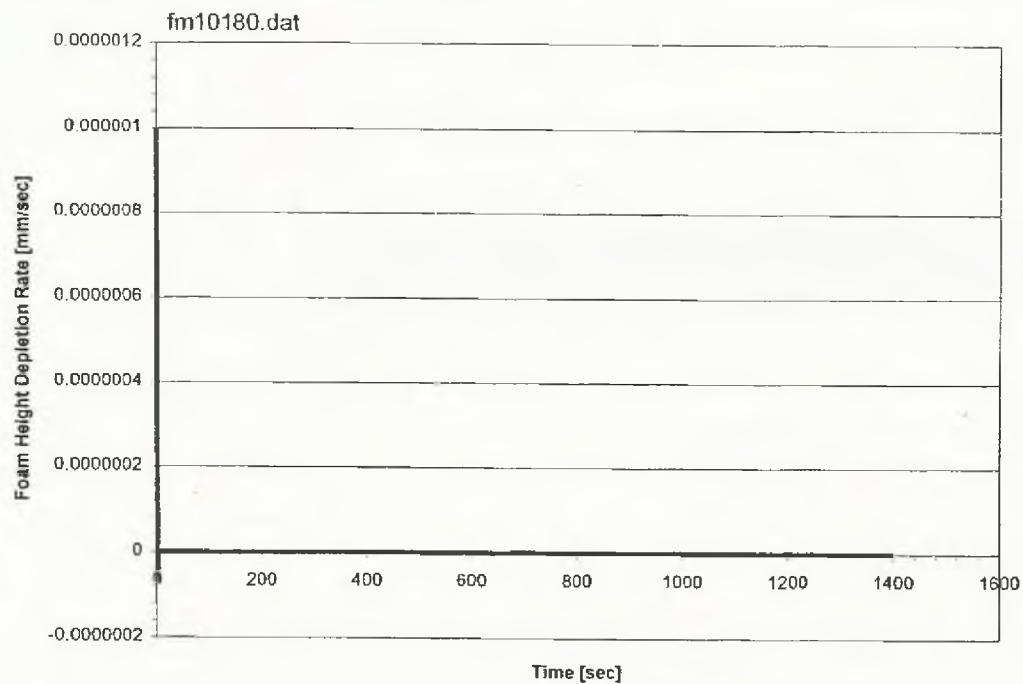


Fig. C8- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.3, irradiance= 0kW/m2, initial foam height= 28mm.

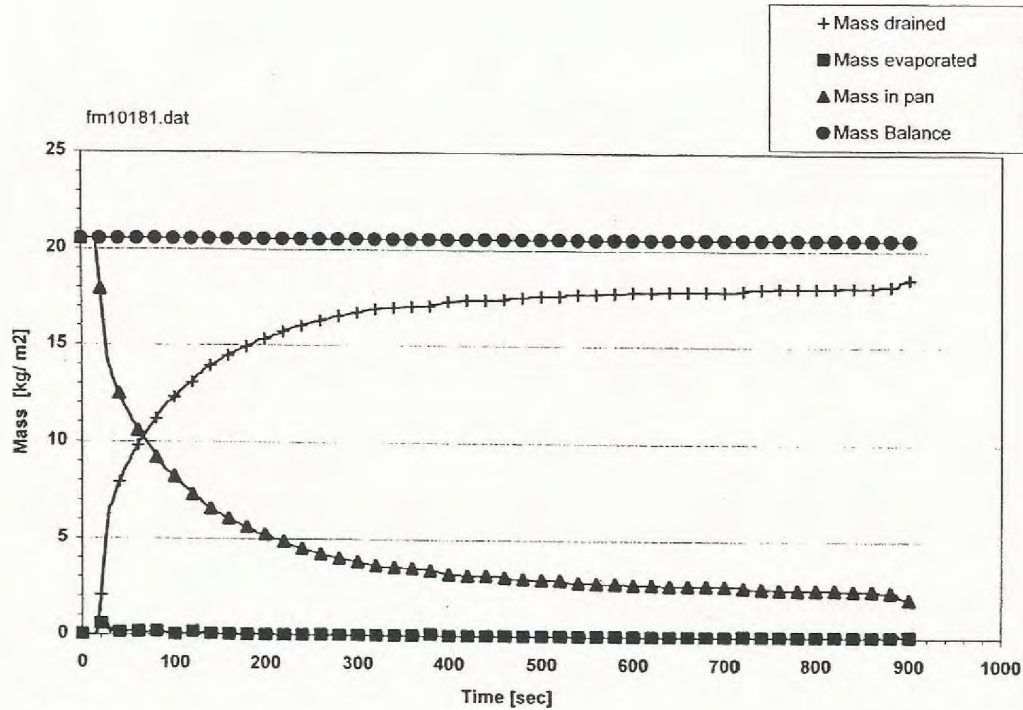


Fig. C9- Mass data in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.3, irradiance= 0kW/m², initial foam height= 68mm.

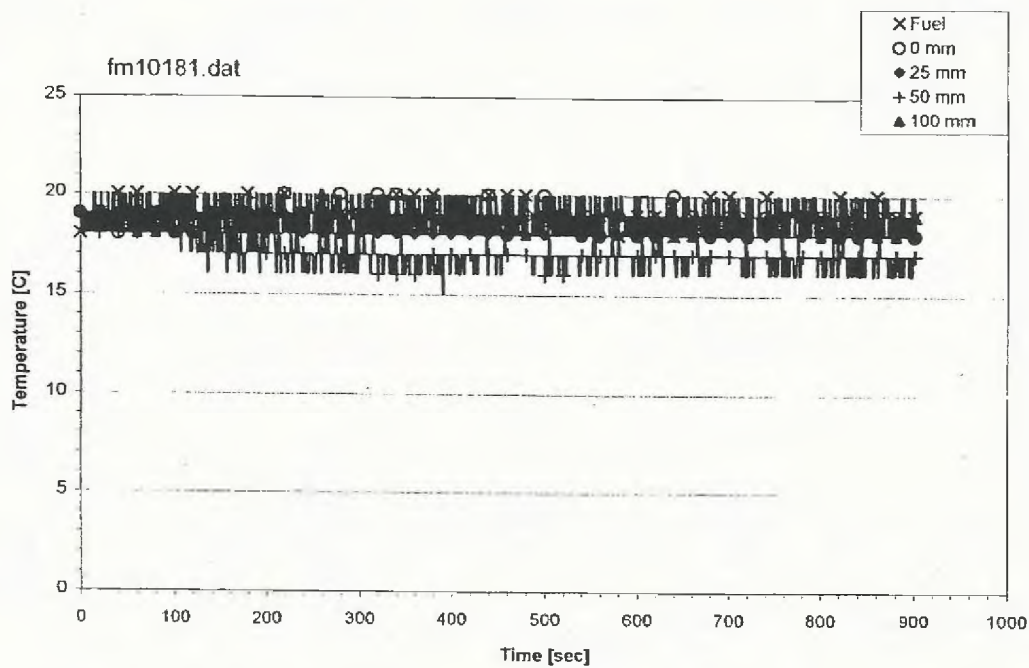


Fig. C10- Foam temperature in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.3, irradiance= 0kW/m², initial foam height= 68mm.

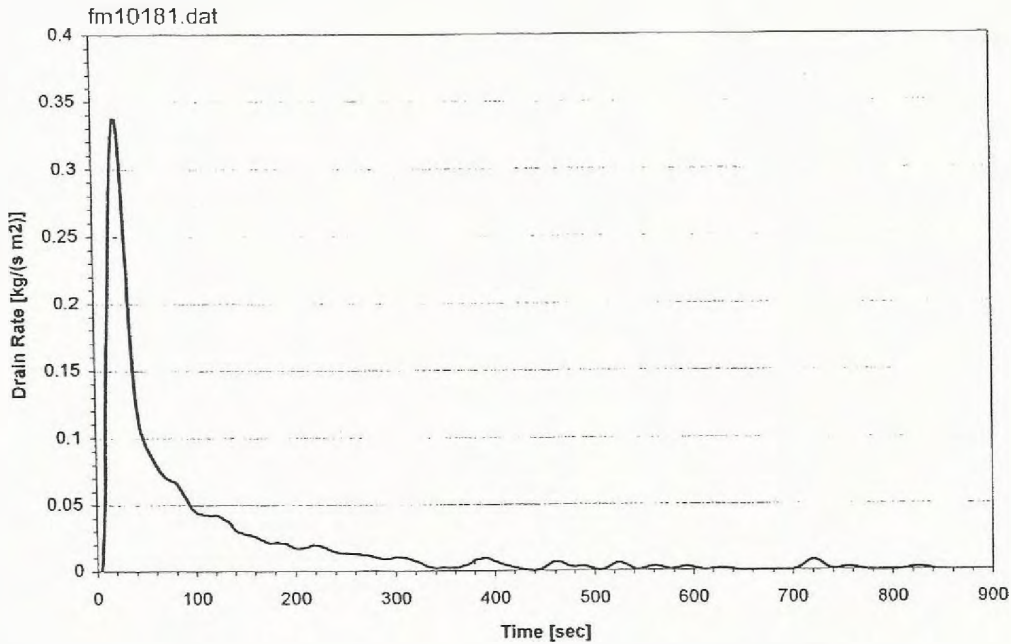


Fig. C11- Drain rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.3, irradiance= 0kW/m², initial foam height= 68mm.

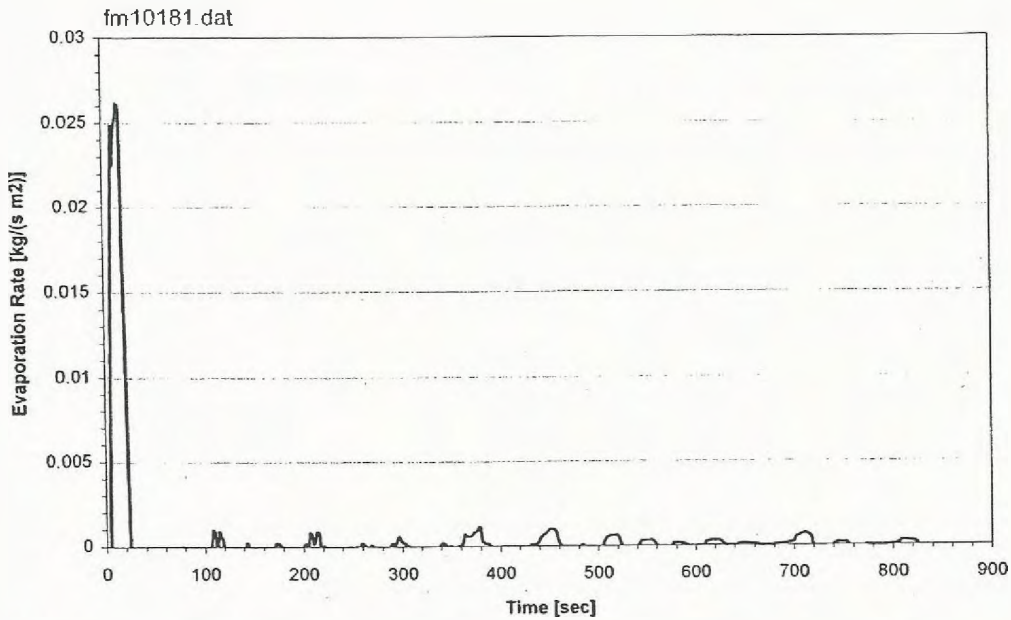


Fig. C12- Evaporation rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.3, irradiance= 0kW/m², initial foam height= 68mm.

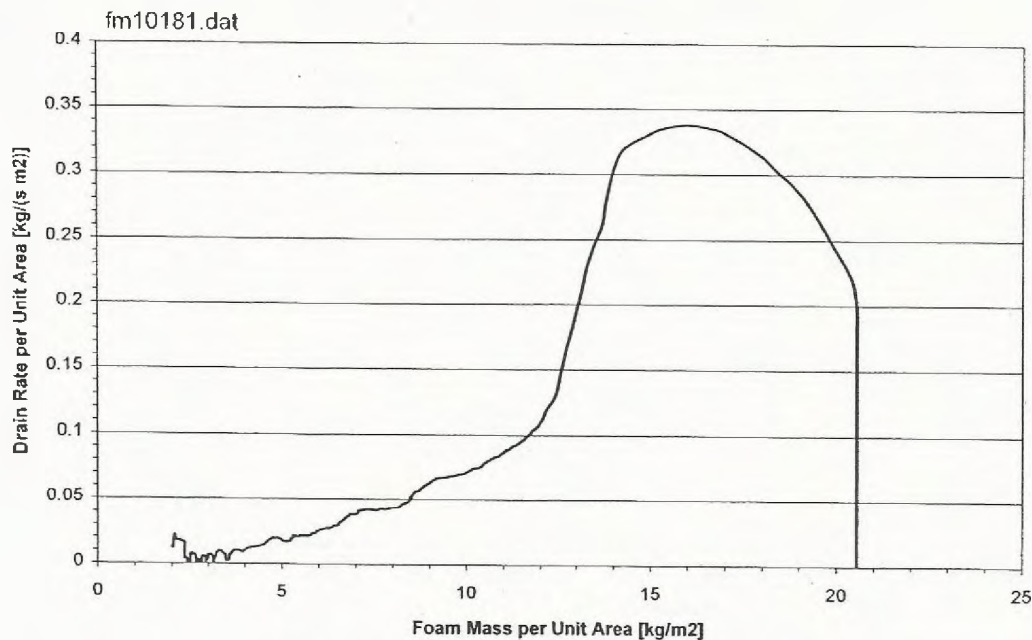


Fig. C13- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.3, irradiance= 0kW/m2, initial foam height= 68mm.

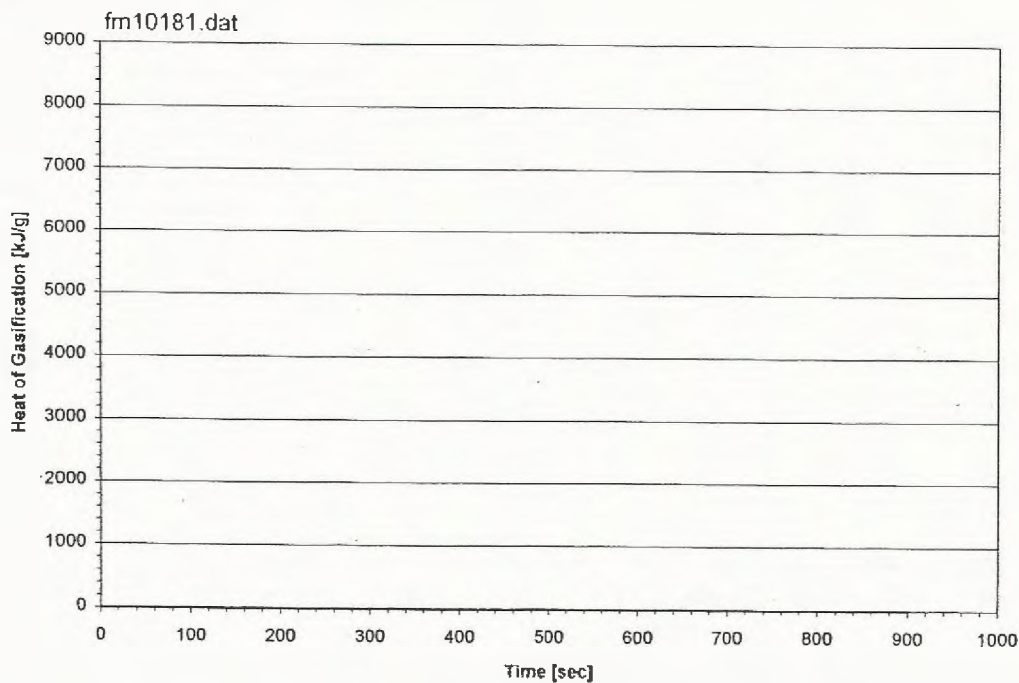


Fig. C14- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.3, irradiance= 0kW/m2, initial foam height= 68mm.

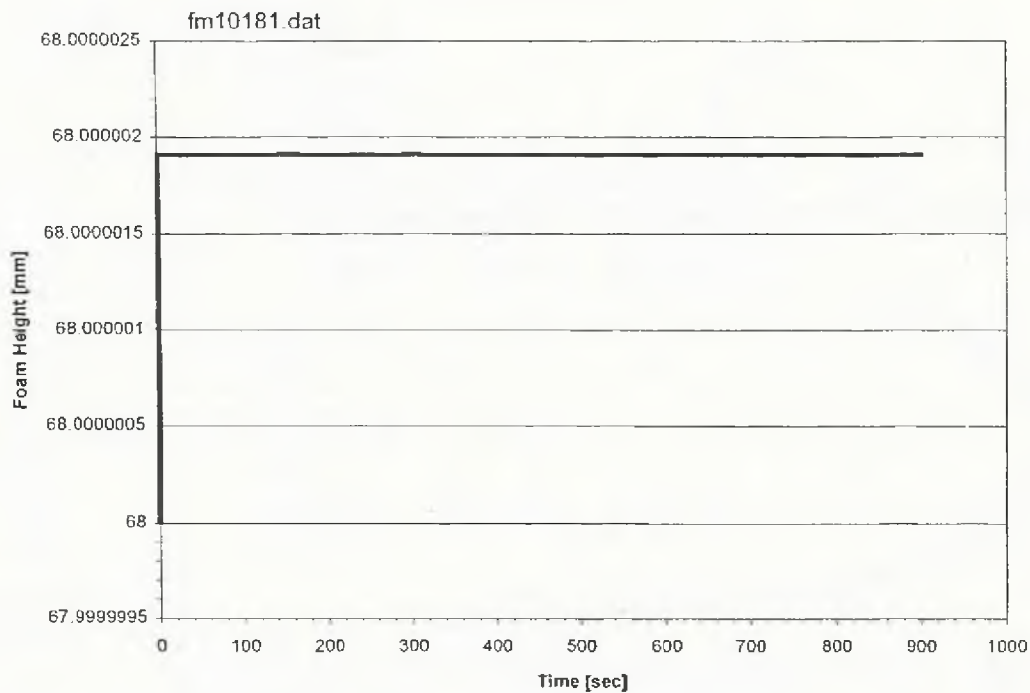


Fig. C15- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.3, irradiance= 0kW/m², initial foam height= 68mm.

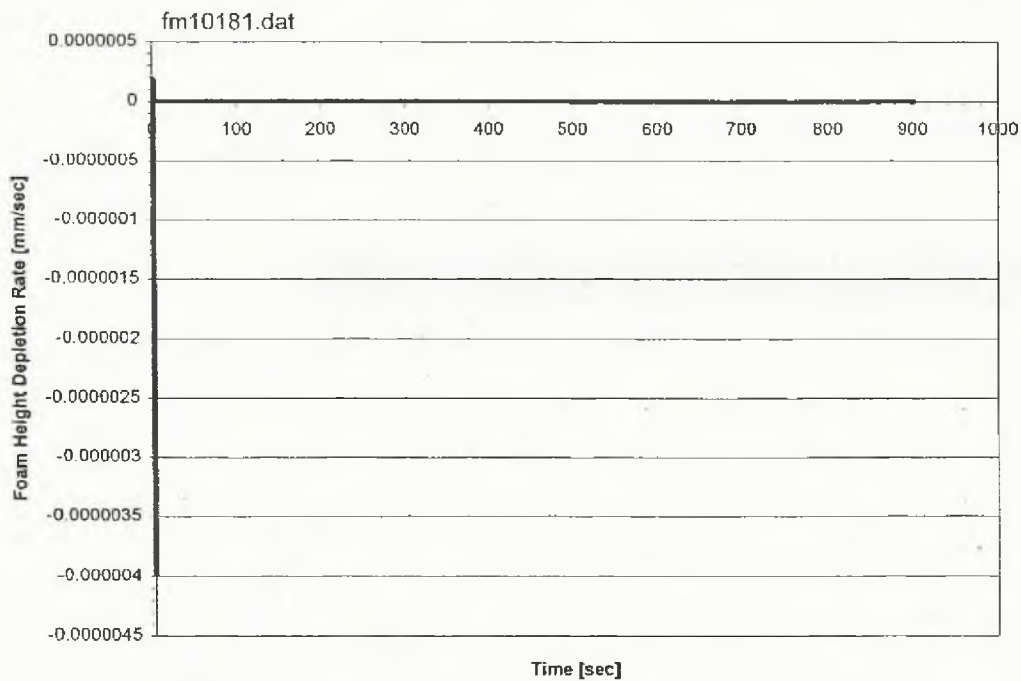


Fig. C16- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.3, irradiance= 0kW/m², initial foam height= 68mm.

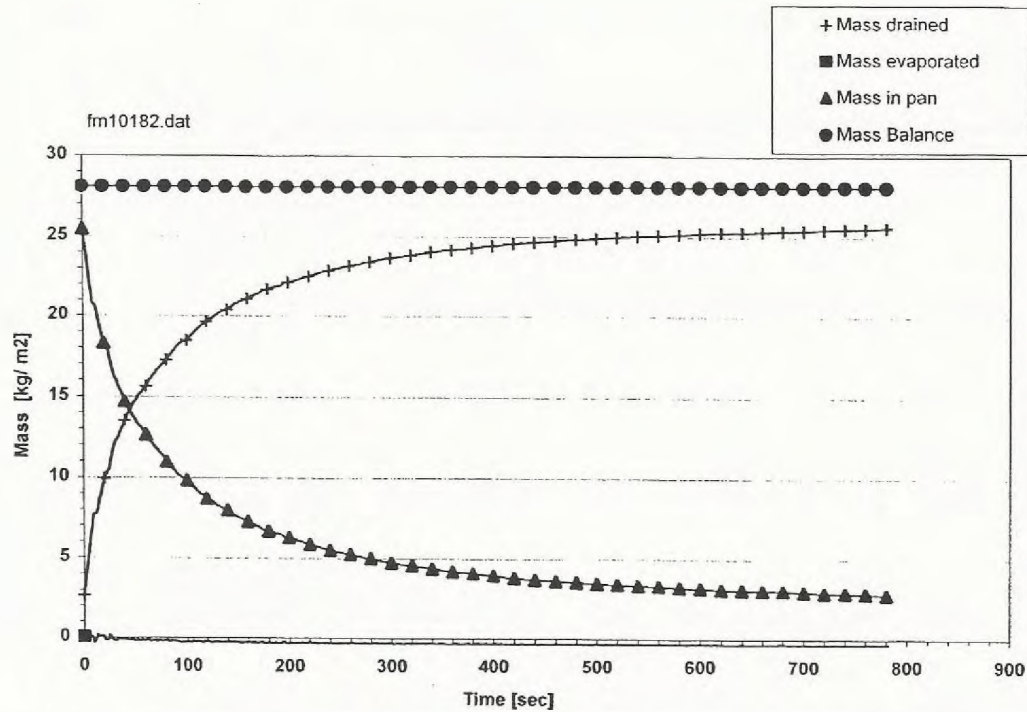


Fig. C17- Mass data in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.3, irradiance= 0kW/m², initial foam height= 93mm.

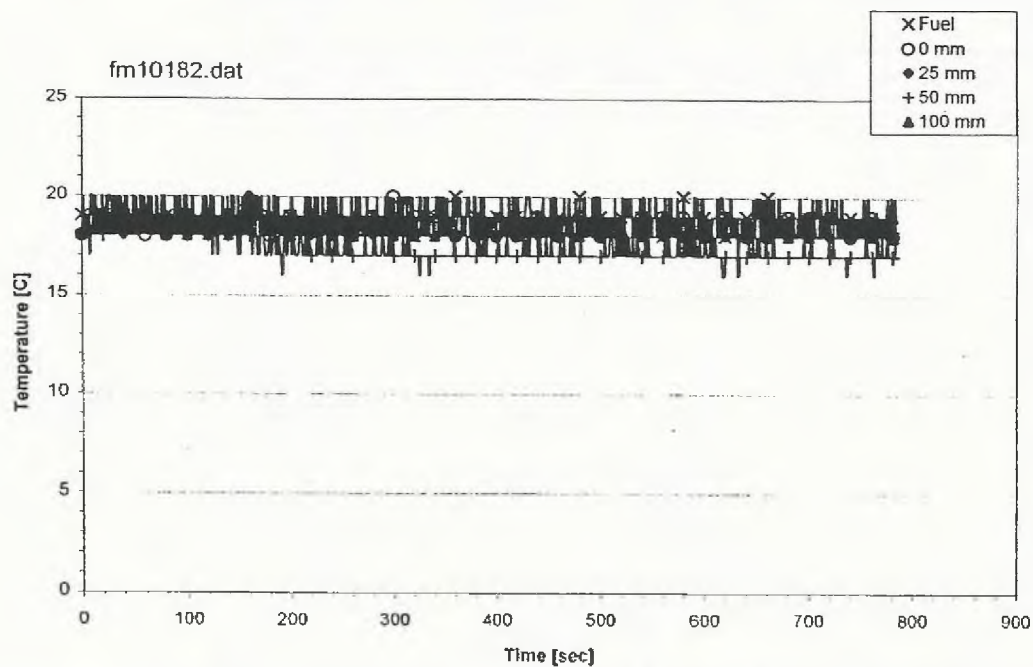


Fig. C18- Foam temperature in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.3, irradiance= 0kW/m², initial foam height= 93mm.

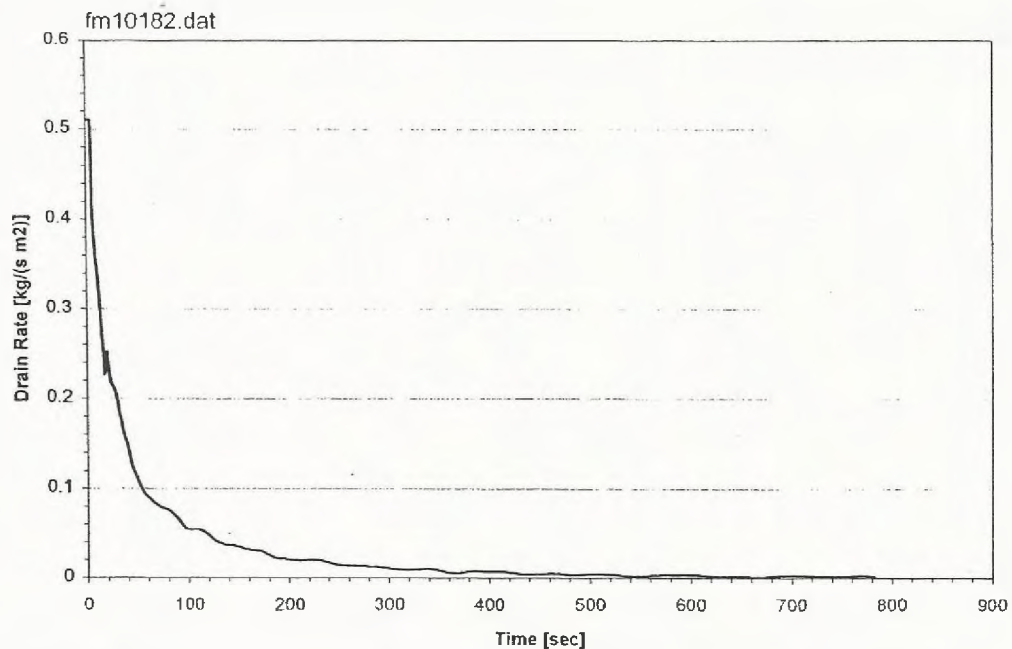


Fig. C19- Drain rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.3, irradiance= 0kW/m2, initial foam height= 93mm.

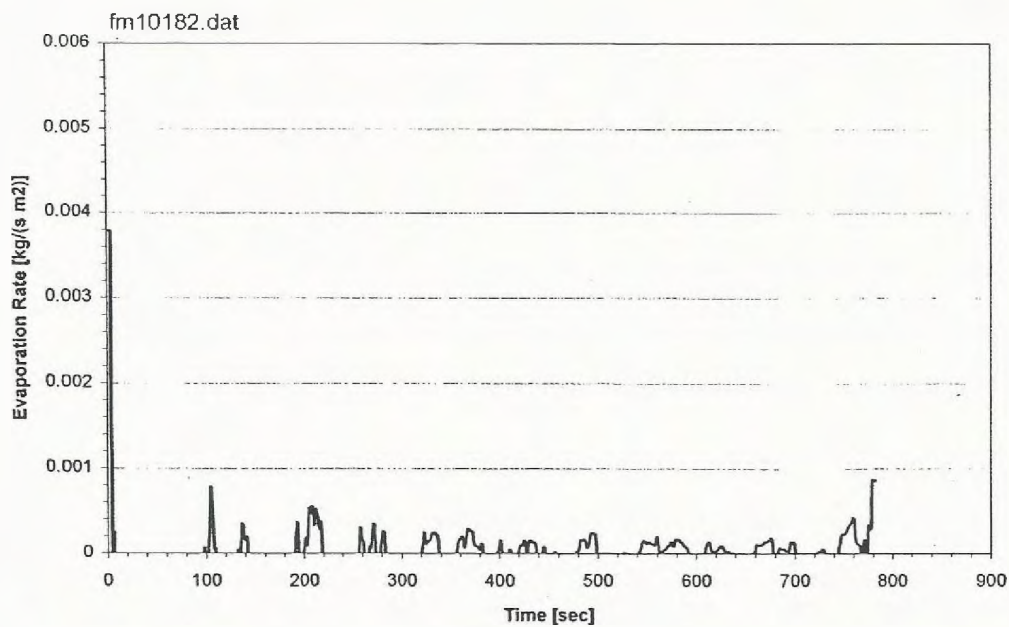


Fig. C20- Evaporation rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.3, irradiance= 0kW/m2, initial foam height= 93mm.

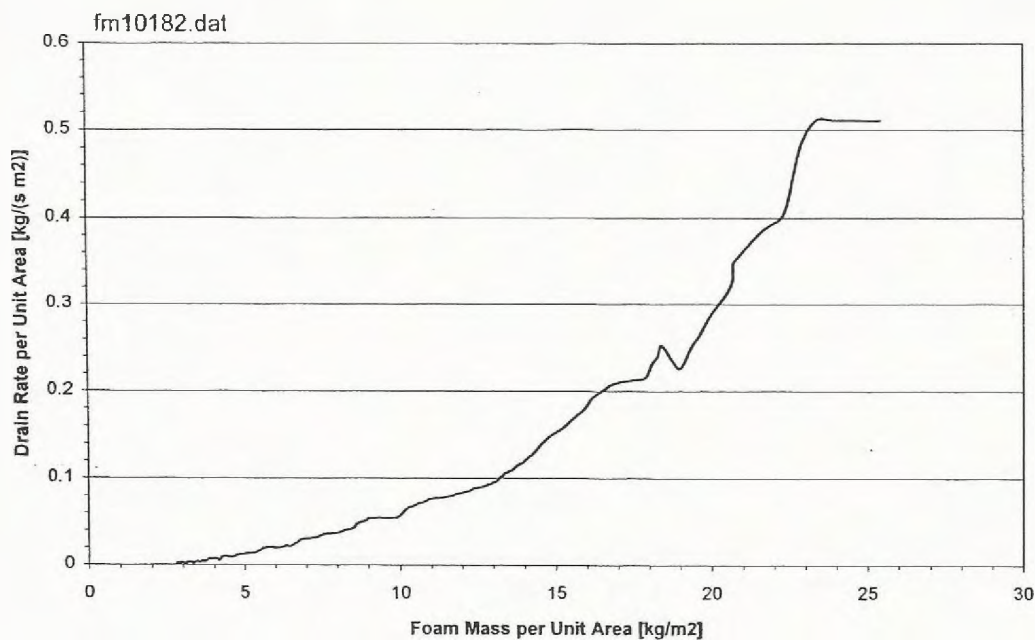


Fig. C21- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.3, irradiance= 0kW/m², initial foam height= 93mm.

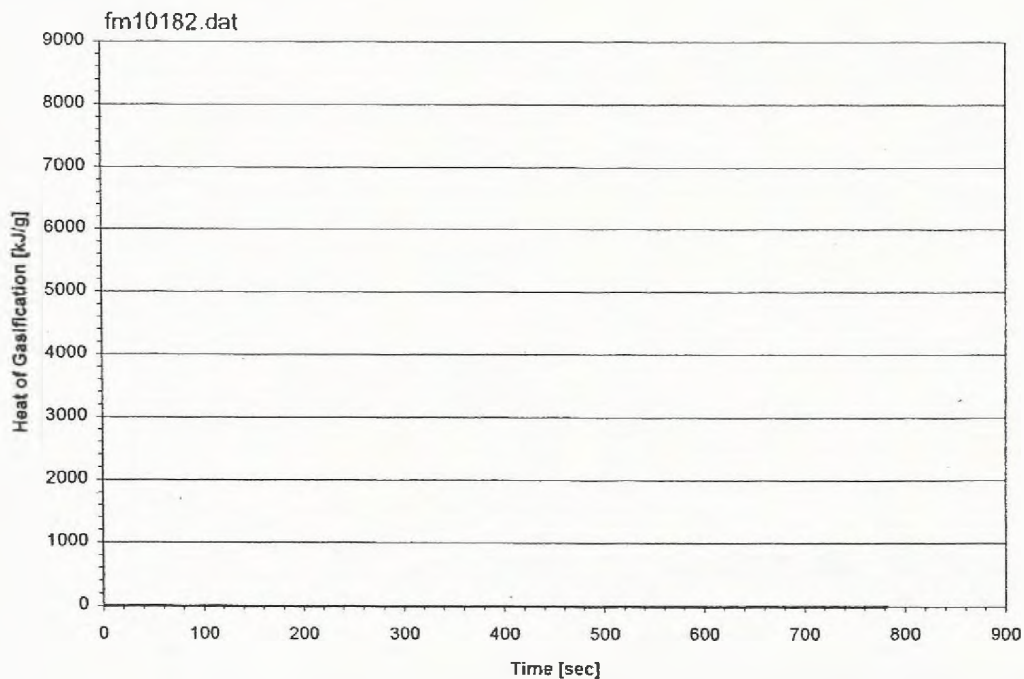


Fig. C22- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.3, irradiance= 0kW/m², initial foam height= 93mm.

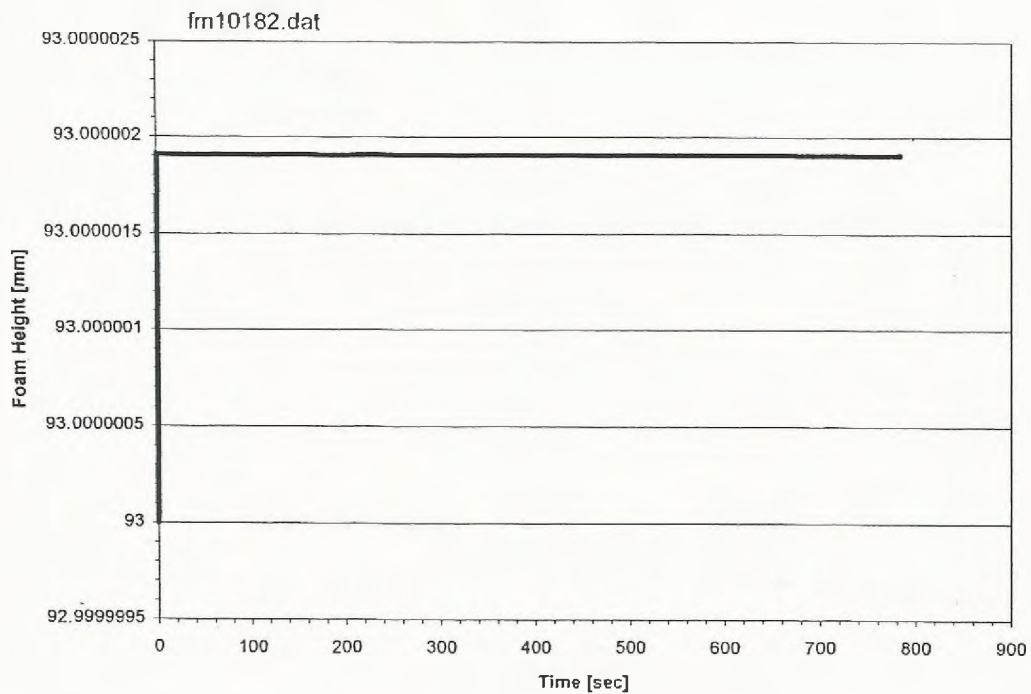


Fig. C23- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.3, irradiance= 0kW/m², initial foam height= 93mm.

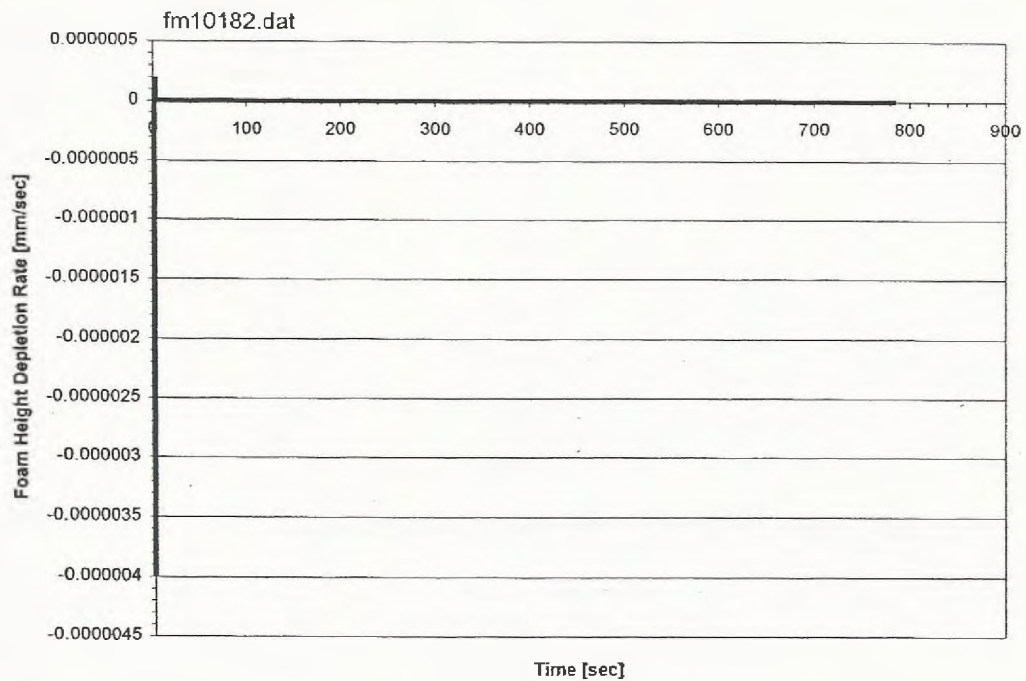


Fig. C24- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.3, irradiance= 0kW/m², initial foam height= 93mm.

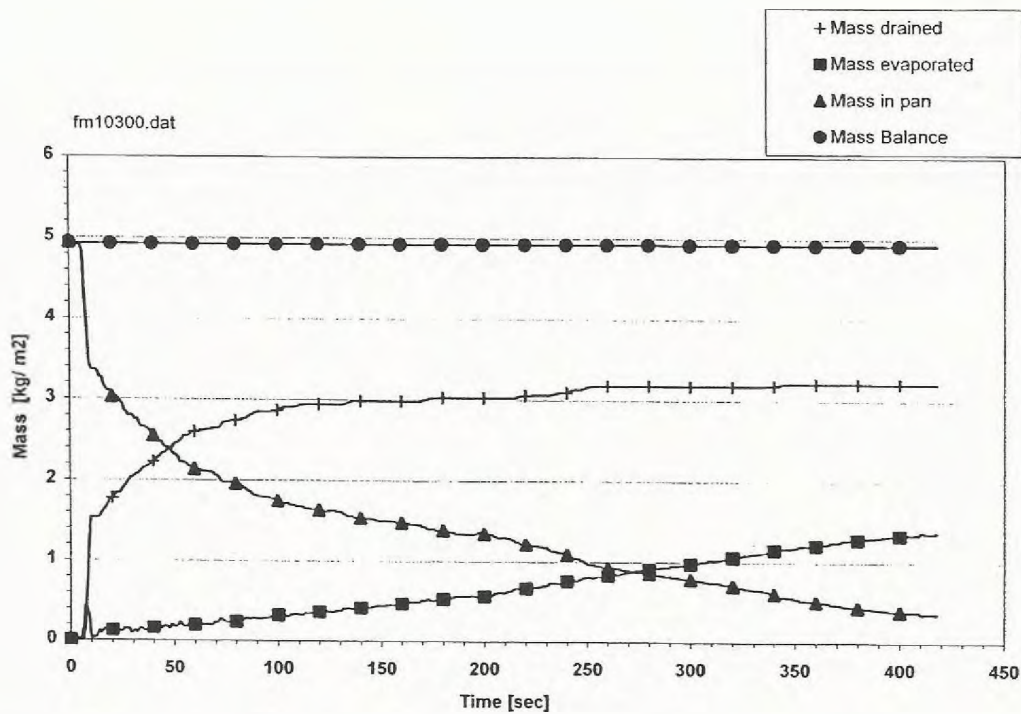


Fig. C25- Mass data in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 5.08, irradiance= 20kW/m², initial foam height= 25mm.

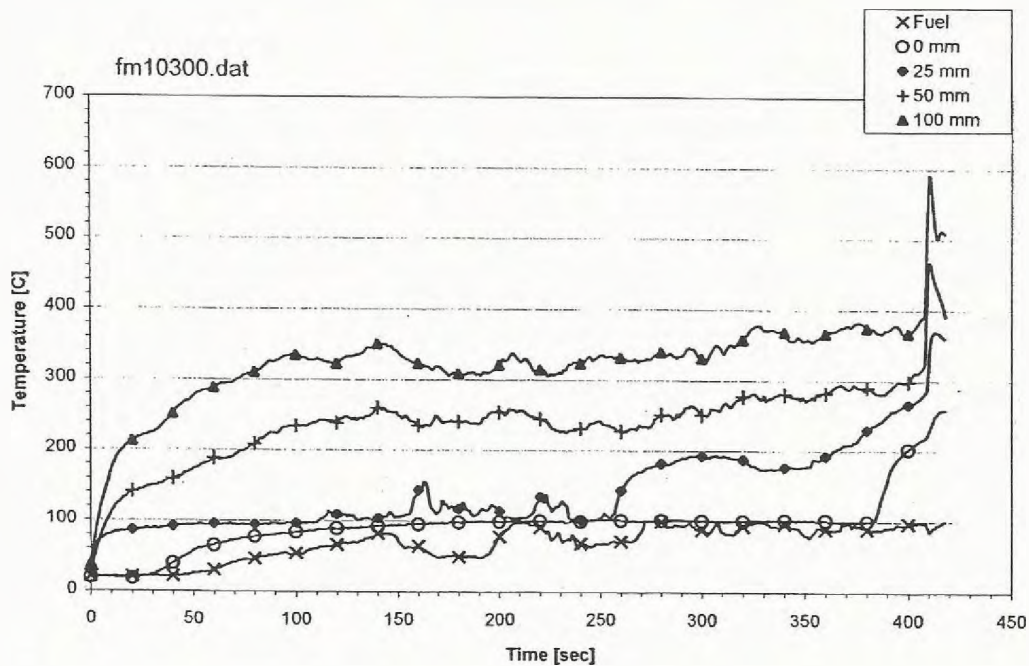


Fig. C26- Foam temperature in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 5.08, irradiance= 20kW/m², initial foam height= 25mm.

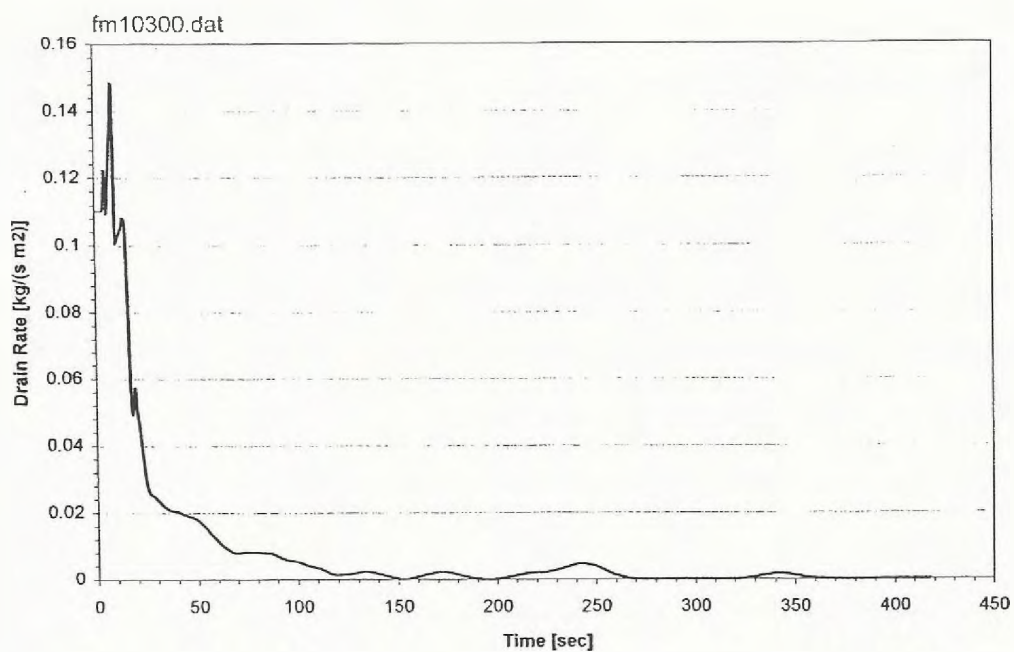


Fig. C27- Drain rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.08, irradiance= 20kW/m², initial foam height= 25mm.

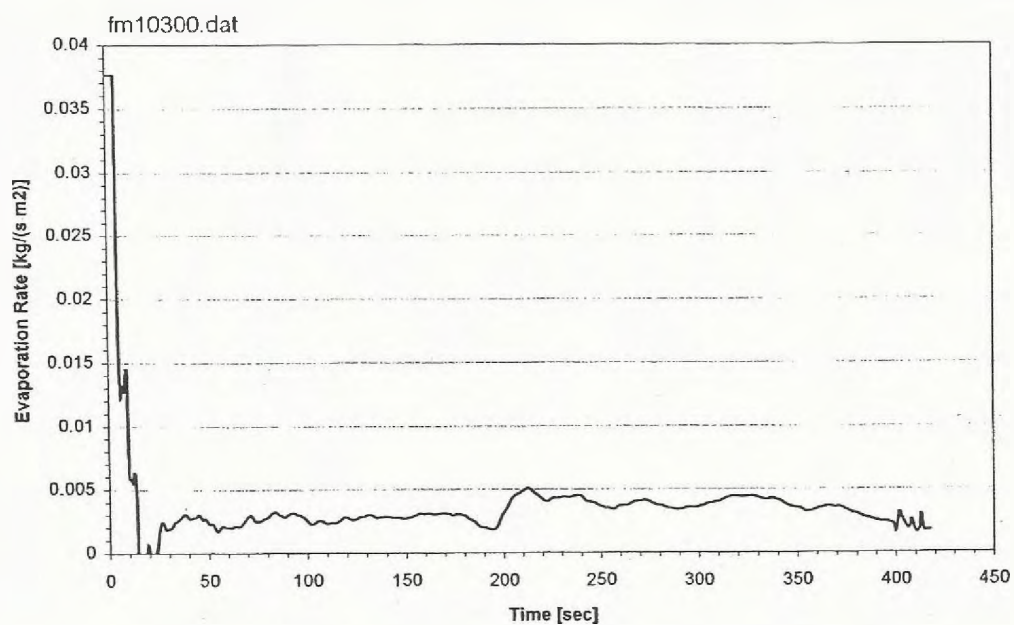


Fig. C28- Evaporation rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.08, irradiance= 20kW/m², initial foam height= 25mm.

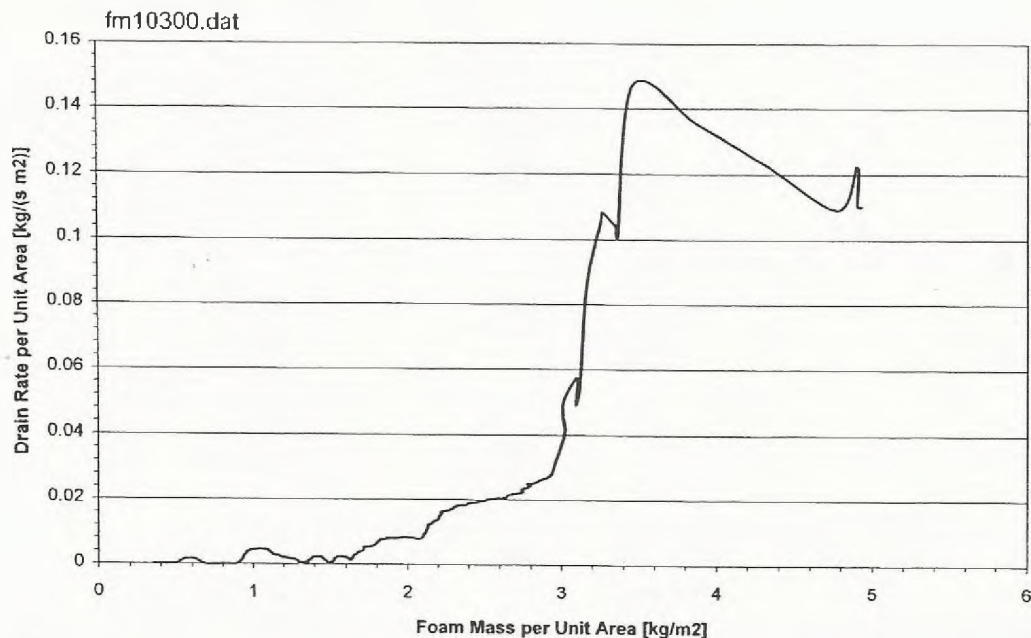


Fig. C29- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.08, irradiance= 20kW/m², initial foam height= 25mm.

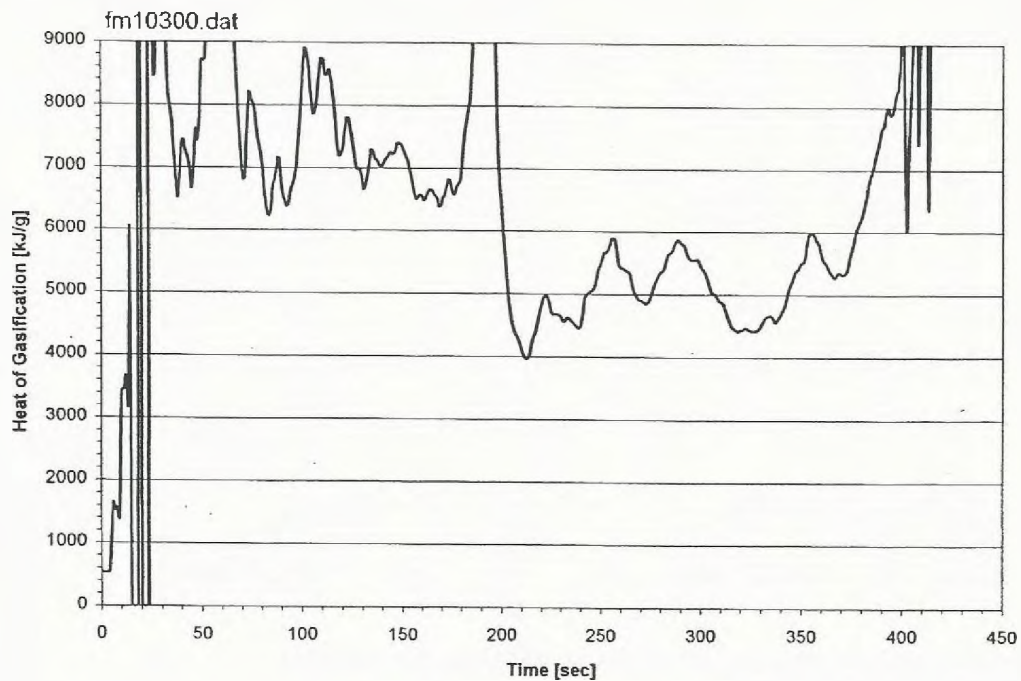


Fig. C30- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.08, irradiance= 20kW/m², initial foam height= 25mm.

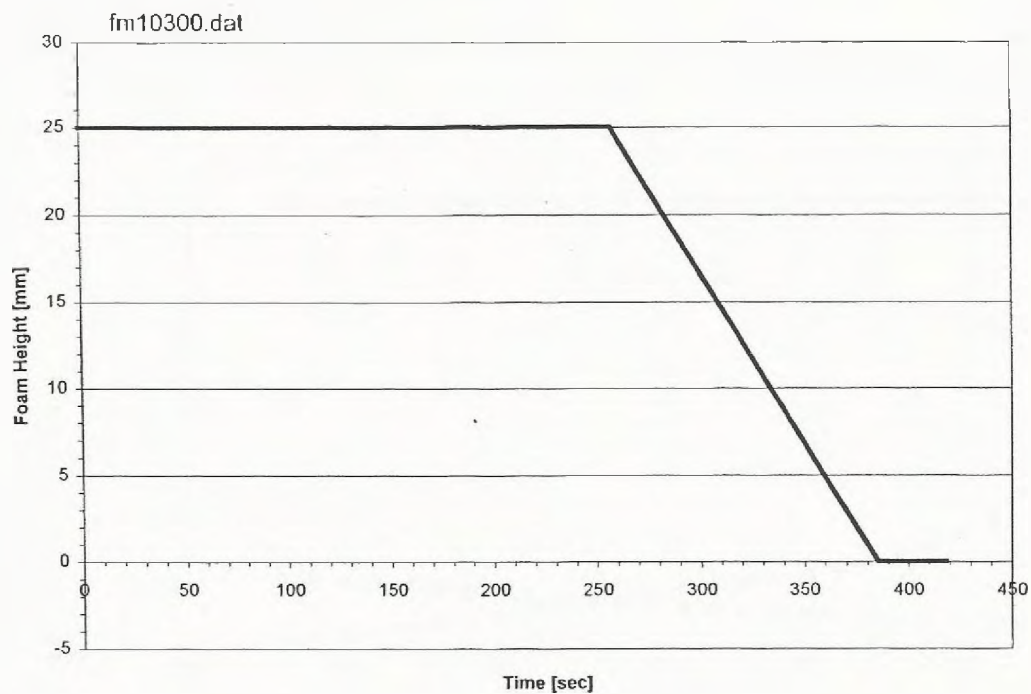


Fig. C31- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.08, irradiance= 20kW/m², initial foam height= 25mm.

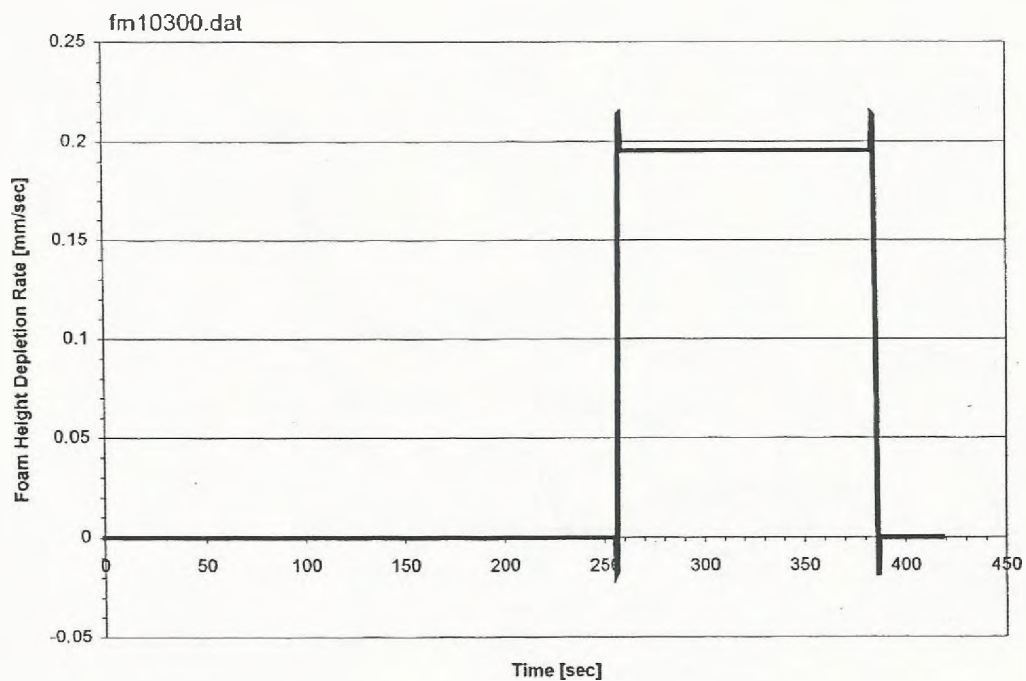


Fig. C32- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.08, irradiance= 20kW/m², initial foam height= 25mm.

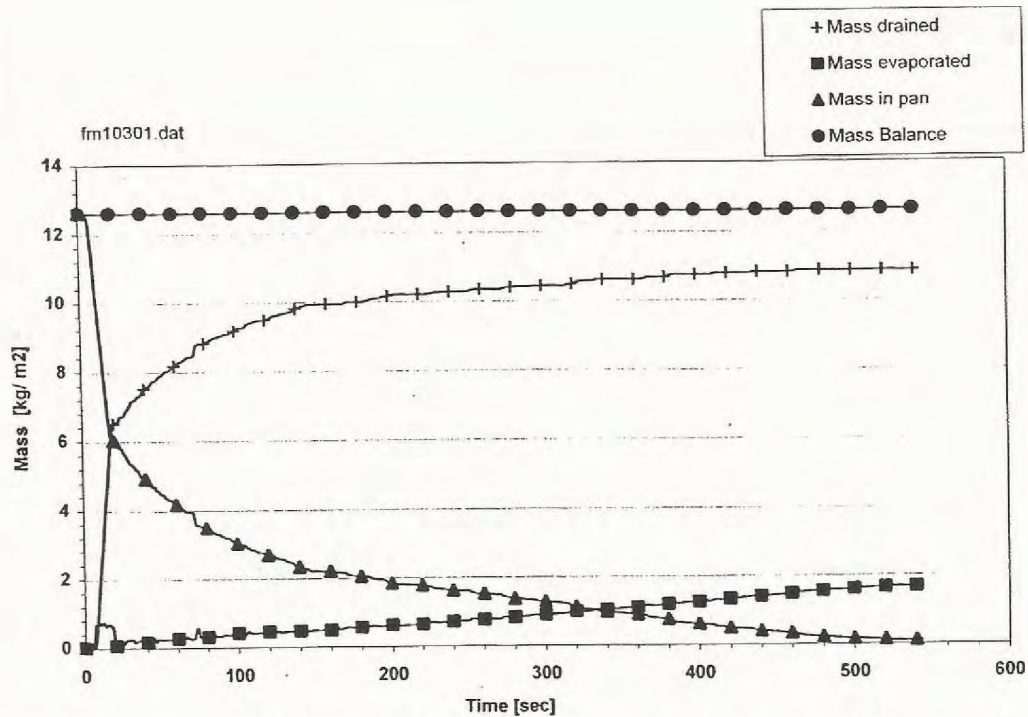


Fig. C33- Mass data in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 3.98, irradiance= 20kW/m², initial foam height= 50mm.

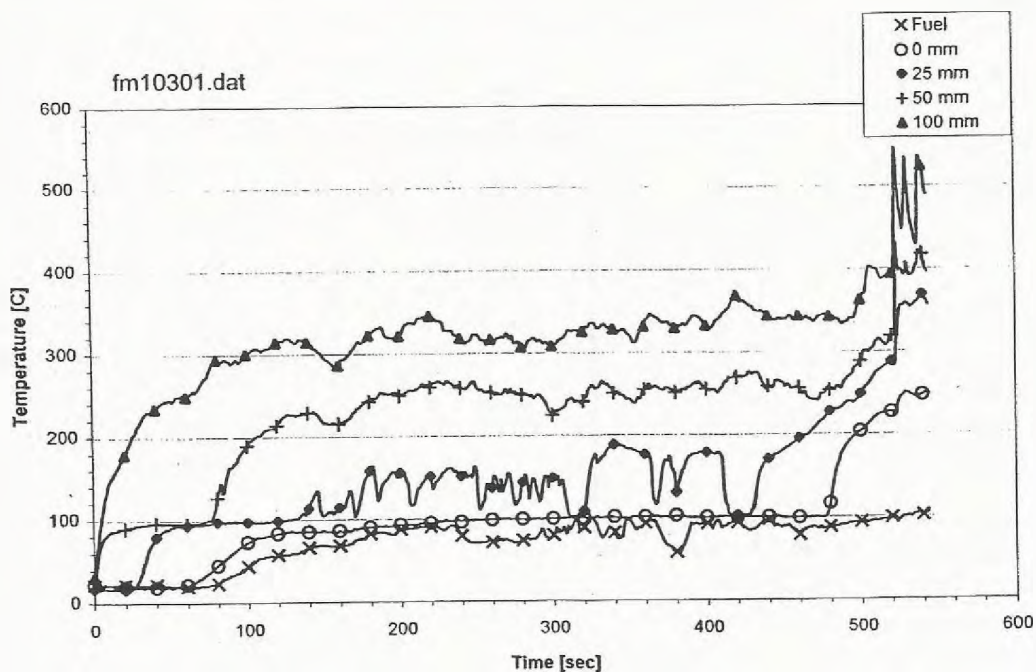


Fig. C34- Foam temperature in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 3.98, irradiance= 20kW/m², initial foam height= 50mm.

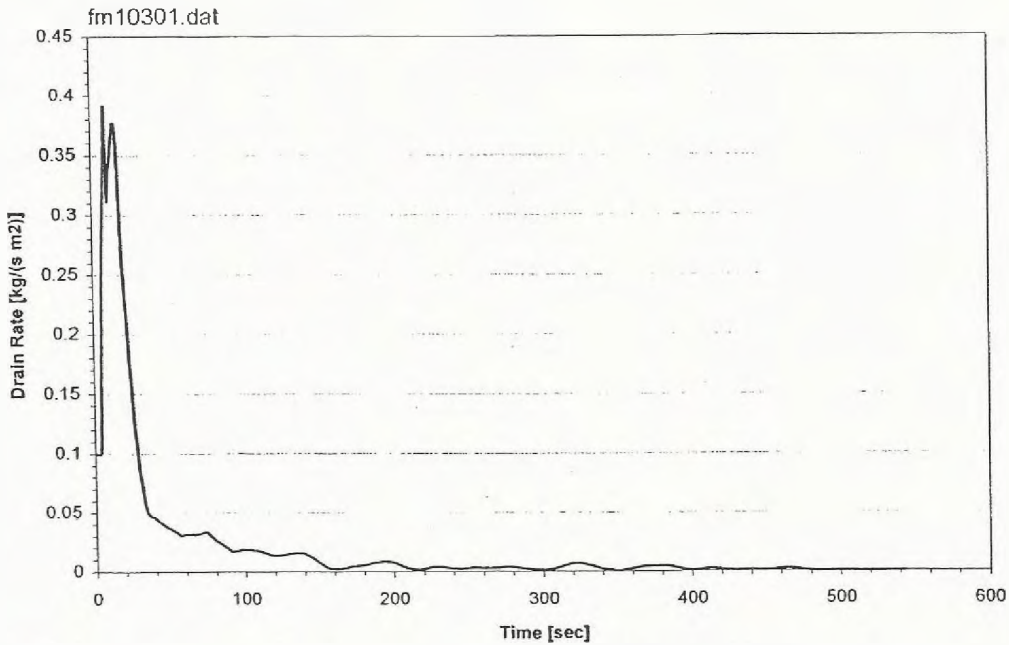


Fig. C35- Drain rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.98, irradiance= 20kW/m², initial foam height= 50mm.

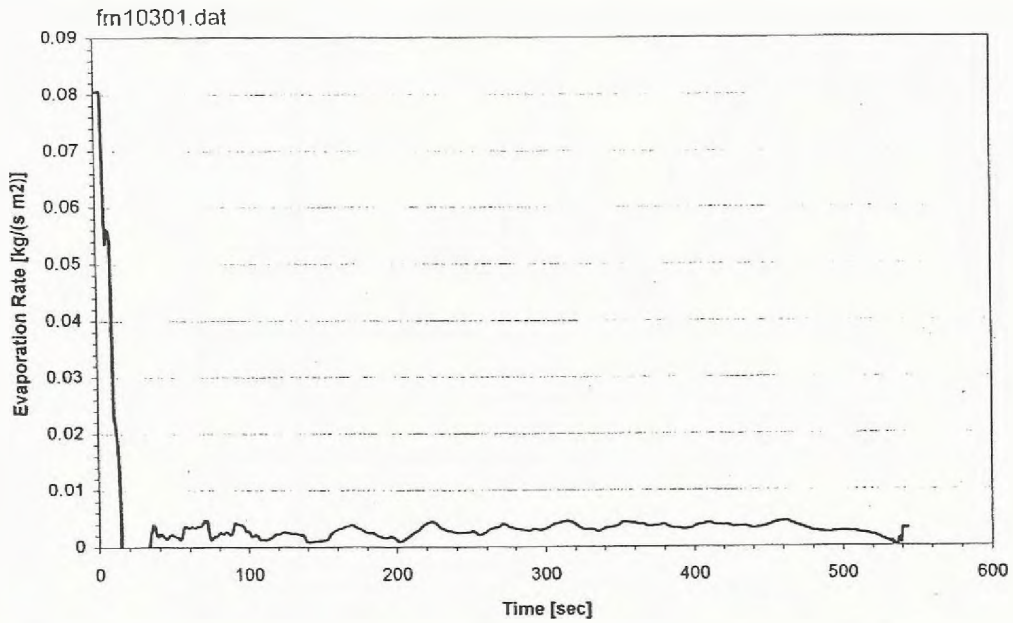


Fig. C36- Evaporation rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.98, irradiance= 20kW/m², initial foam height= 50mm.

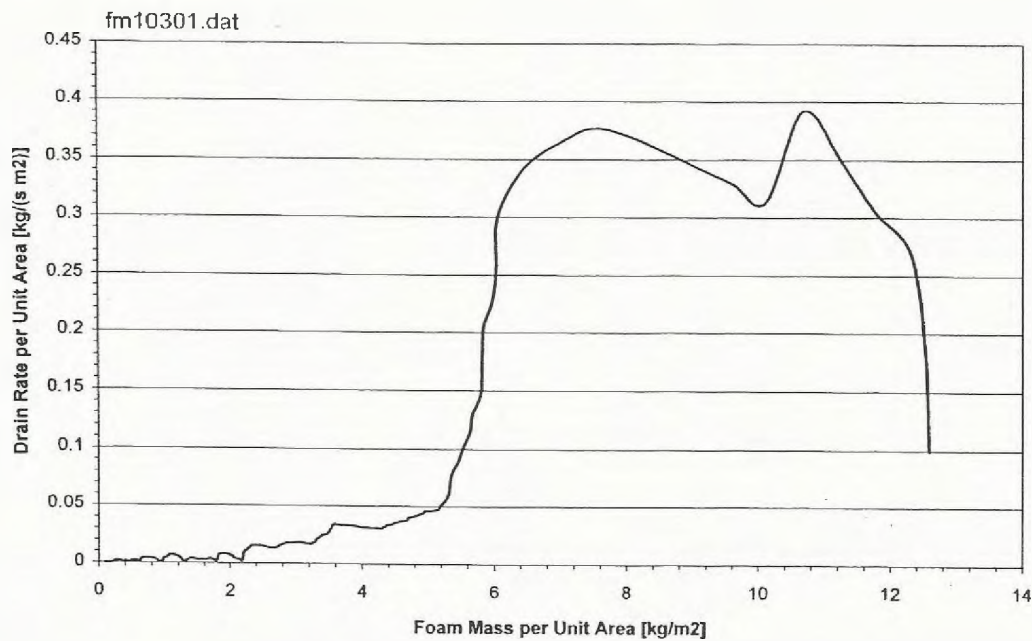


Fig. C37- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.98, irradiance= 20kW/m2, initial foam height= 50mm.

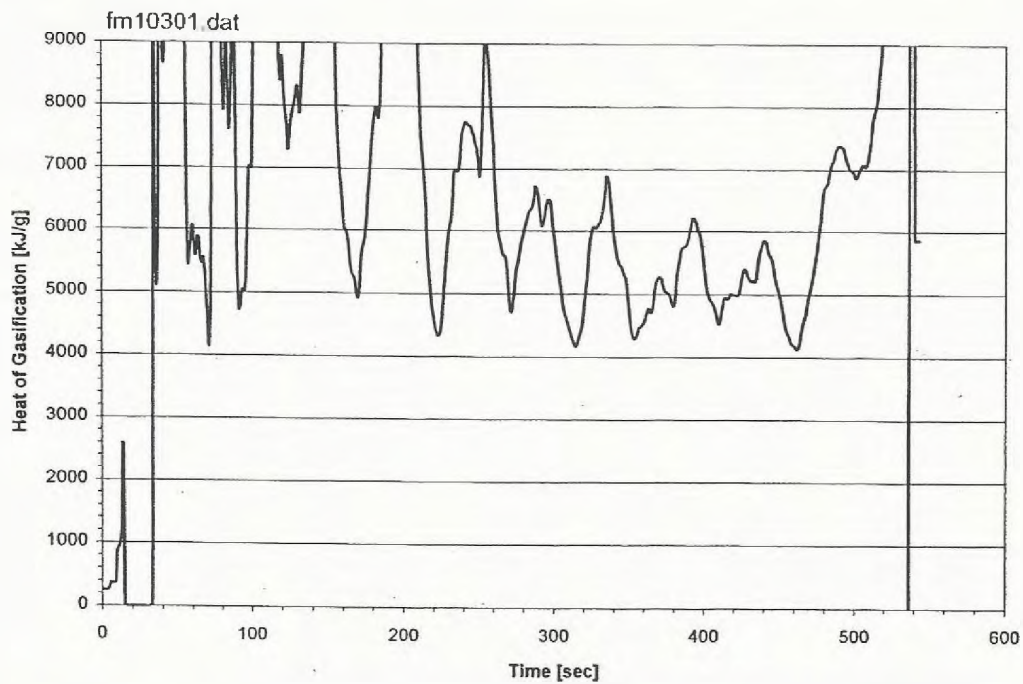


Fig. C38- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.98, irradiance= 20kW/m2, initial foam height= 50mm.

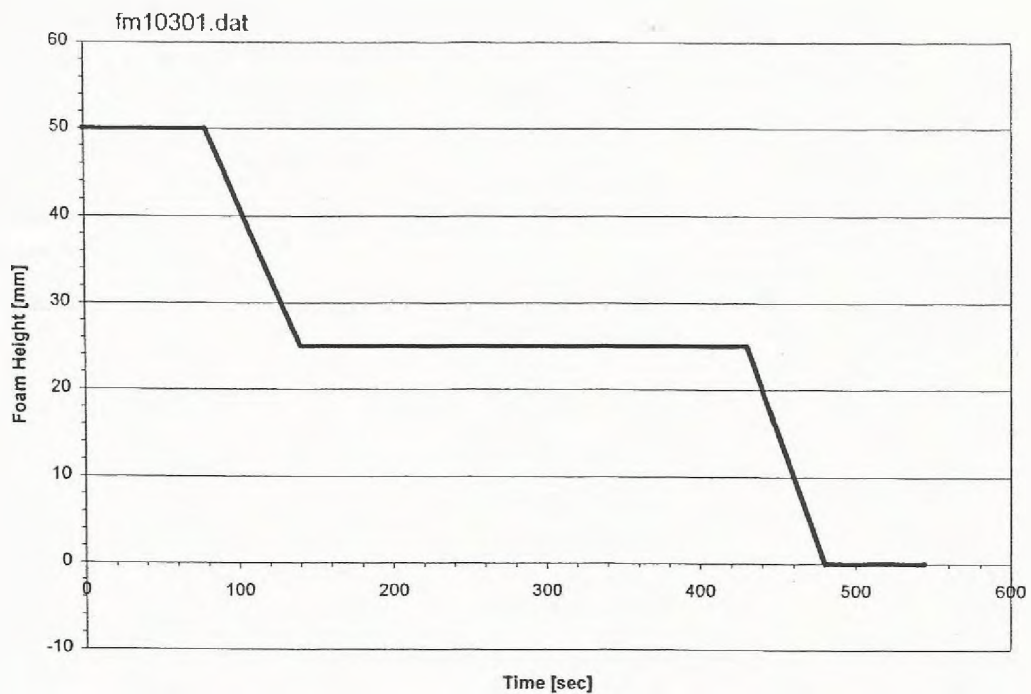


Fig. C39- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.98, irradiance= 20kW/m², initial foam height= 50mm.

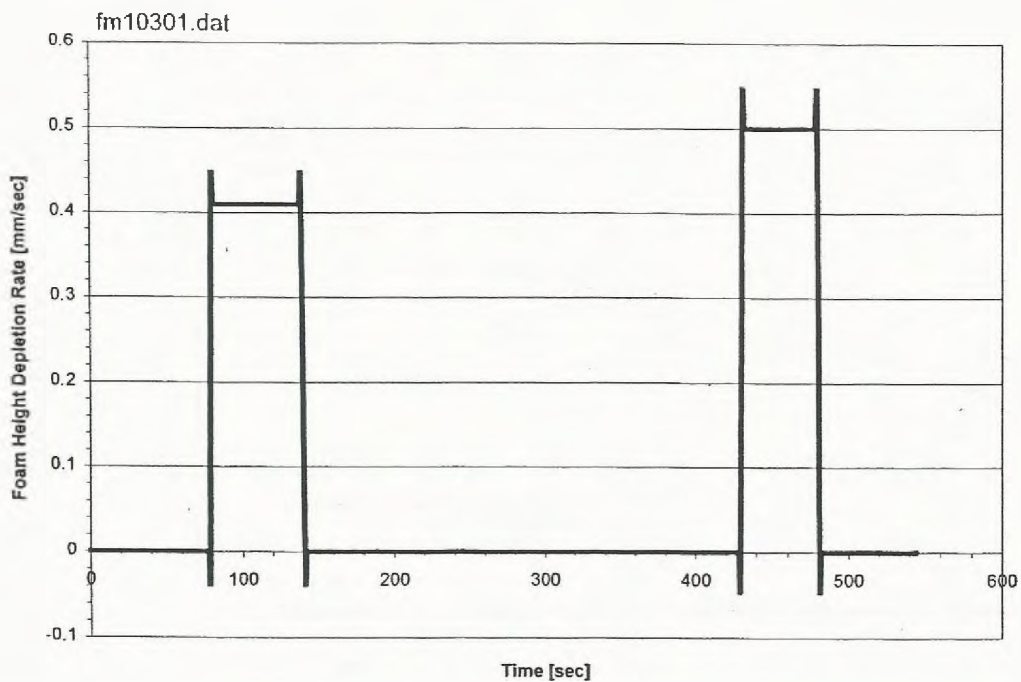


Fig. C40- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.98, irradiance= 20kW/m², initial foam height= 50mm.

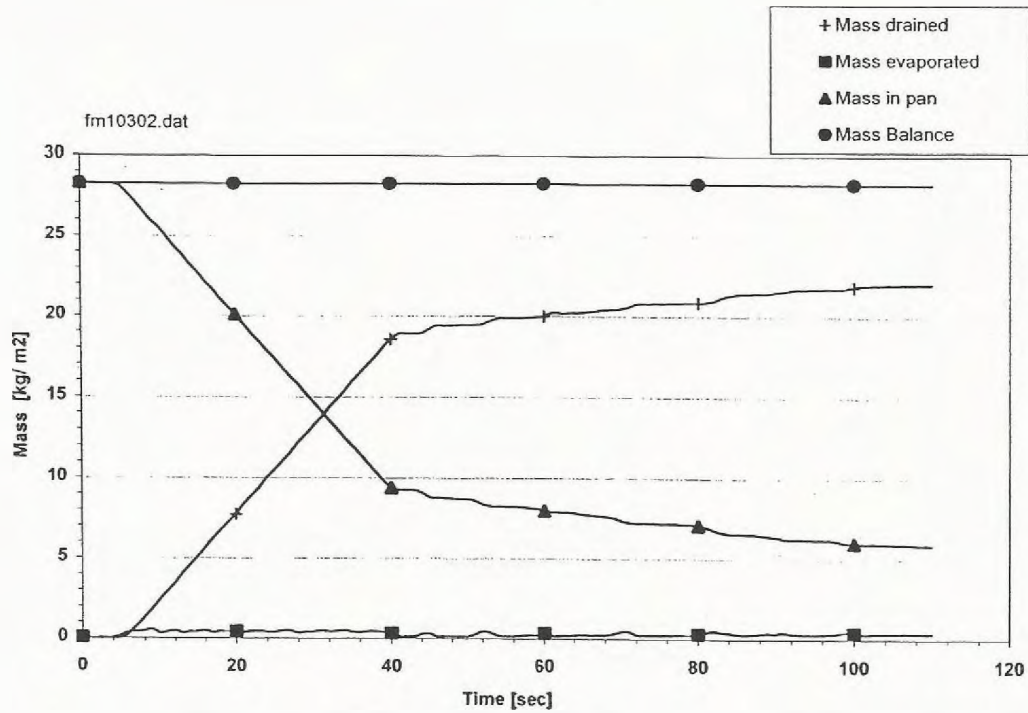


Fig. C41- Mass data in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 2.66, irradiance= 20kW/m2, initial foam height= 75mm.

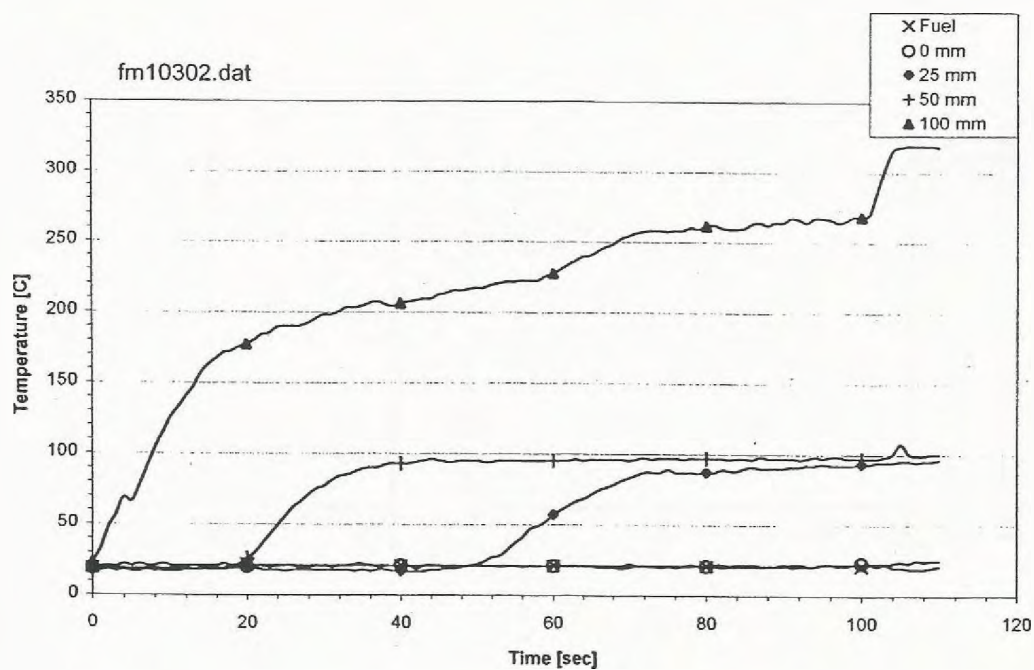


Fig. C42- Foam temperature in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 2.66, irradiance= 20kW/m2, initial foam height= 75mm.

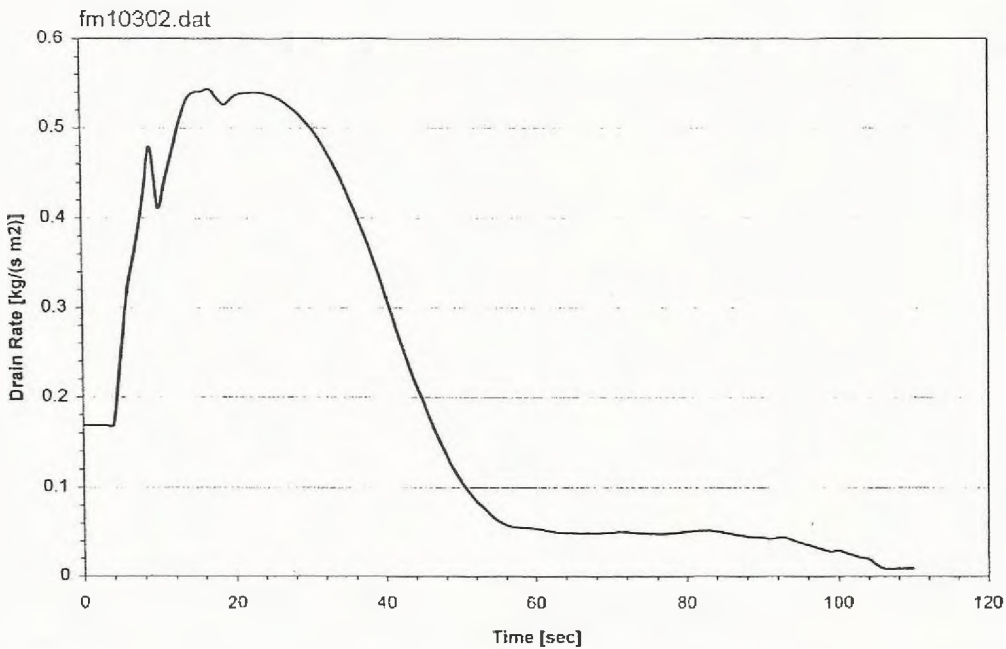


Fig. C43- Drain rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 2.66, irradiance= 20kW/m², initial foam height= 75mm.

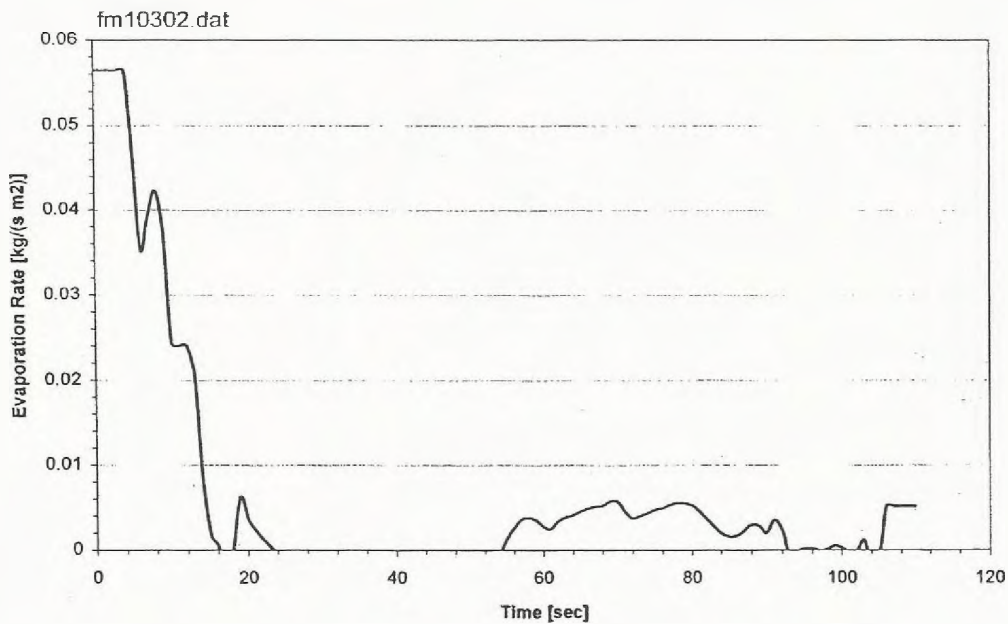


Fig. C44- Evaporation rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 2.66, irradiance= 20kW/m², initial foam height= 75mm.

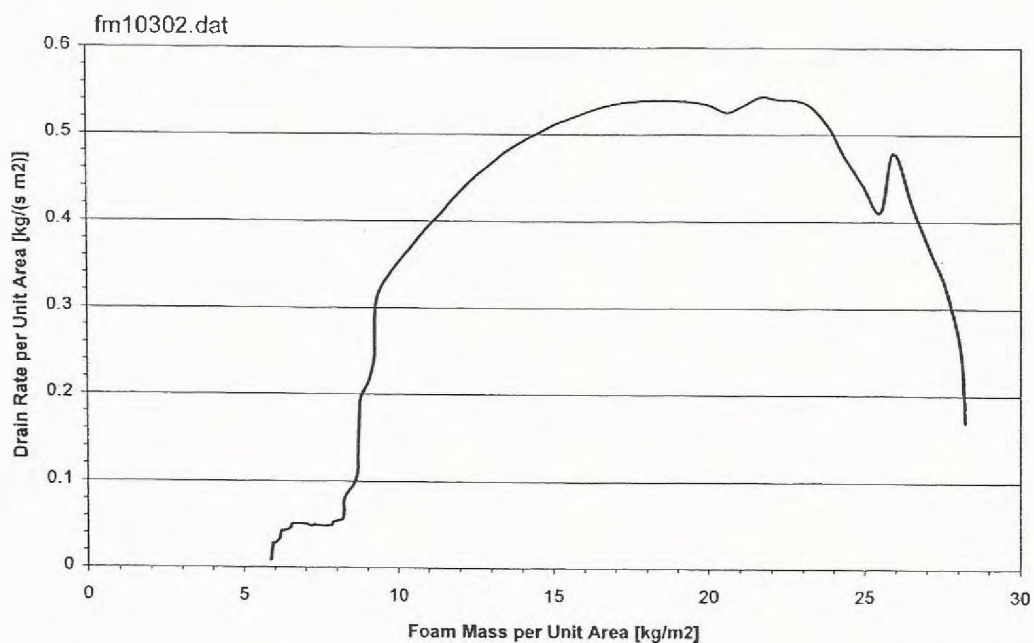


Fig. C45- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 2.66, irradiance= 20kW/m², initial foam height= 75mm.

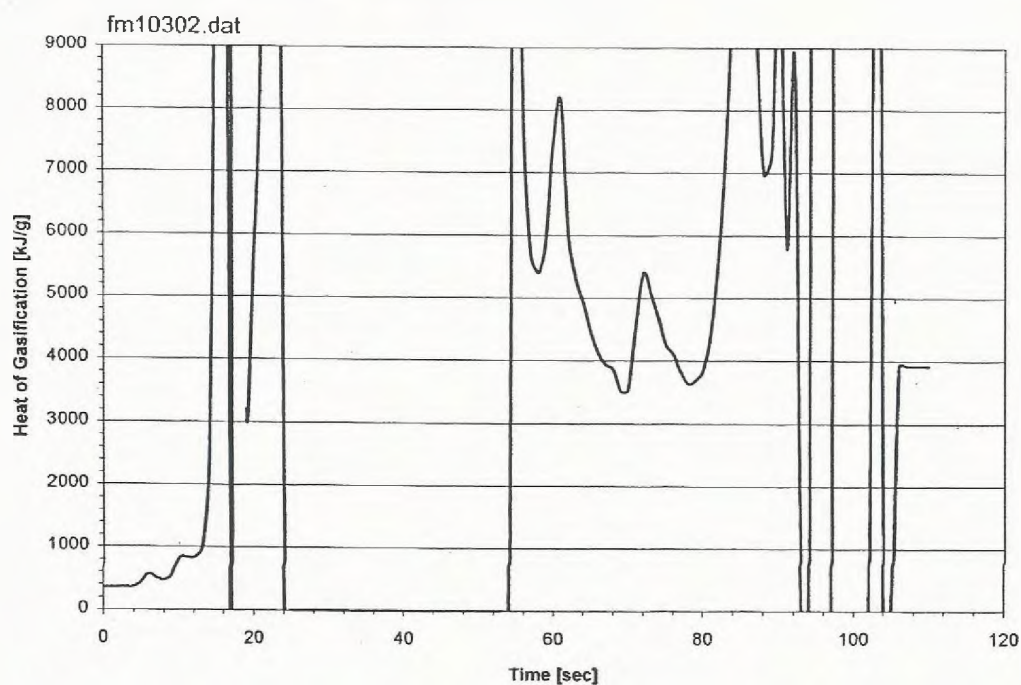


Fig. C46- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 2.66, irradiance= 20kW/m², initial foam height= 75mm.

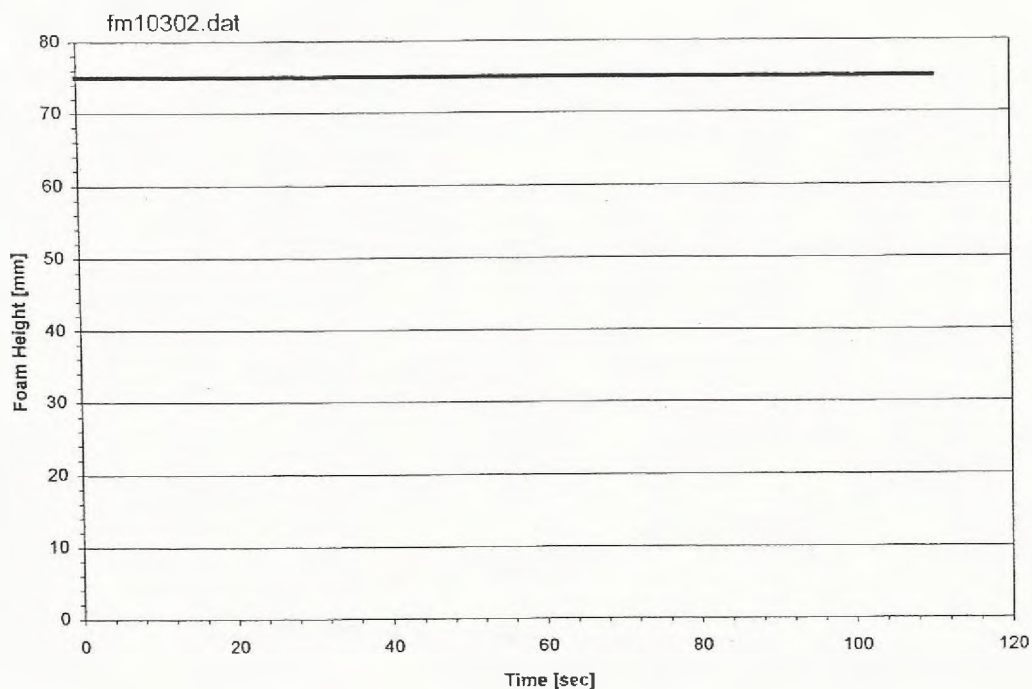


Fig. C47- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 2.66, irradiance= 20kW/m², initial foam height= 75mm.

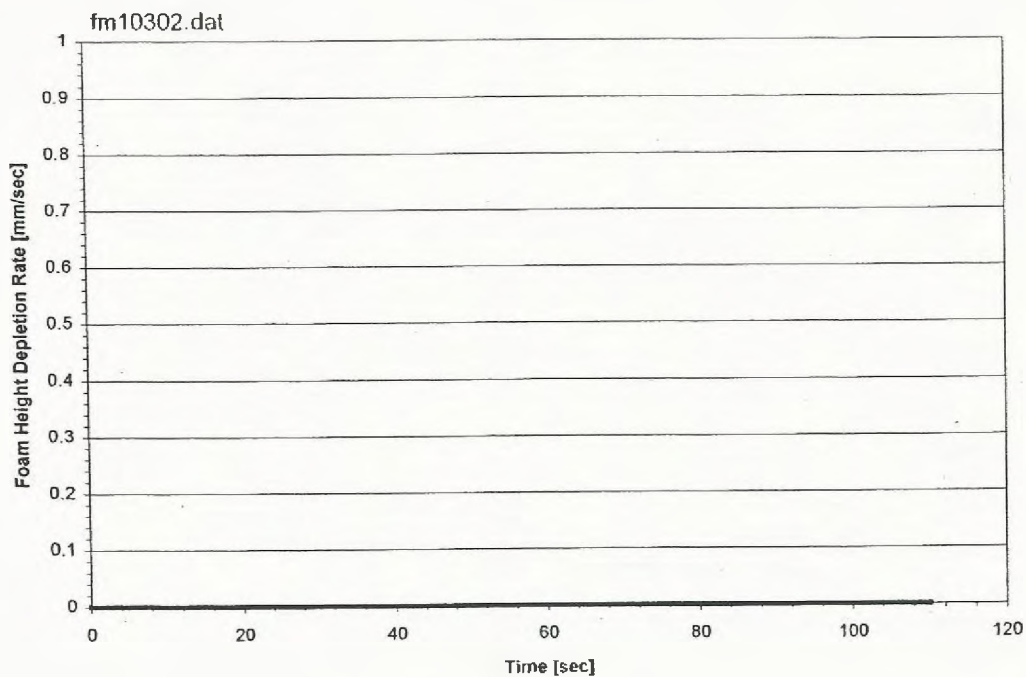


Fig. C48- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 2.66, irradiance= 20kW/m², initial foam height= 75mm.

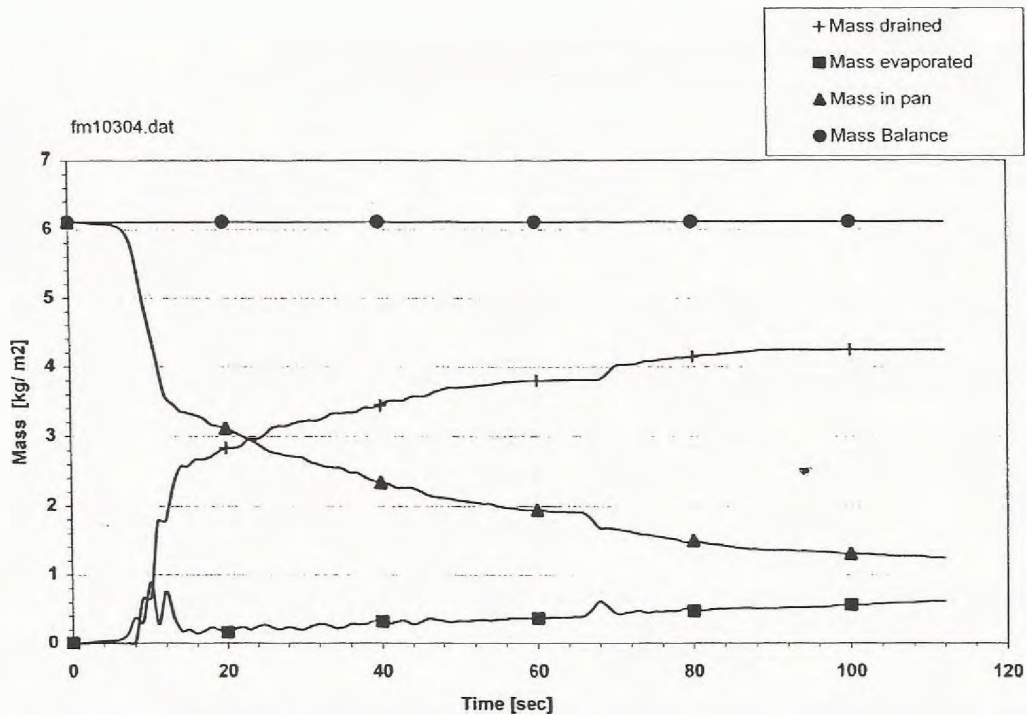


Fig. C49- Mass data in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 4.11, irradiance= 35kW/m², initial foam height= 25mm.

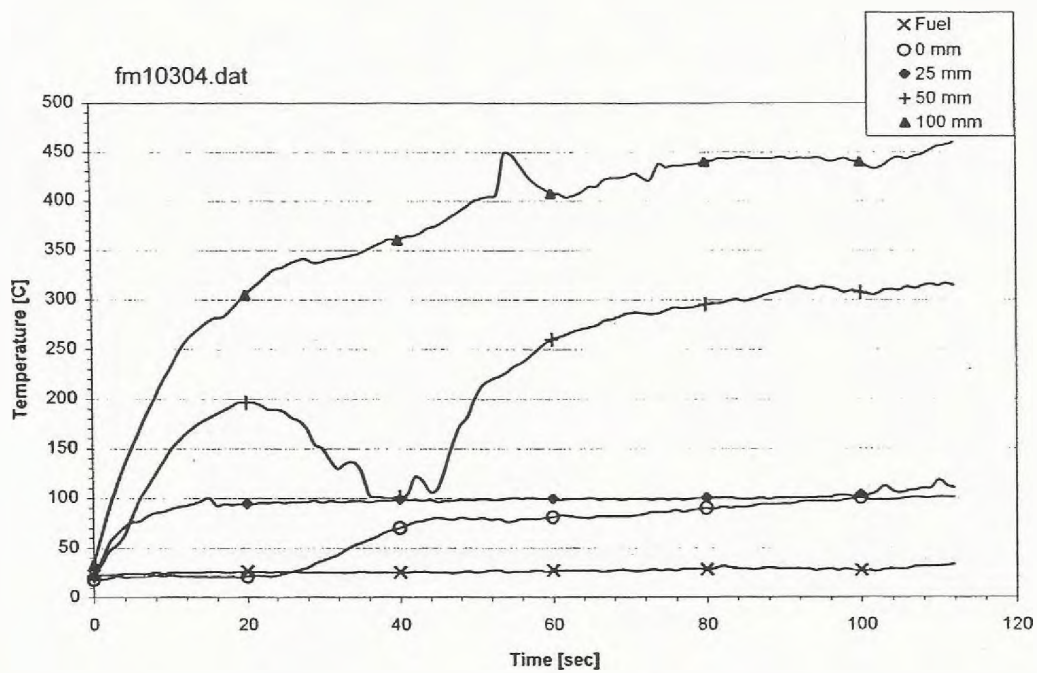


Fig. C50- Foam temperature in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 4.11, irradiance= 35kW/m², initial foam height= 25mm.

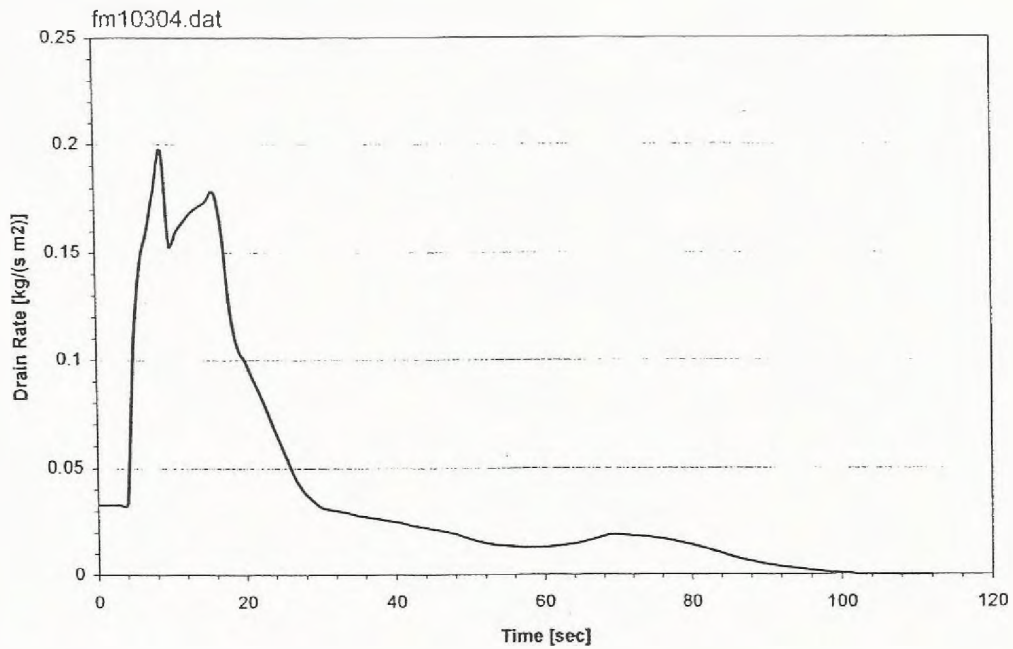


Fig. C51- Drain rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 4.11, irradiance= 35kW/m², initial foam height= 25mm.

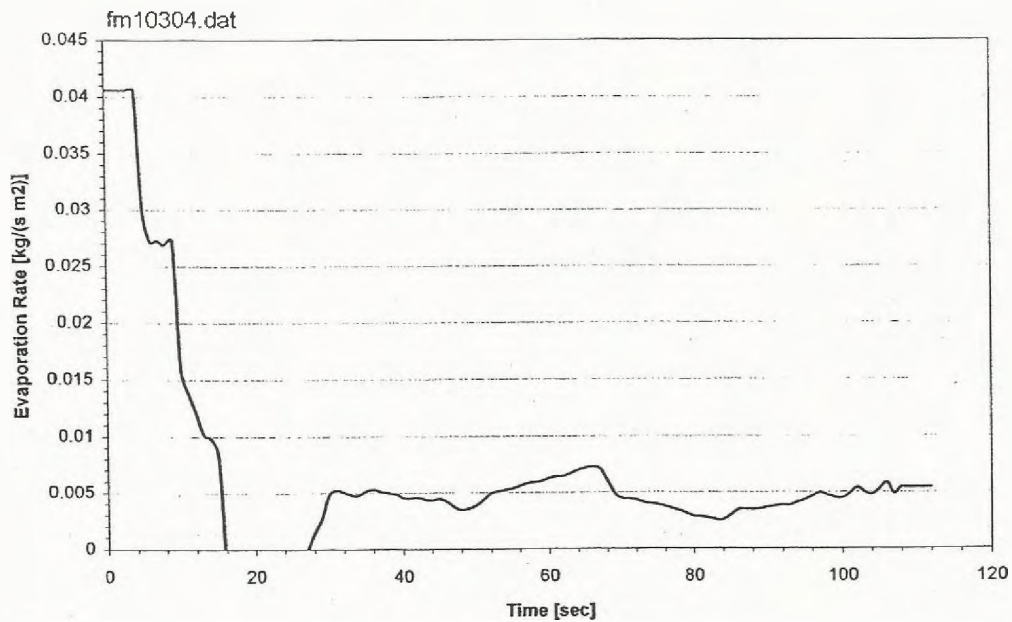


Fig. C52- Evaporation rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 4.11, irradiance= 35kW/m², initial foam height= 25mm.

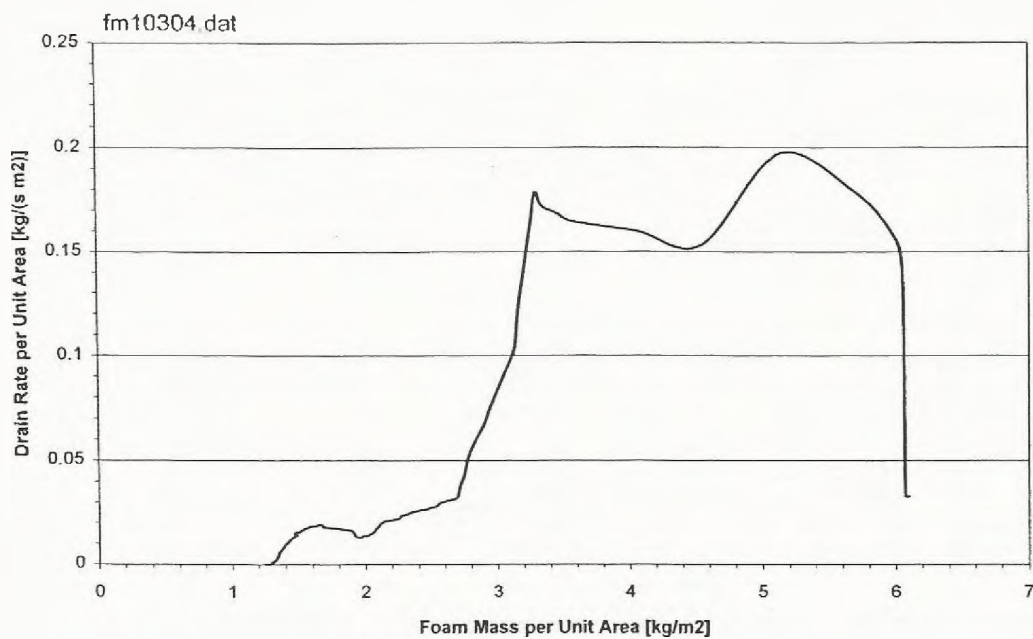


Fig. C53- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 4.11, irradiance= 35kW/m2, initial foam height= 25mm.

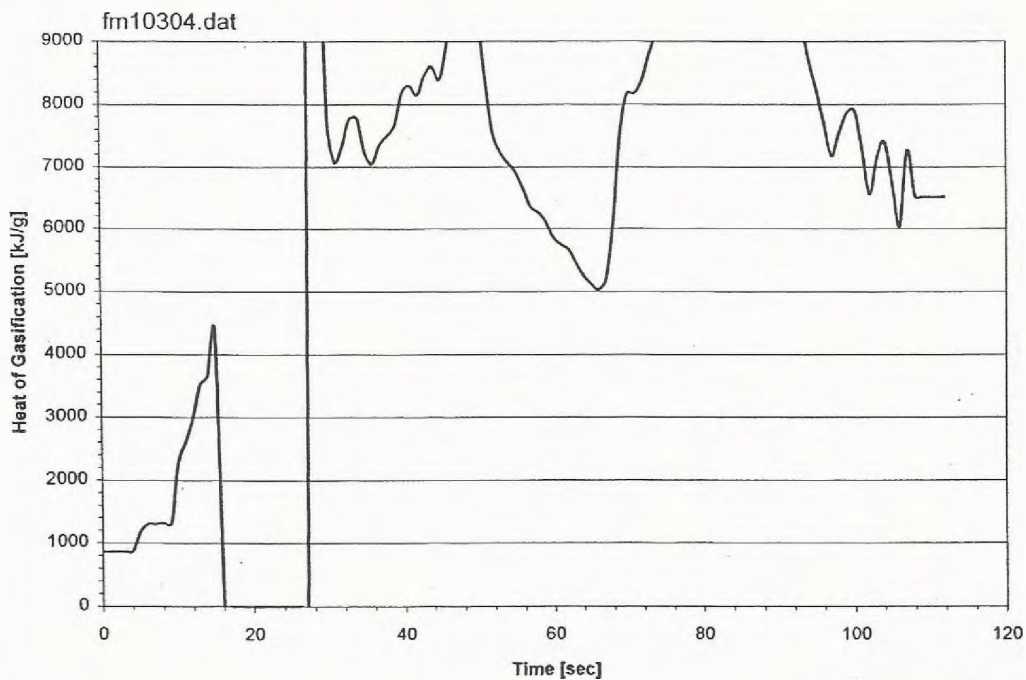


Fig. C54- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 4.11, irradiance= 35kW/m2, initial foam height= 25mm.

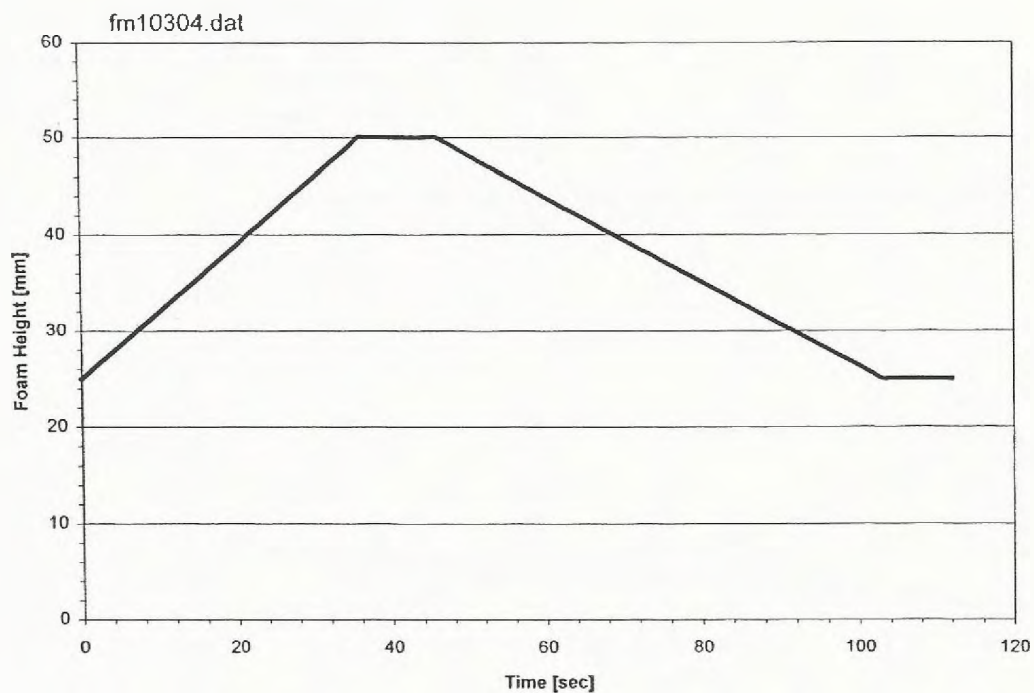


Fig. C55- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 4.11, irradiance= 35kW/m2, initial foam height= 25mm.

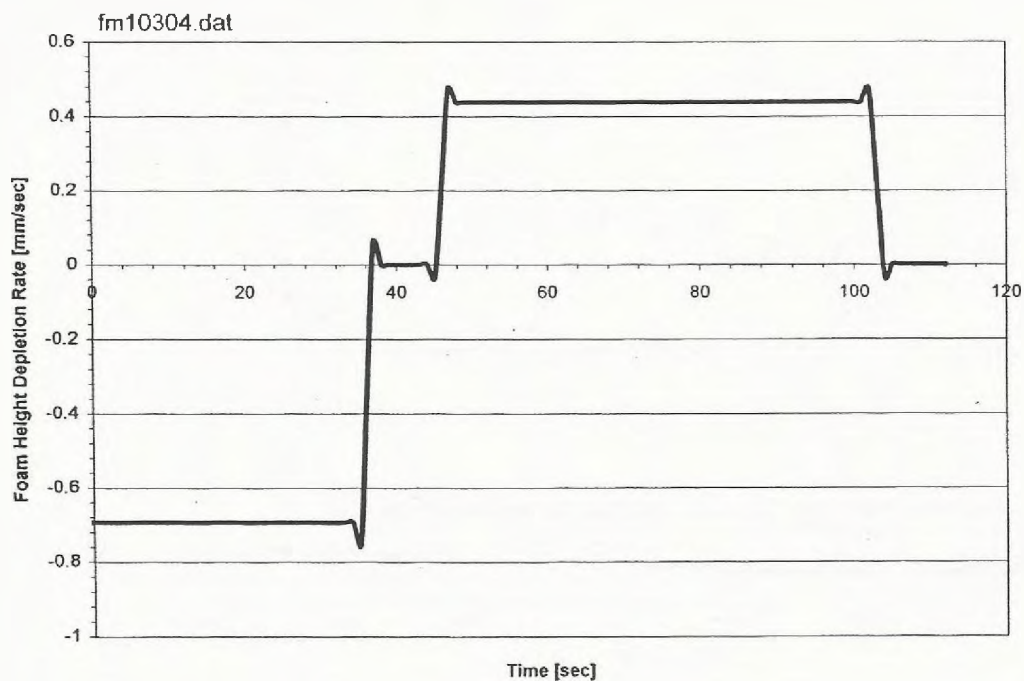


Fig. C56- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 4.11, irradiance= 35kW/m2, initial foam height= 25mm.

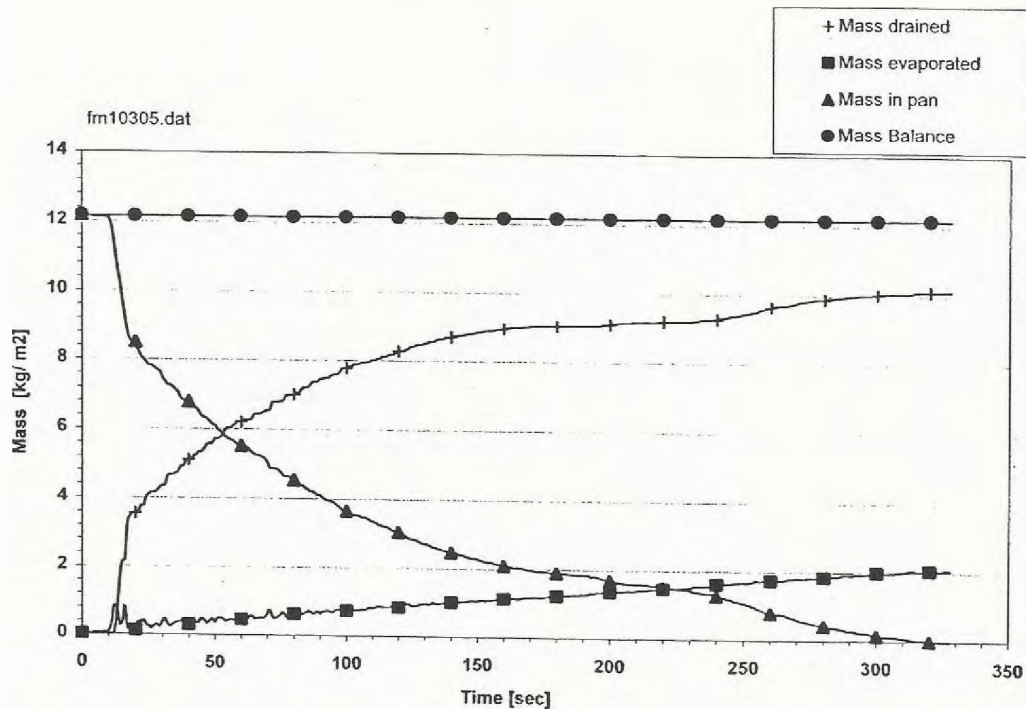


Fig. C57- Mass data in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 4.13, irradiance= 35kW/m2, initial foam height= 50mm.

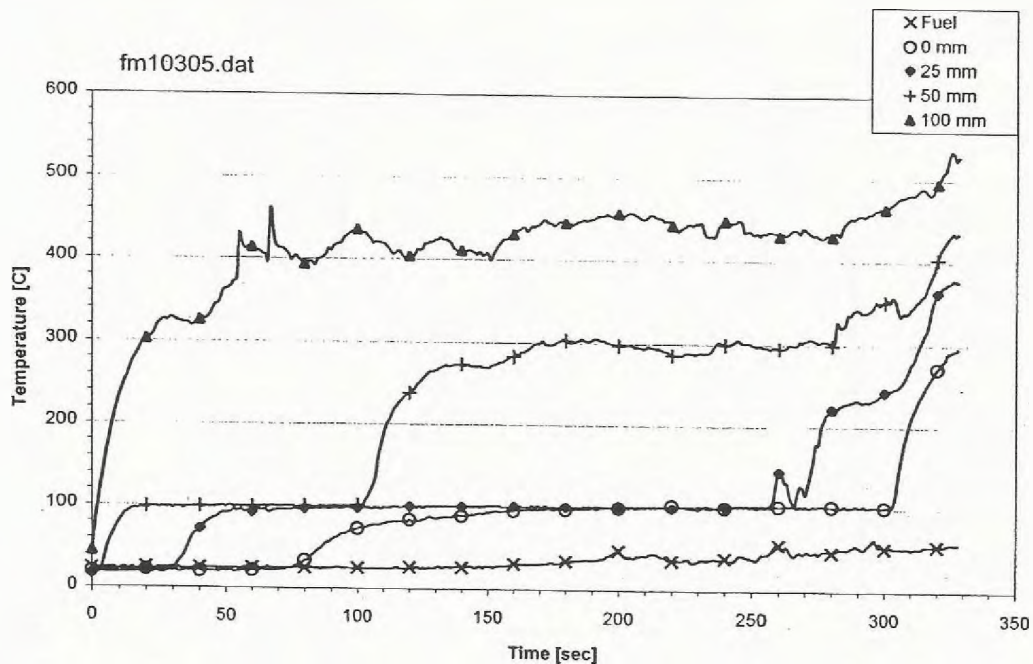


Fig. C58- Foam temperature in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 4.13, irradiance= 35kW/m2, initial foam height= 50mm.

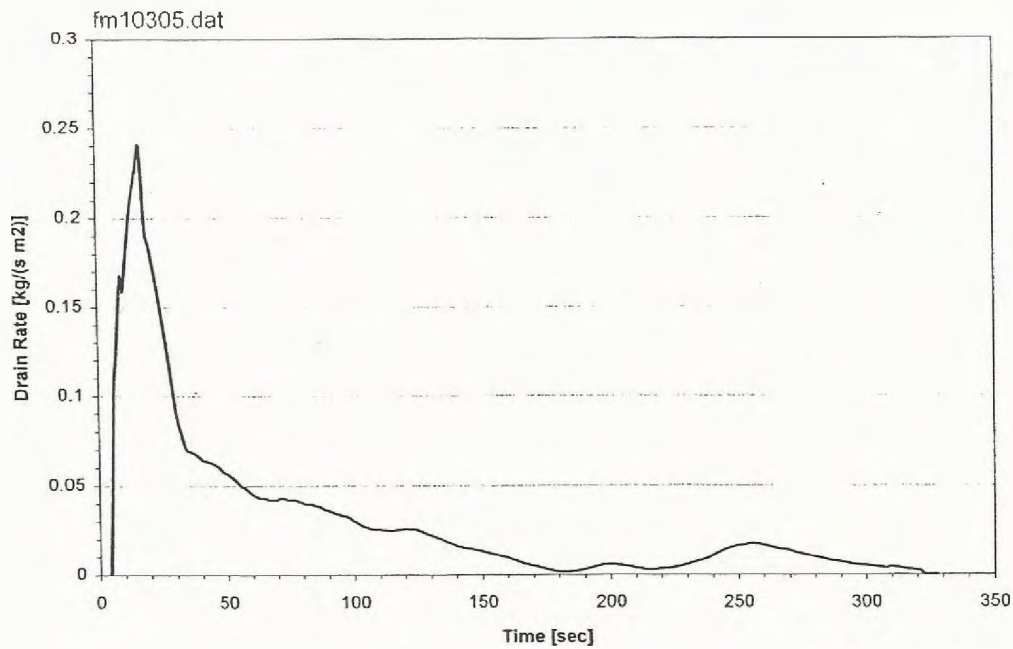


Fig. C59- Drain rate in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 4.13, irradiance= 35kW/m², initial foam height= 50mm.

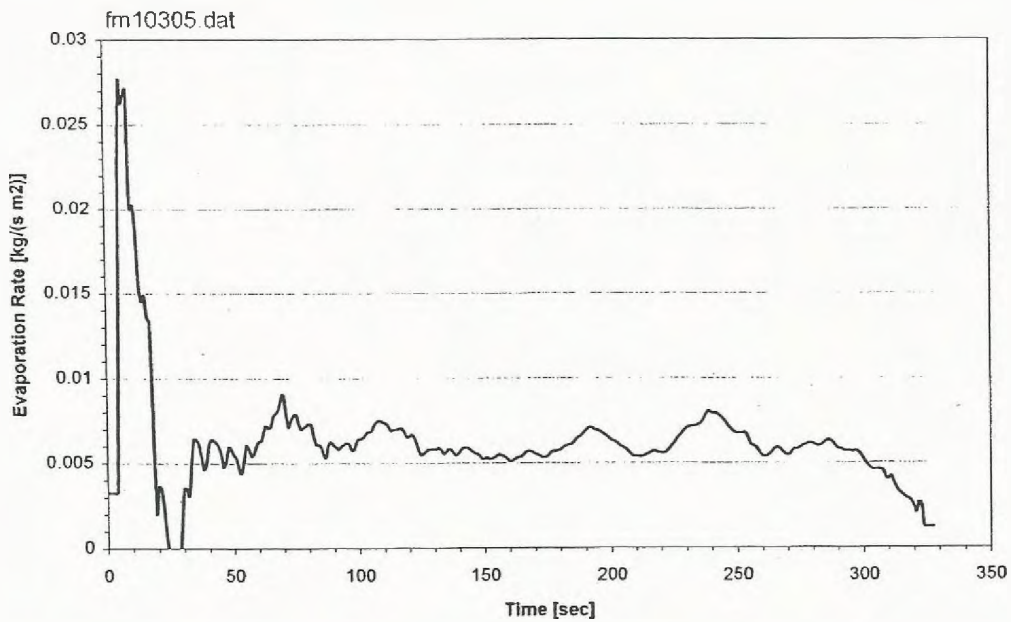


Fig. C60- Evaporation rate in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 4.13, irradiance= 35kW/m², initial foam height= 50mm.

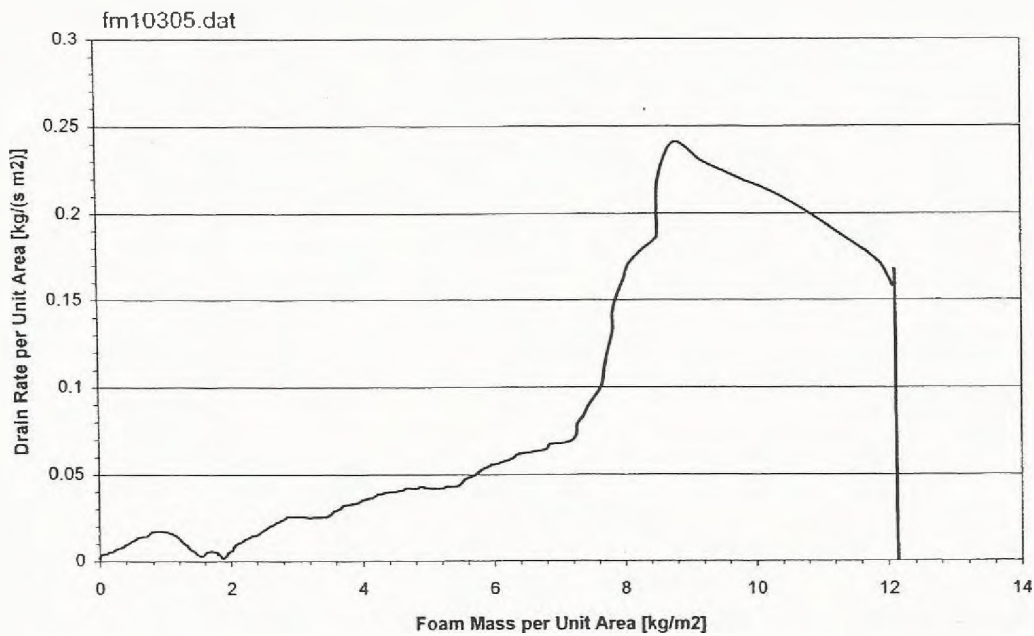


Fig. C61- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 4.13, irradiance= 35kW/m2, initial foam height= 50mm.

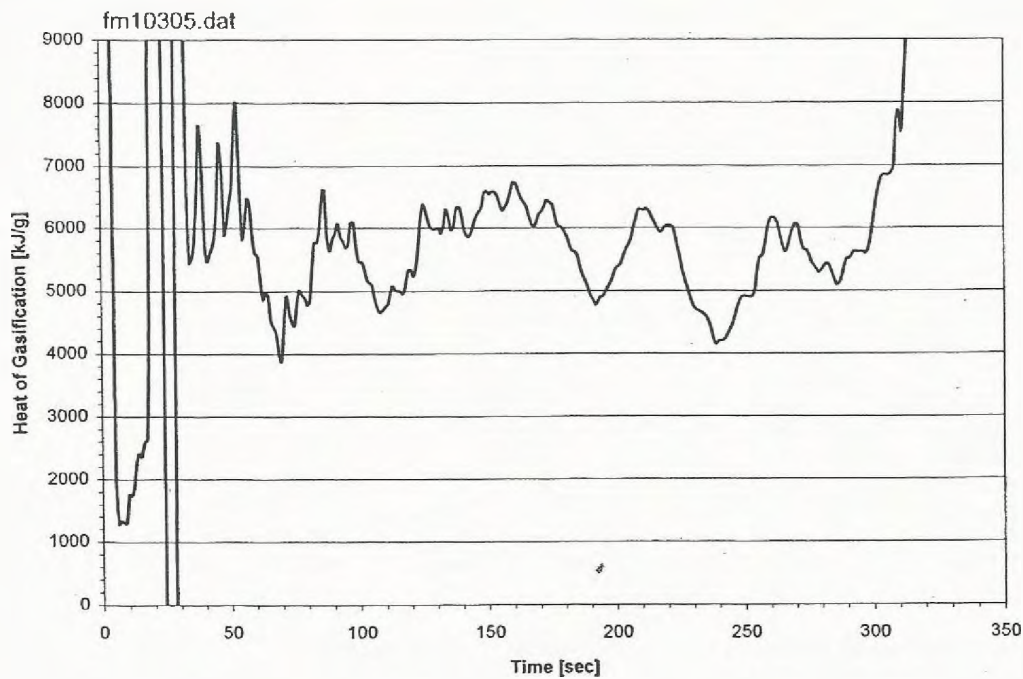


Fig. C62- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 4.13, irradiance= 35kW/m2, initial foam height= 50mm.

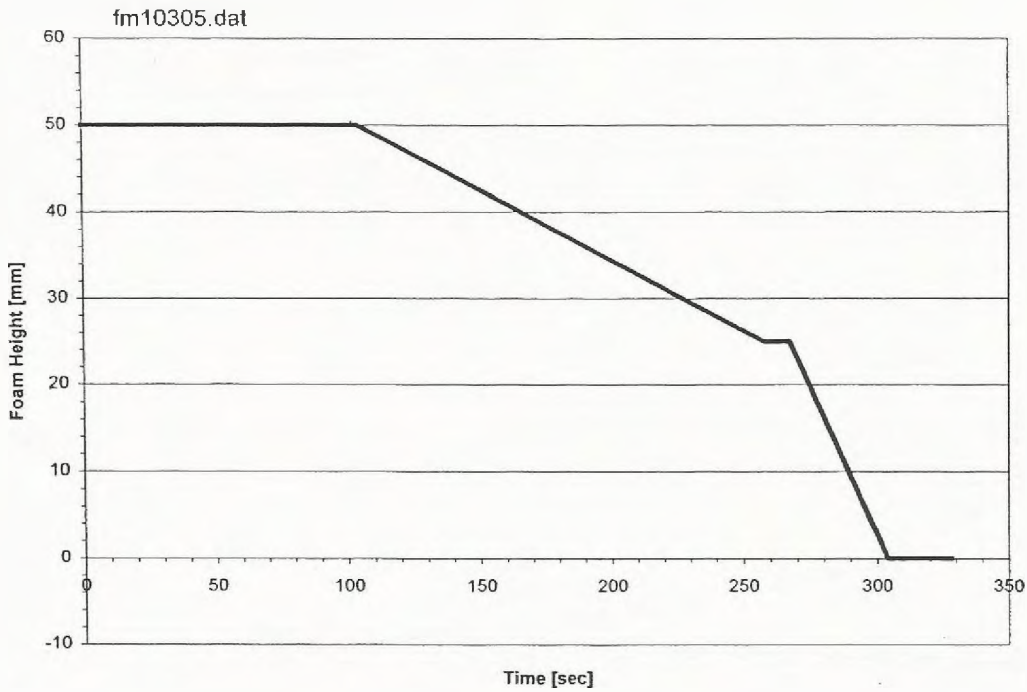


Fig. C63- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 4.13, irradiance= 35kW/m², initial foam height= 50mm.

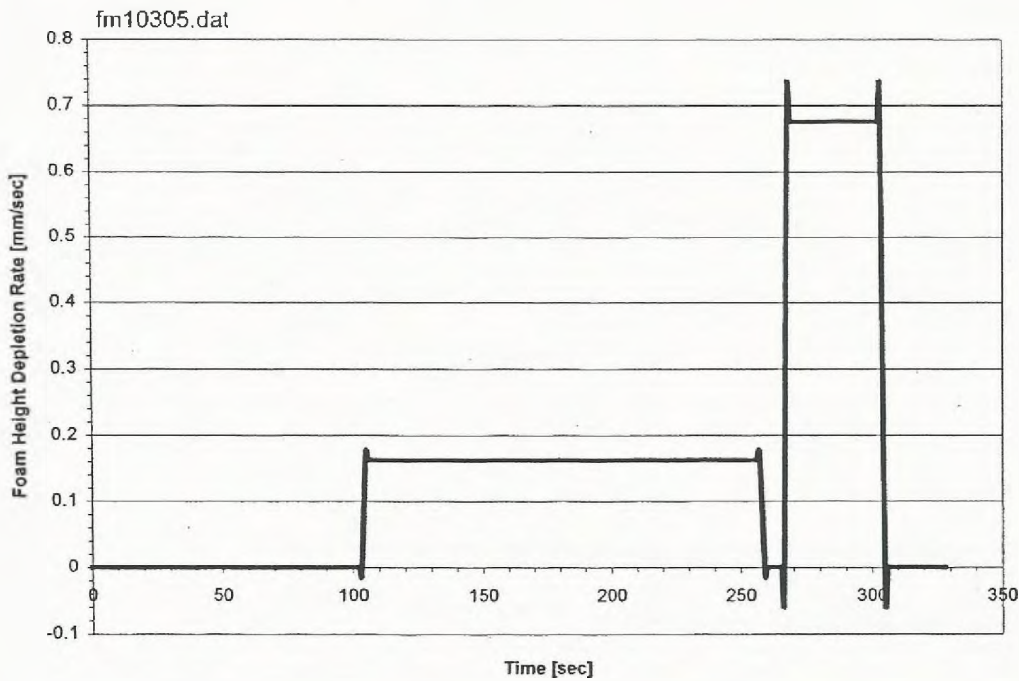


Fig. C64- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 4.13, irradiance= 35kW/m², initial foam height= 50mm.

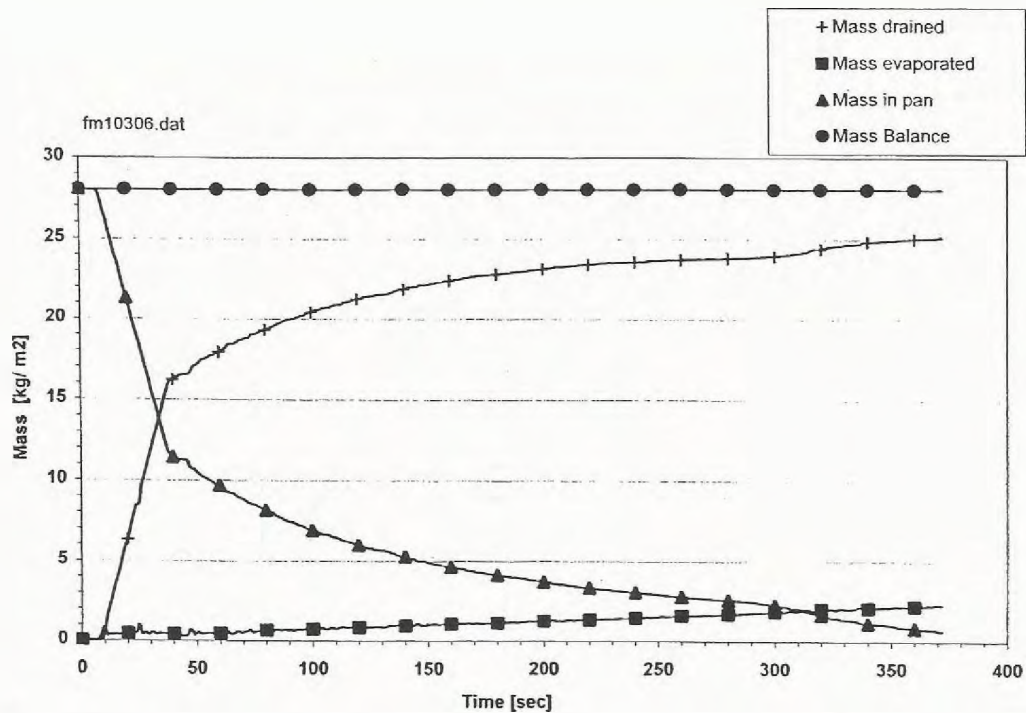


Fig. C65- Mass data in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 2.68, irradiance= 35kW/m², initial foam height= 75mm.

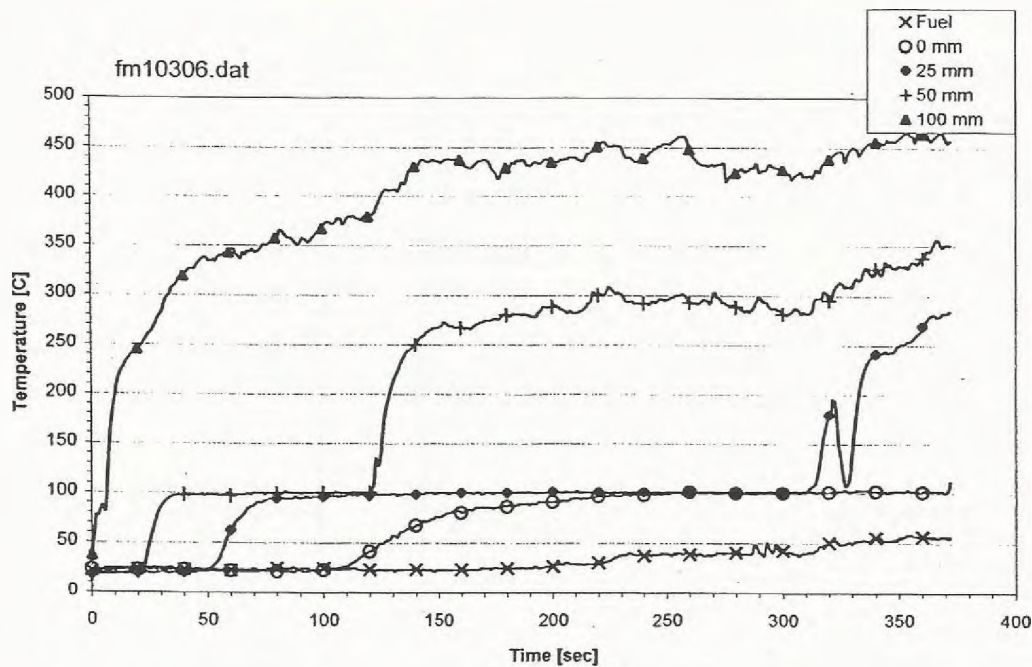


Fig. C66- Foam temperature in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 2.68, irradiance= 35kW/m², initial foam height= 75mm.

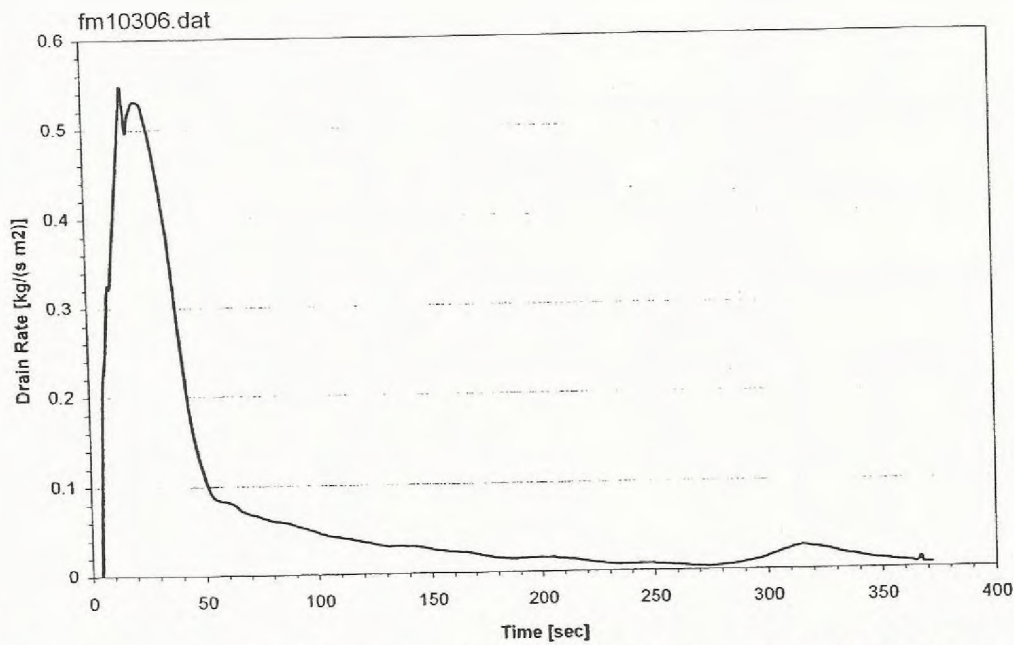


Fig. C67- Drain rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio=2.68, irradiance=35kW/m², initial foam height=75mm.

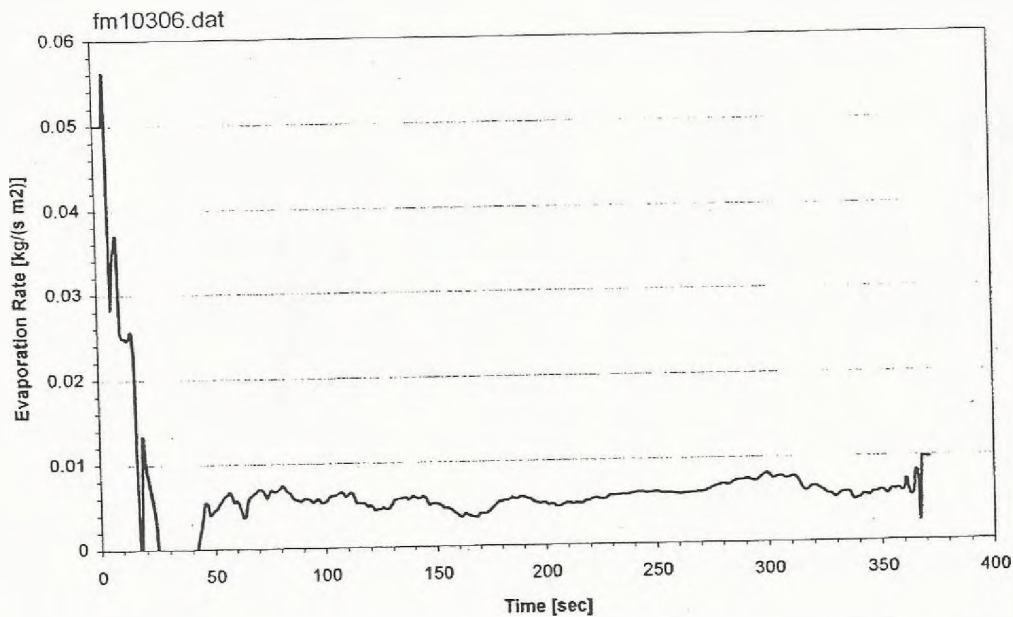


Fig. C68- Evaporation rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio=2.68, irradiance=35kW/m², initial foam height=75mm.

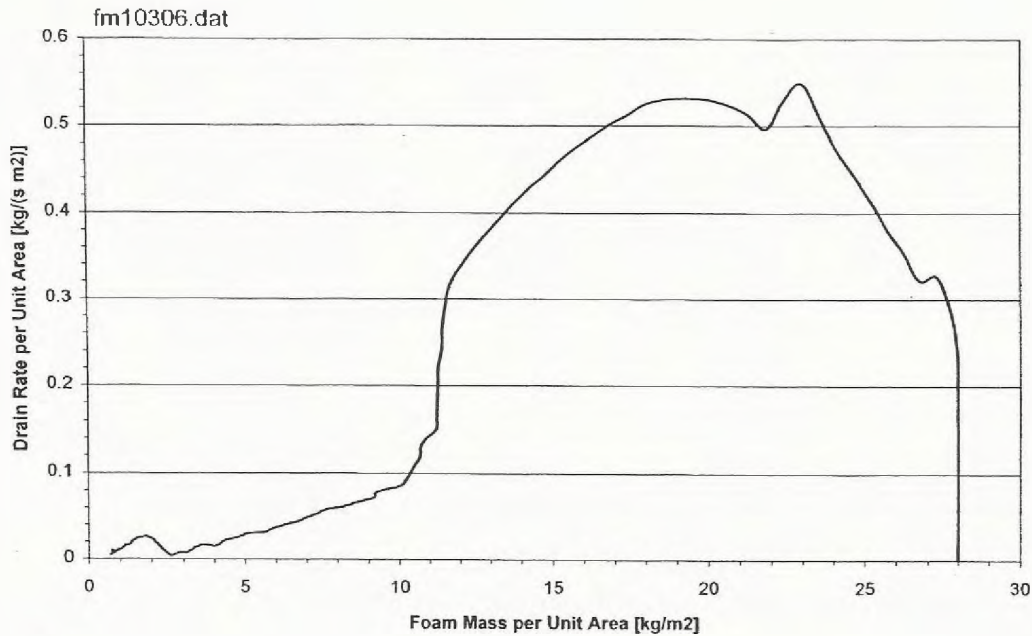


Fig. C69- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 2.68, irradiance= 35kW/m², initial foam height= 75mm.

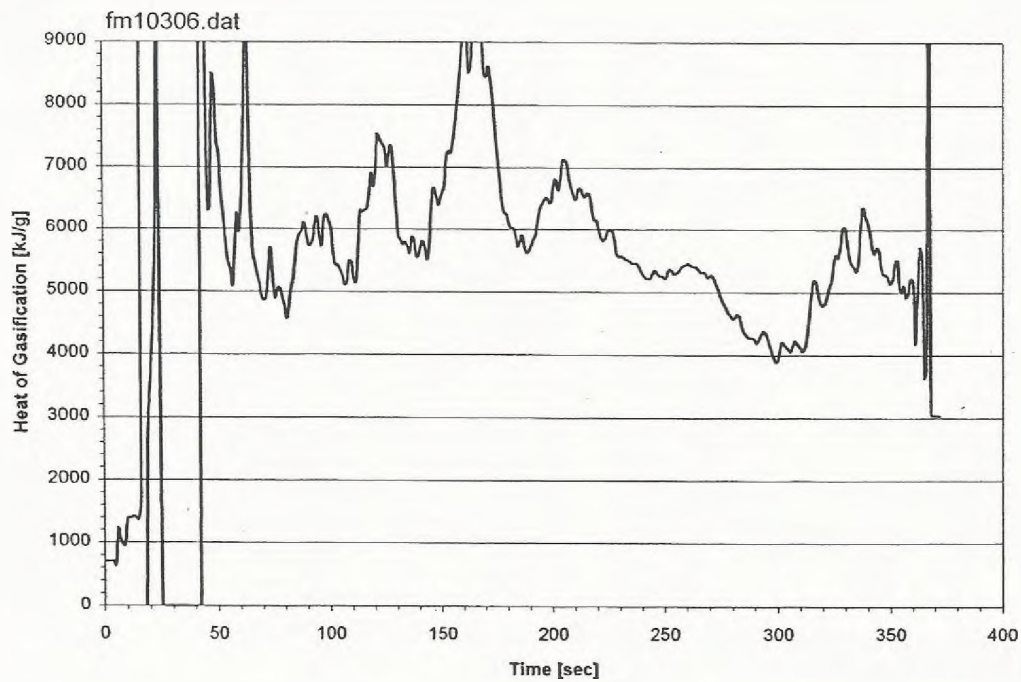


Fig. C70- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 2.68, irradiance= 35kW/m², initial foam height= 75mm.

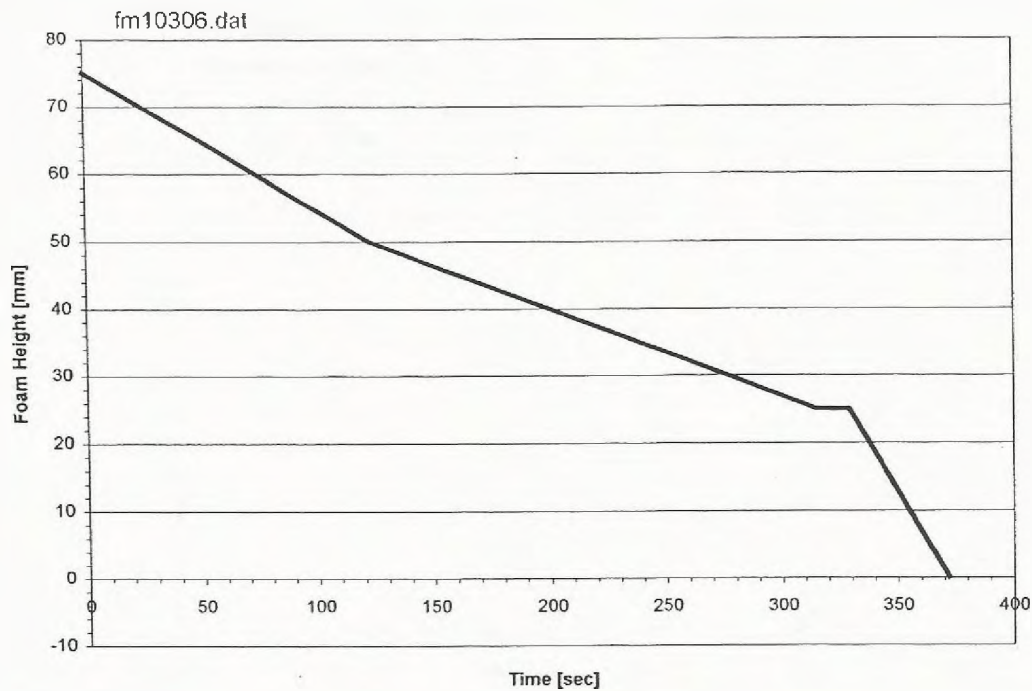


Fig. C71- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 2.68, irradiance= 35kW/m2, initial foam height= 75mm.

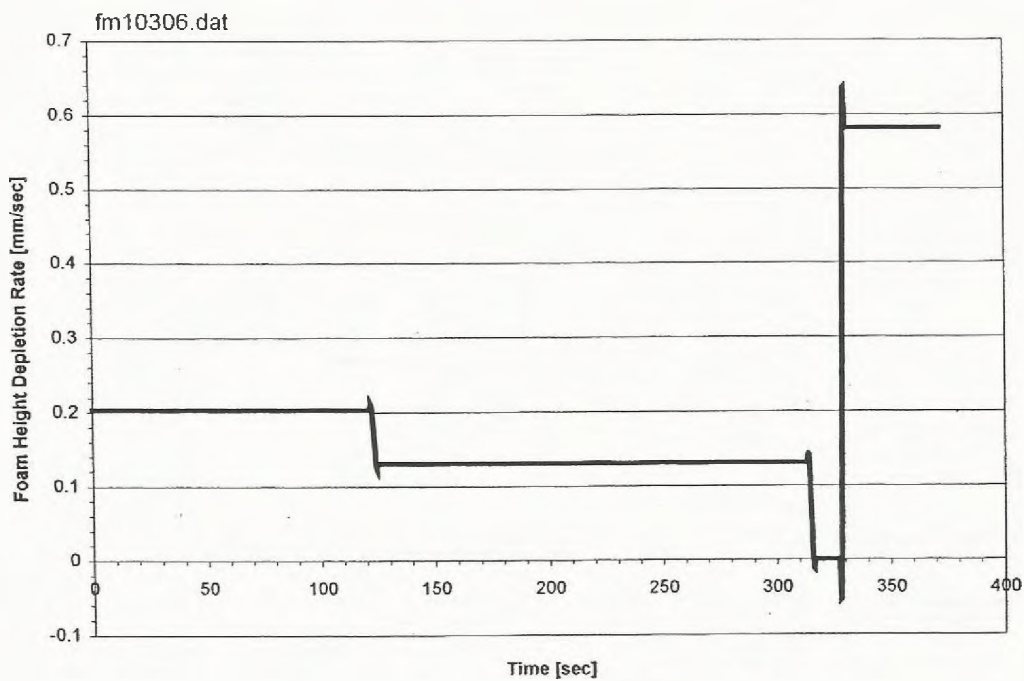


Fig. C72- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 2.68, irradiance= 35kW/m2, initial foam height= 75mm.

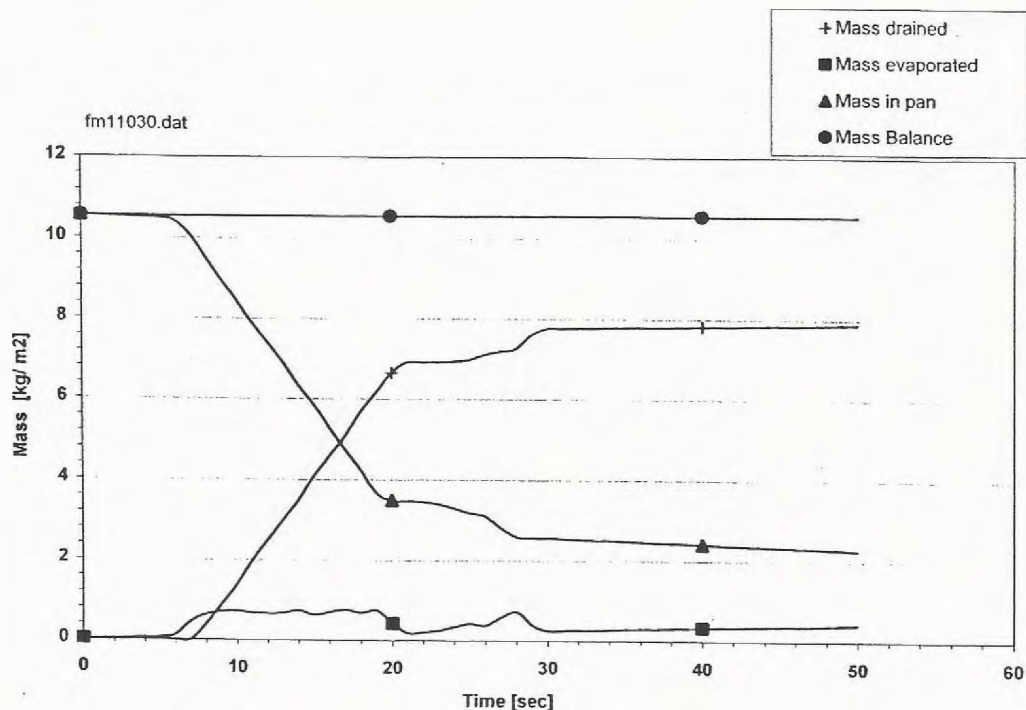


Fig. C73- Mass data in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 2.38, irradiance= 50kW/m², initial foam height= 25mm.

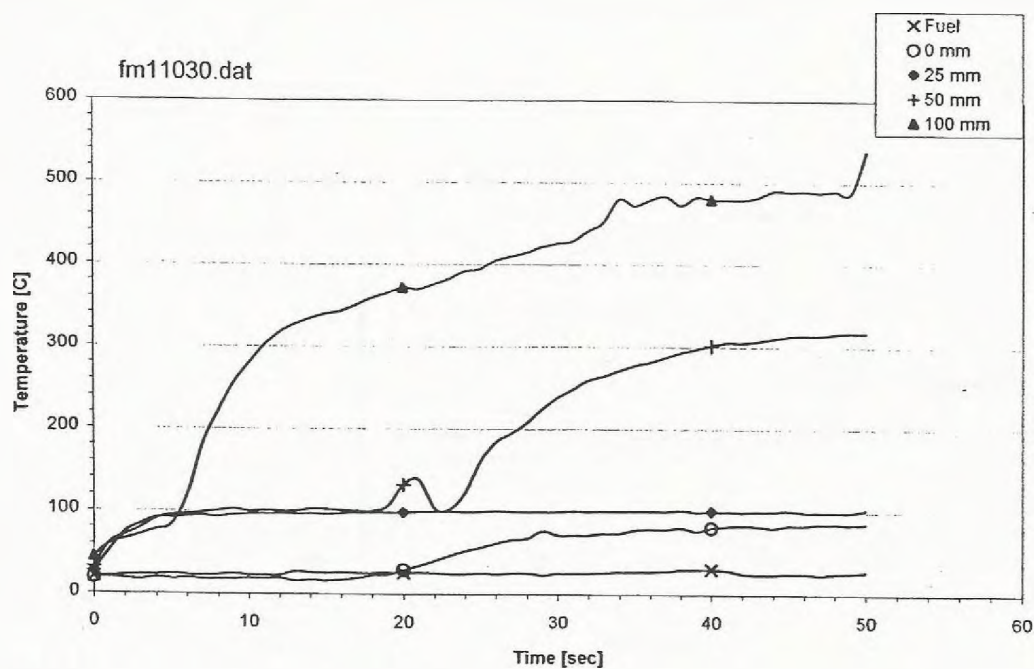


Fig. C74- Foam temperature in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 2.38, irradiance= 50kW/m², initial foam height= 25mm.

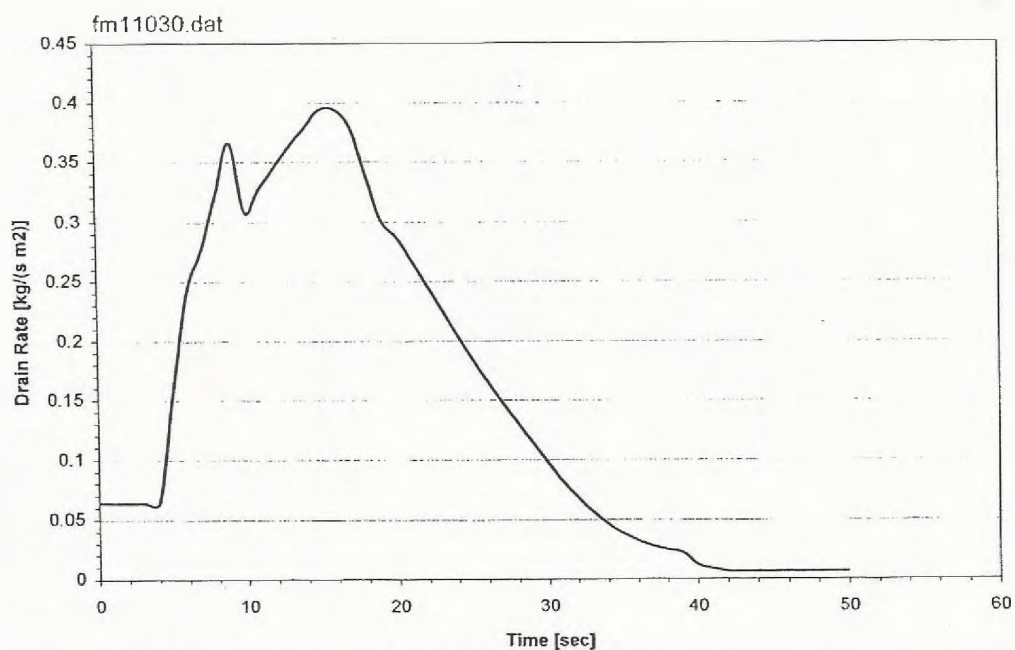


Fig. C75- Drain rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 2.38, irradiance= 50kW/m², initial foam height= 25mm.

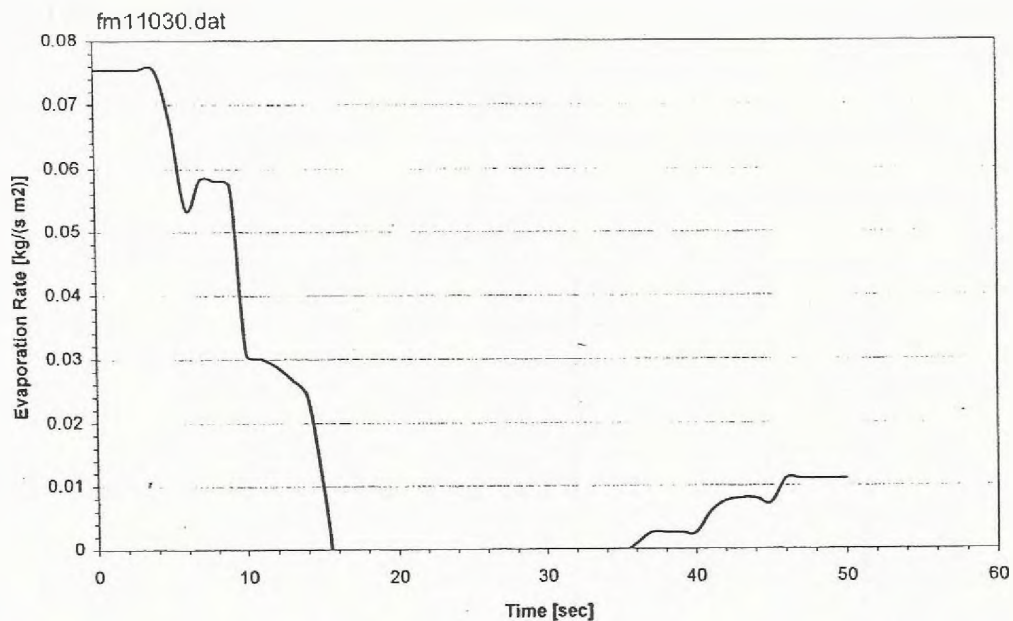


Fig. C76- Evaporation rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 2.38, irradiance= 50kW/m², initial foam height= 25mm.

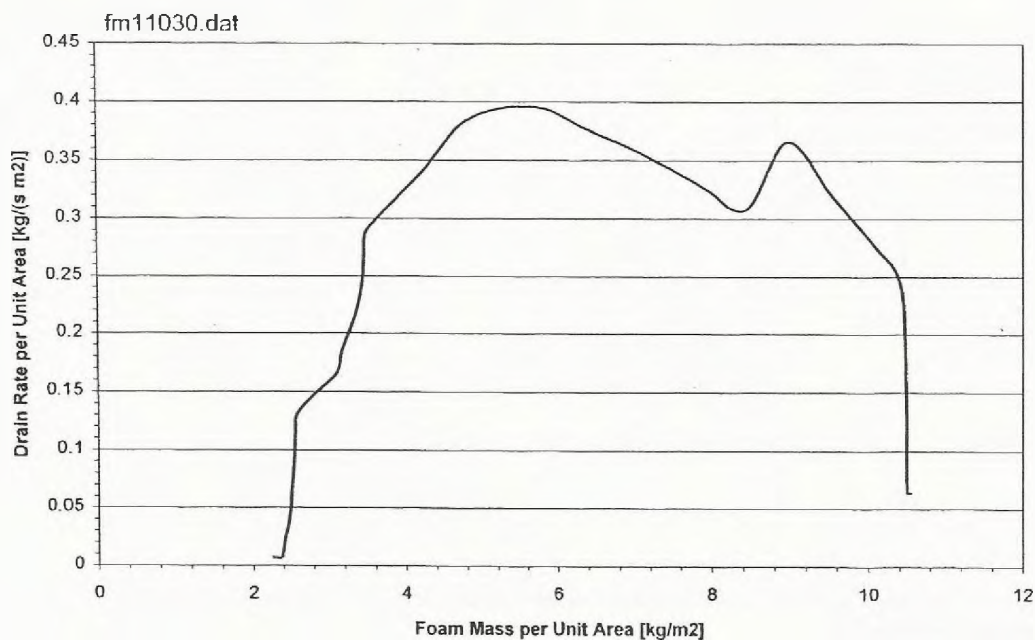


Fig. C77- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 2.38, irradiance= 50kW/m², initial foam height= 25mm.

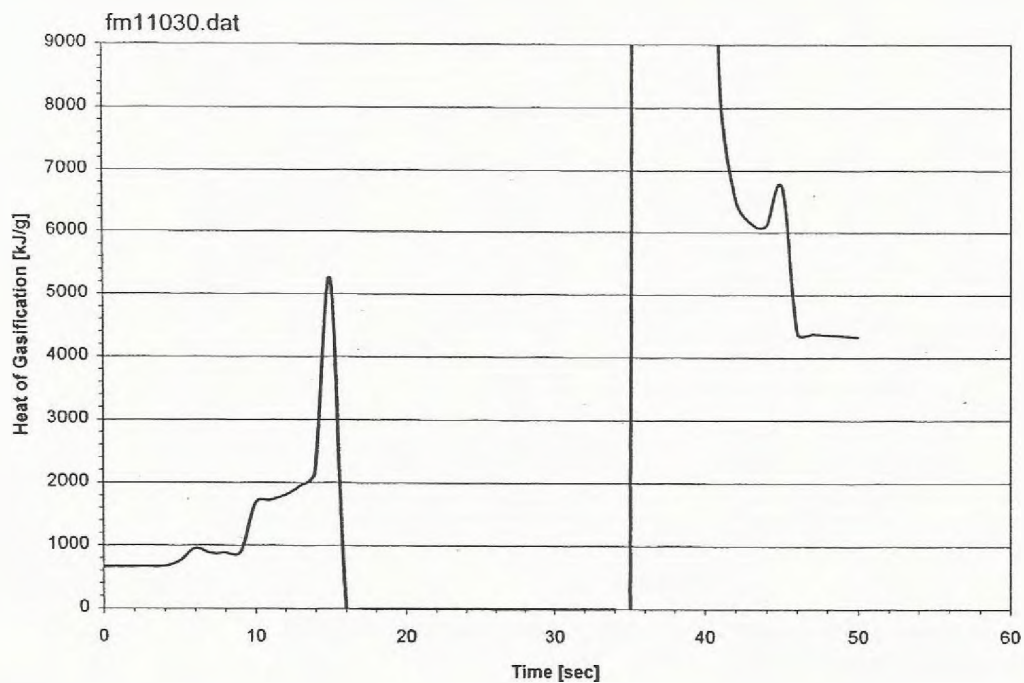


Fig. C78- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 2.38, irradiance= 50kW/m², initial foam height= 25mm.

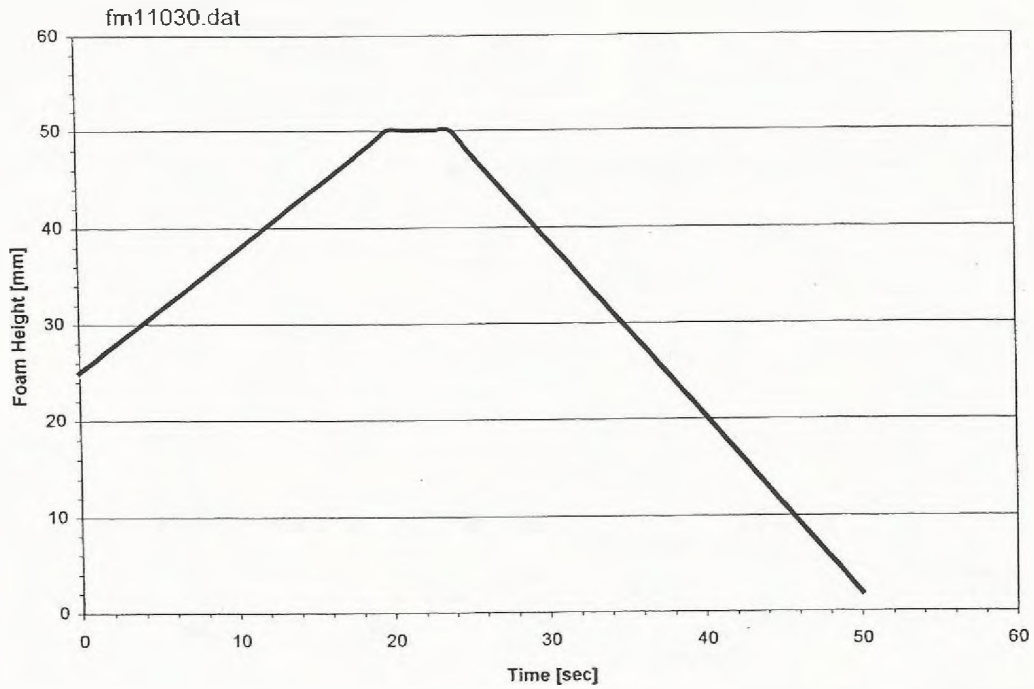


Fig. C79- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 2.38, irradiance= 50kW/m², initial foam height= 25mm.

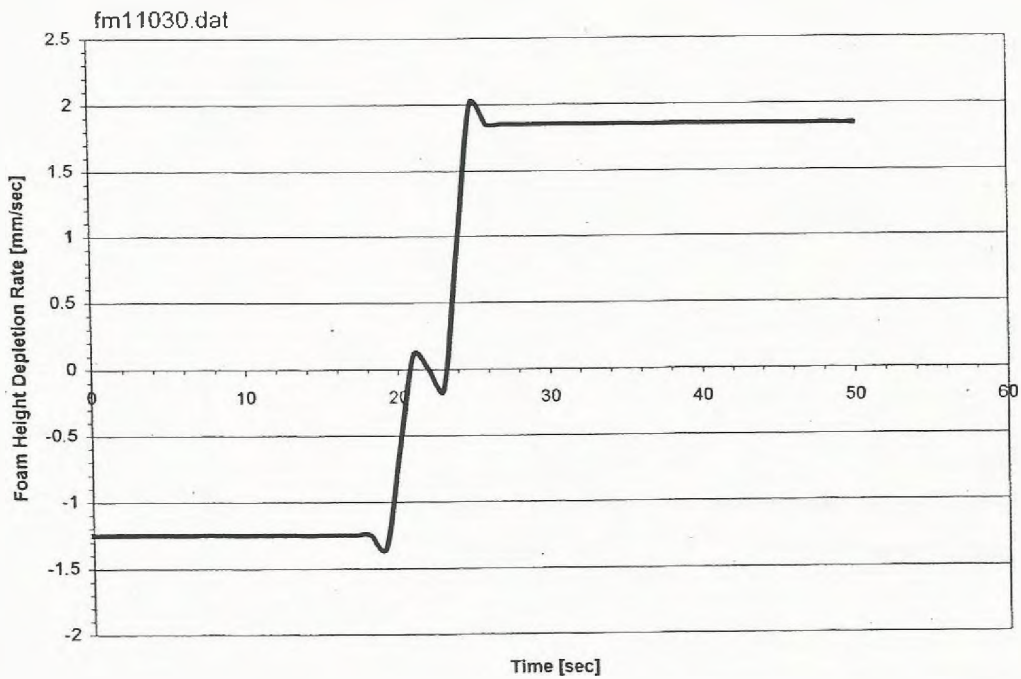


Fig. C80- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 2.38, irradiance= 50kW/m², initial foam height= 25mm.

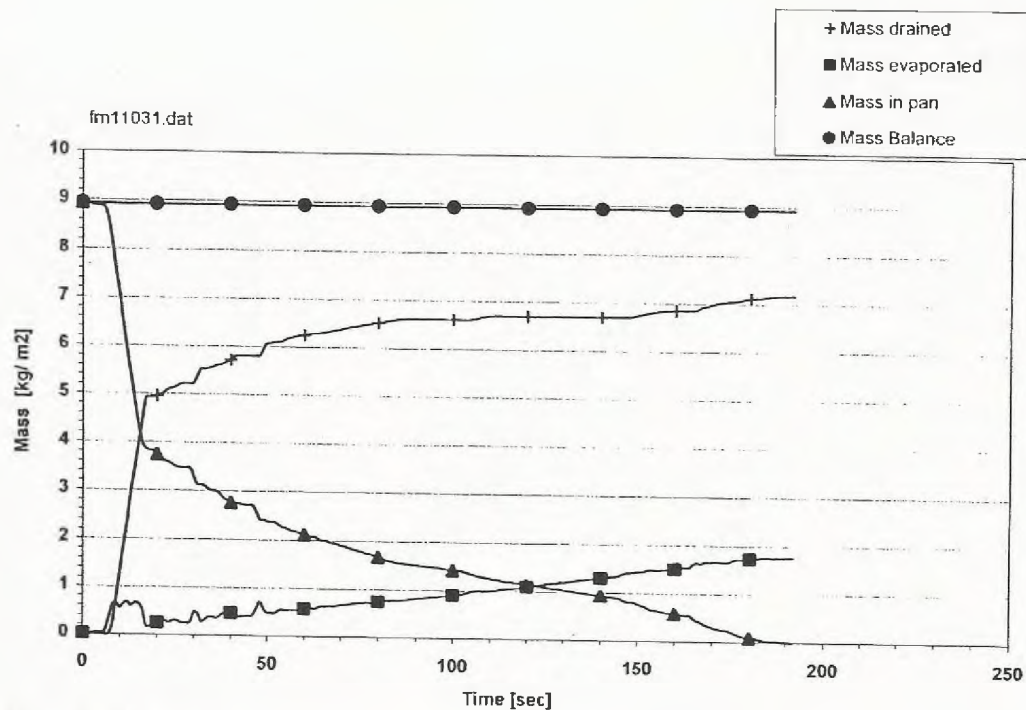


Fig. C81- Mass data in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 2.81, irradiance= 50kW/m², initial foam height= 25mm.

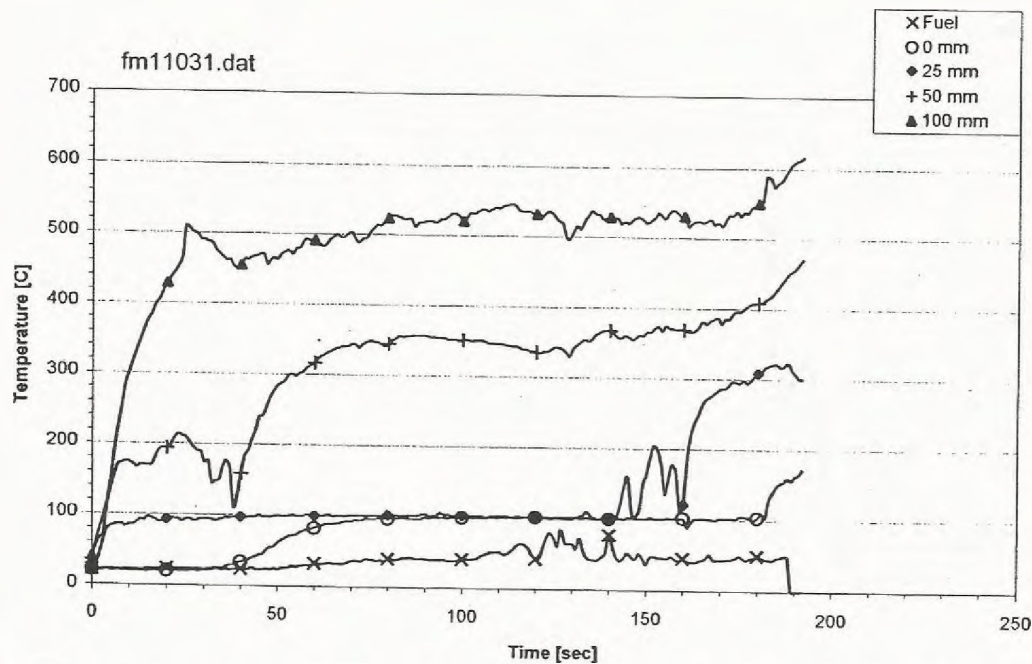


Fig. C82- Foam temperature in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 2.81, irradiance= 50kW/m², initial foam height= 25mm.

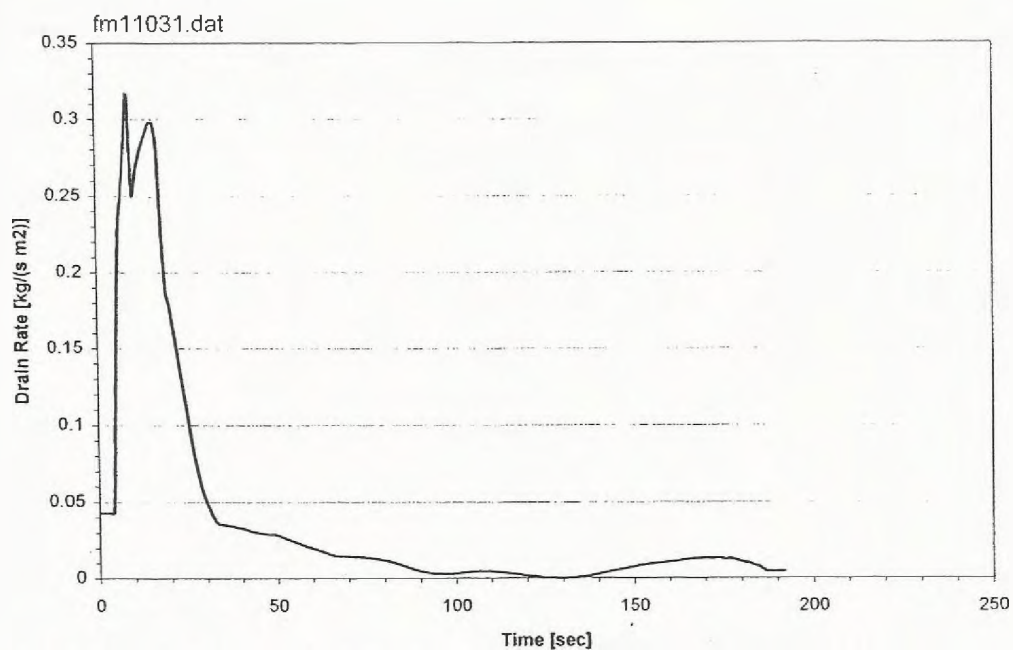


Fig. C83- Drain rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 2.81, irradiance= 50kW/m2, initial foam height= 25mm.

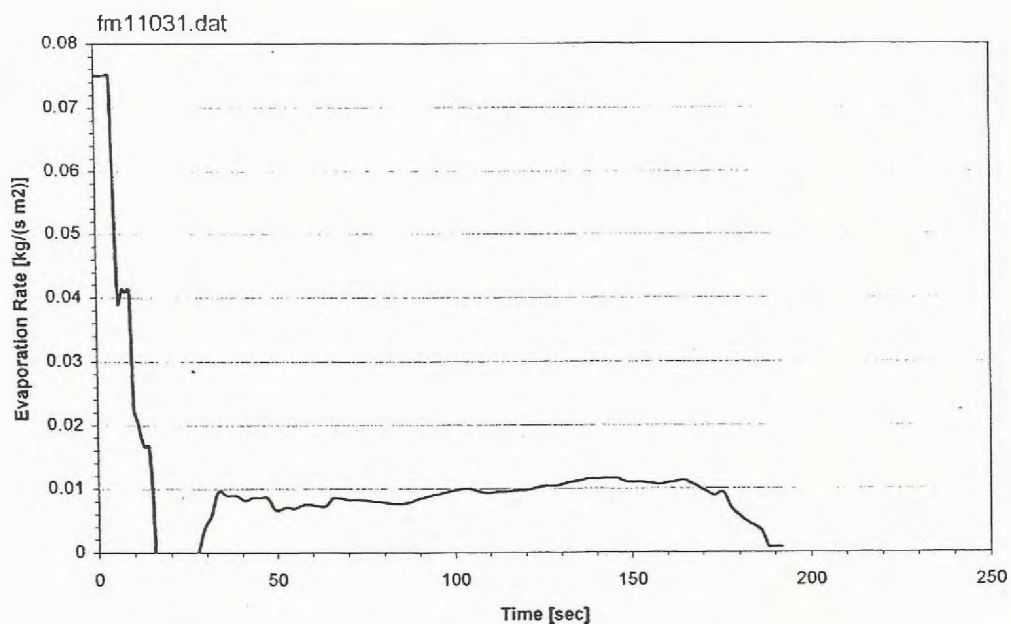


Fig. C84- Evaporation rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 2.81, irradiance= 50kW/m2, initial foam height= 25mm.

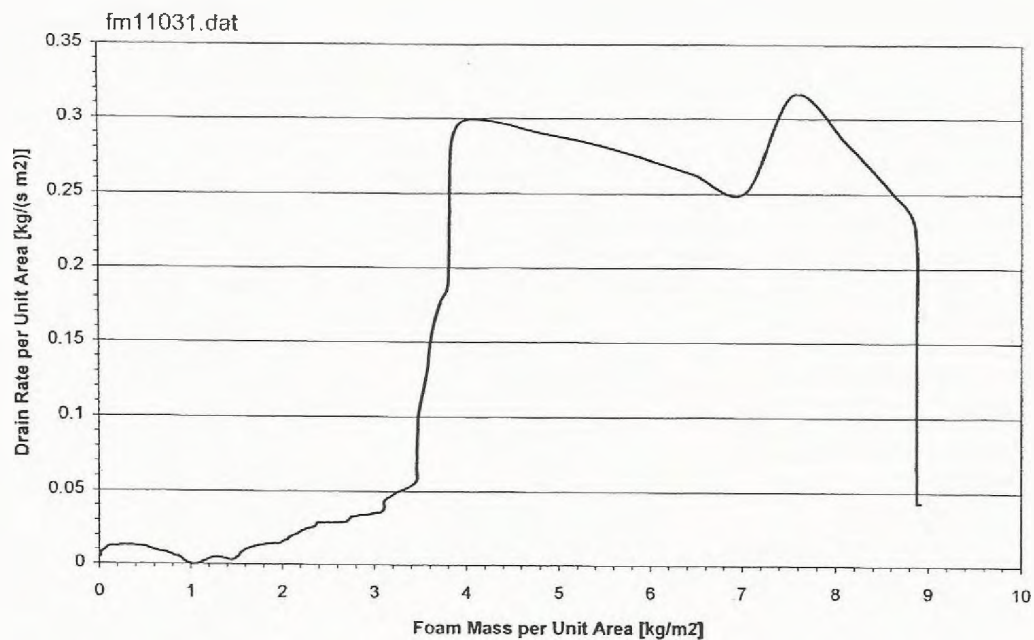


Fig. C85- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 2.81, irradiance= 50kW/m², initial foam height= 25mm.

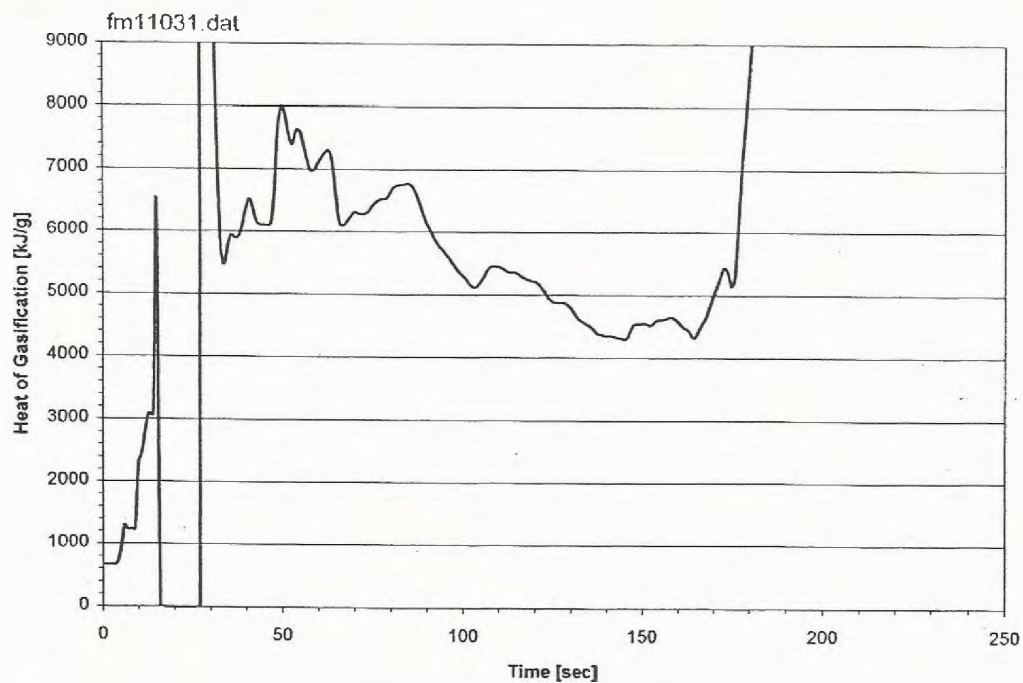


Fig. C86- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 2.81, irradiance= 50kW/m², initial foam height= 25mm.

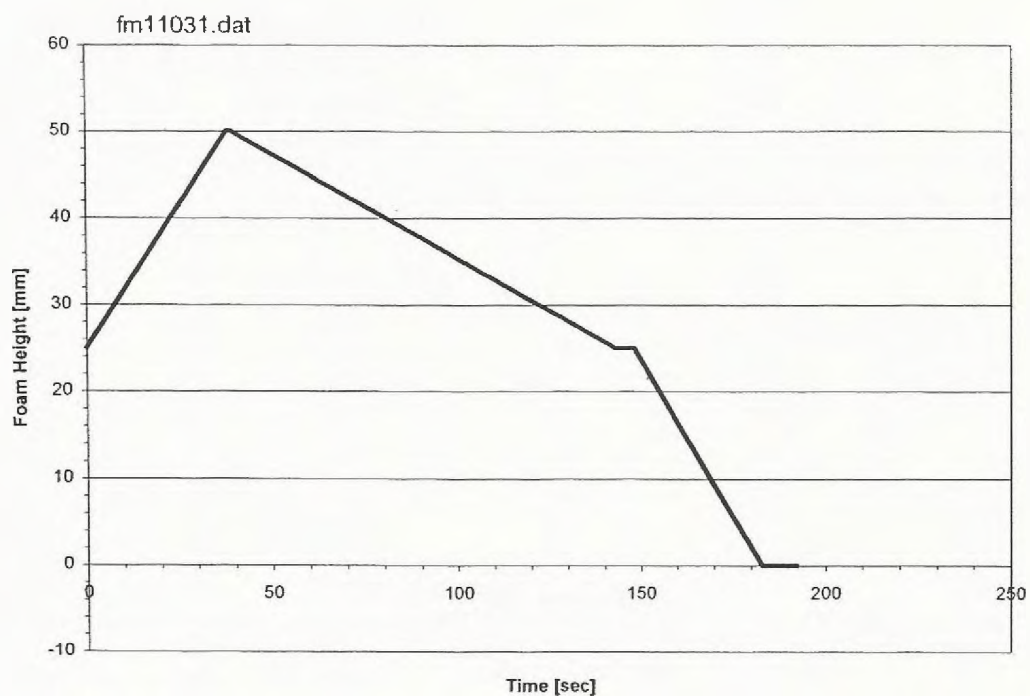


Fig. C87- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 2.81, irradiance= 50kW/m², initial foam height= 25mm.

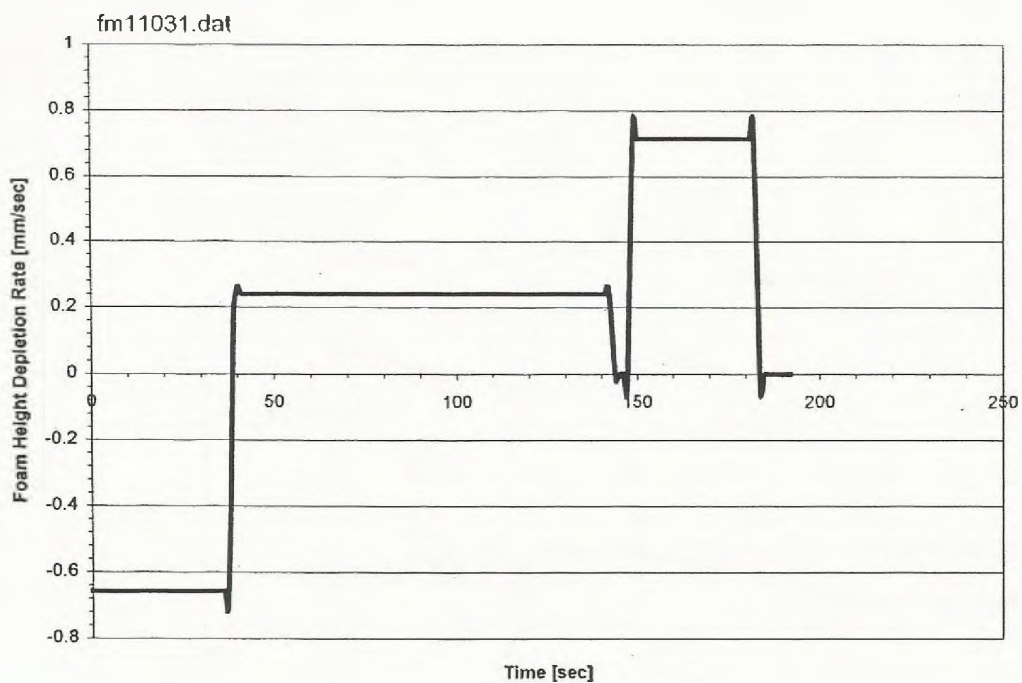


Fig. C88- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 2.81, irradiance= 50kW/m², initial foam height= 25mm.

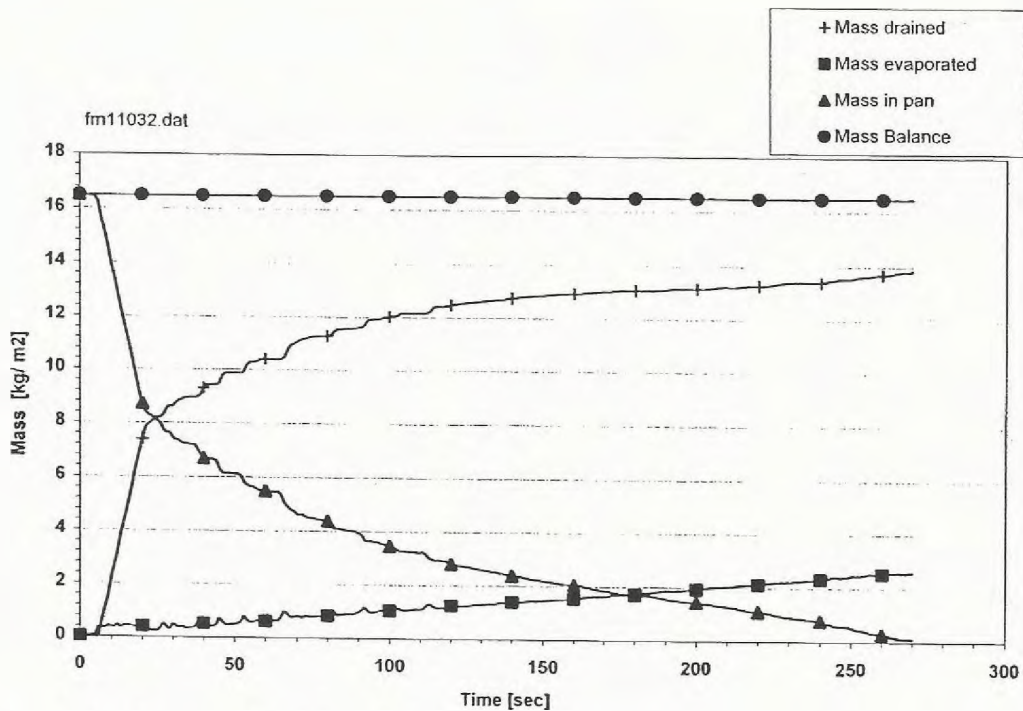


Fig. C89- Mass data in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.04, irradiance= 50kW/m², initial foam height= 50mm.

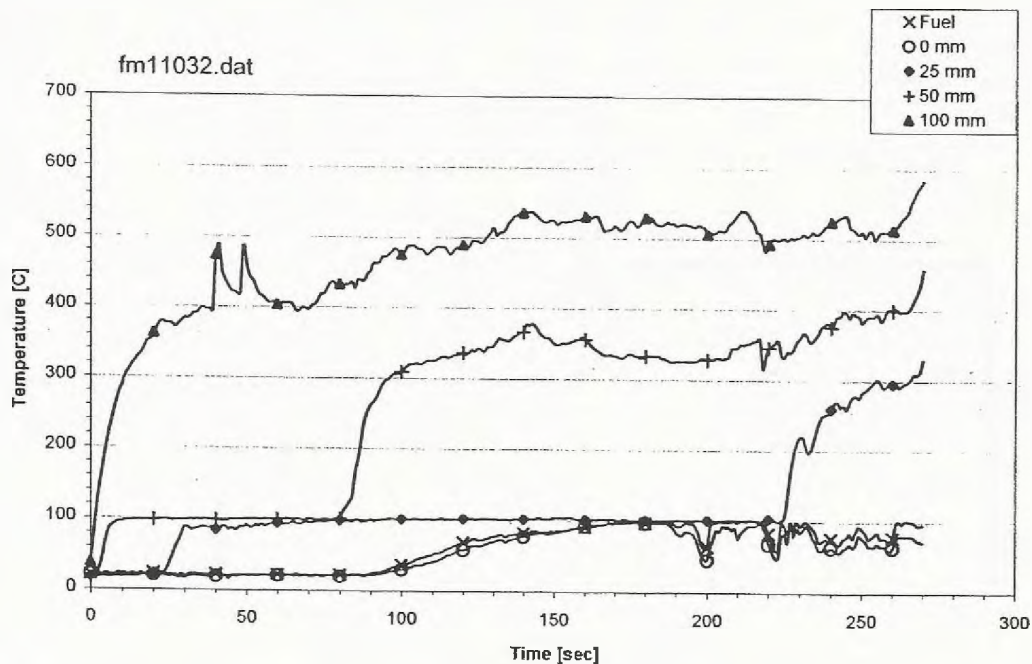


Fig. C90- Foam temperature in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.04, irradiance= 50kW/m², initial foam height= 50mm.

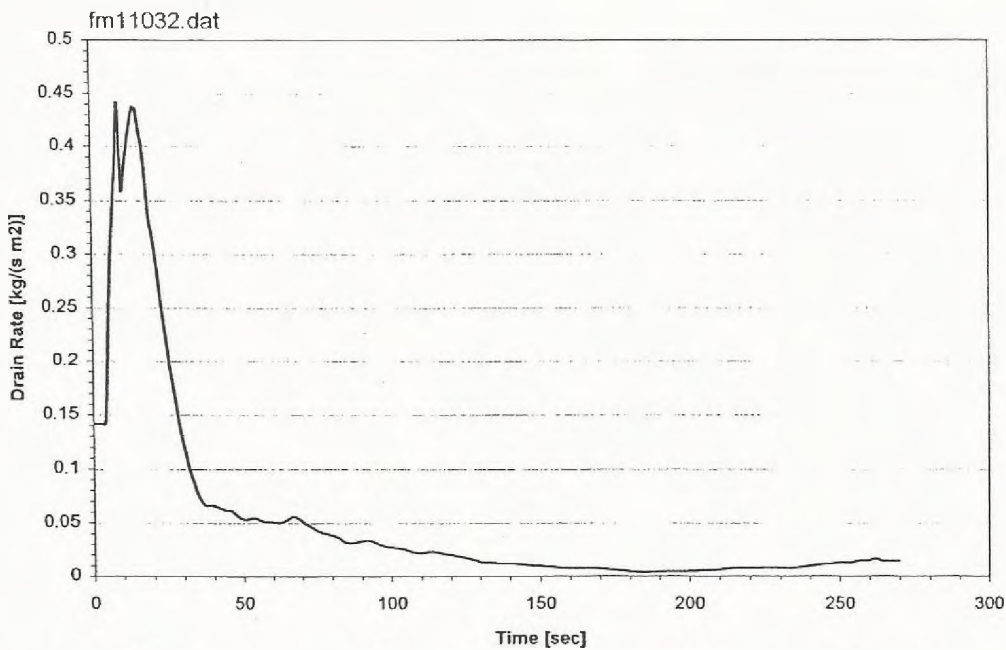


Fig. C91- Drain rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.04, irradiance= 50kW/m2, initial foam height= 50mm.

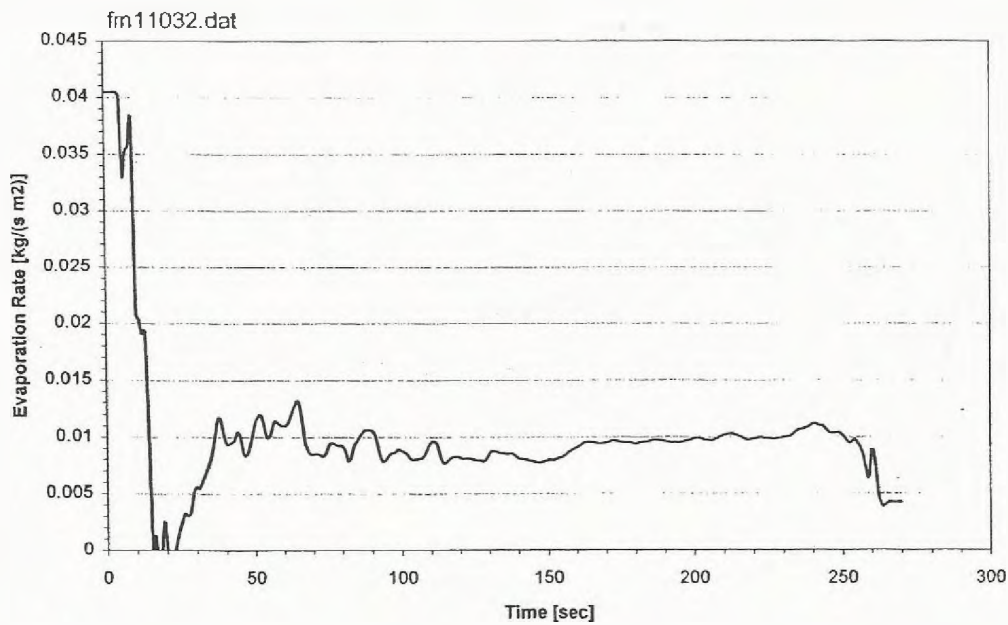


Fig. C92- Evaporation rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.04, irradiance= 50kW/m2, initial foam height= 50mm.

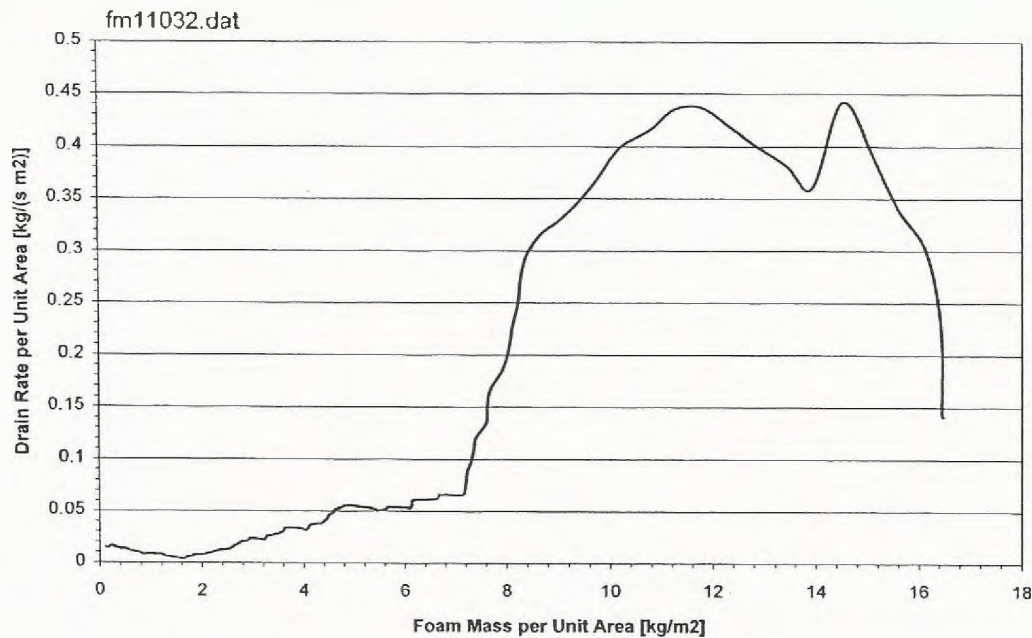


Fig. C93- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.04, irradiance= 50kW/m2, initial foam height= 50mm.

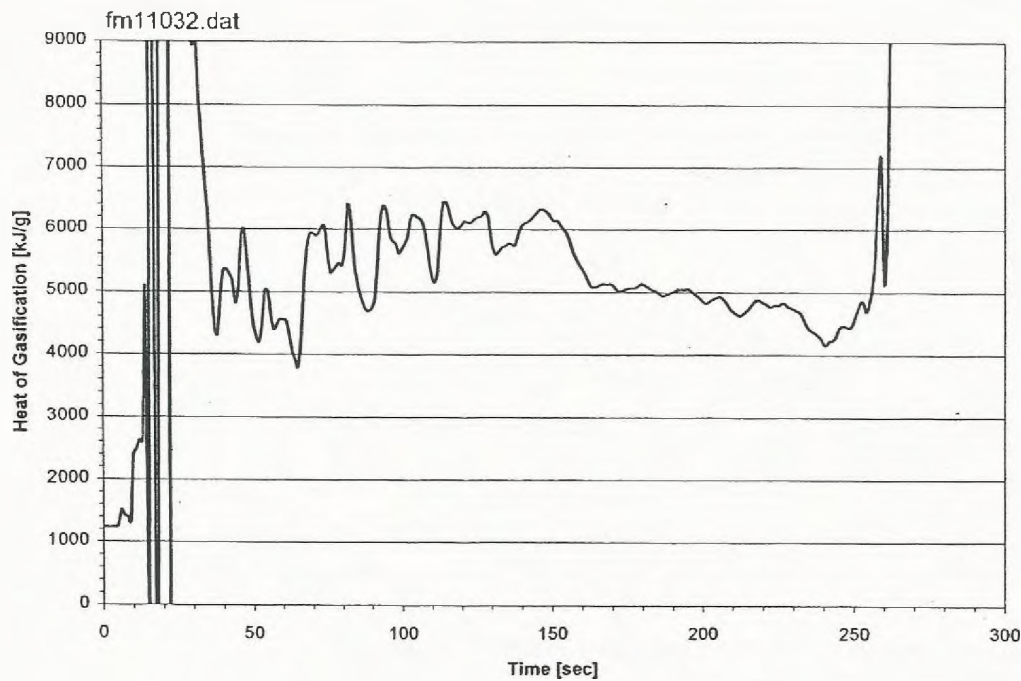


Fig. C94- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.04, irradiance= 50kW/m2, initial foam height= 50mm.

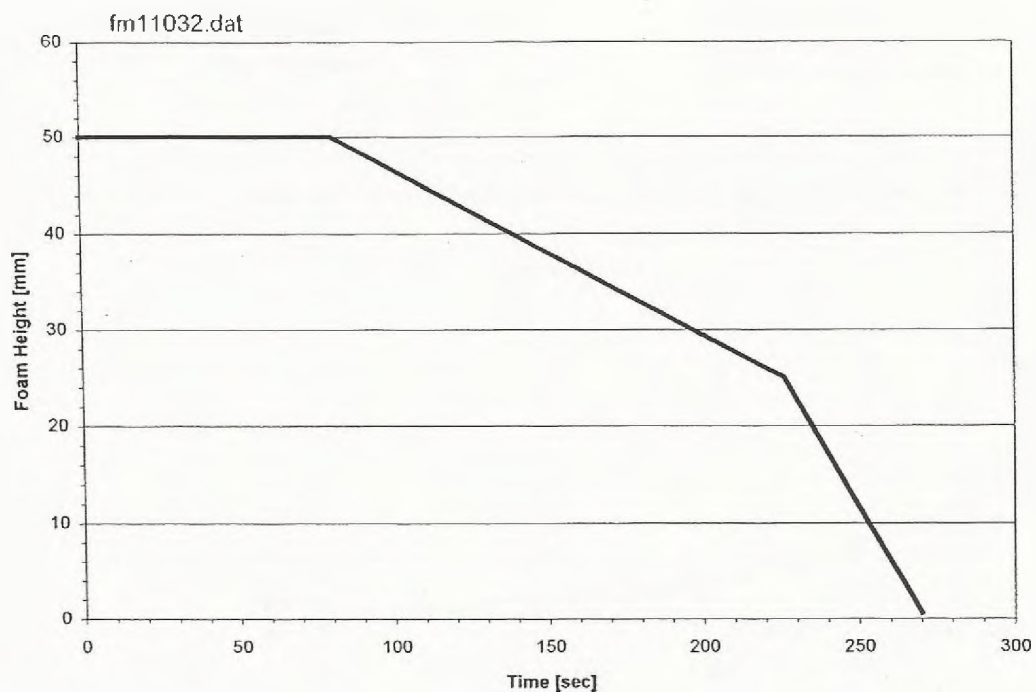


Fig. C95- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.04, irradiance= 50kW/m², initial foam height= 50mm.

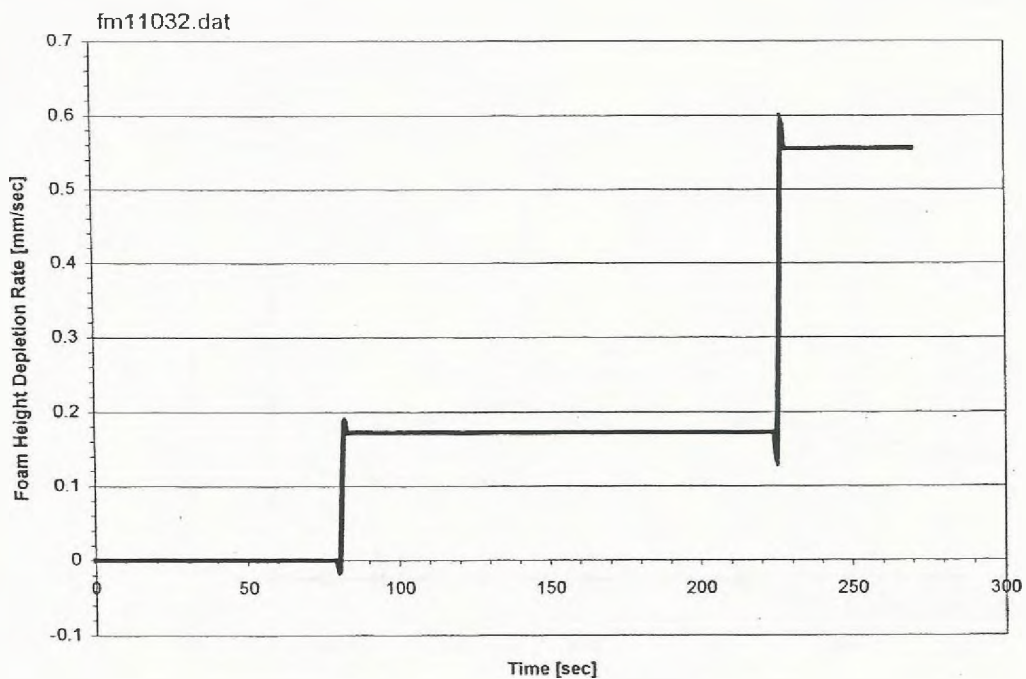


Fig. C96- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 3.04, irradiance= 50kW/m², initial foam height= 50mm.

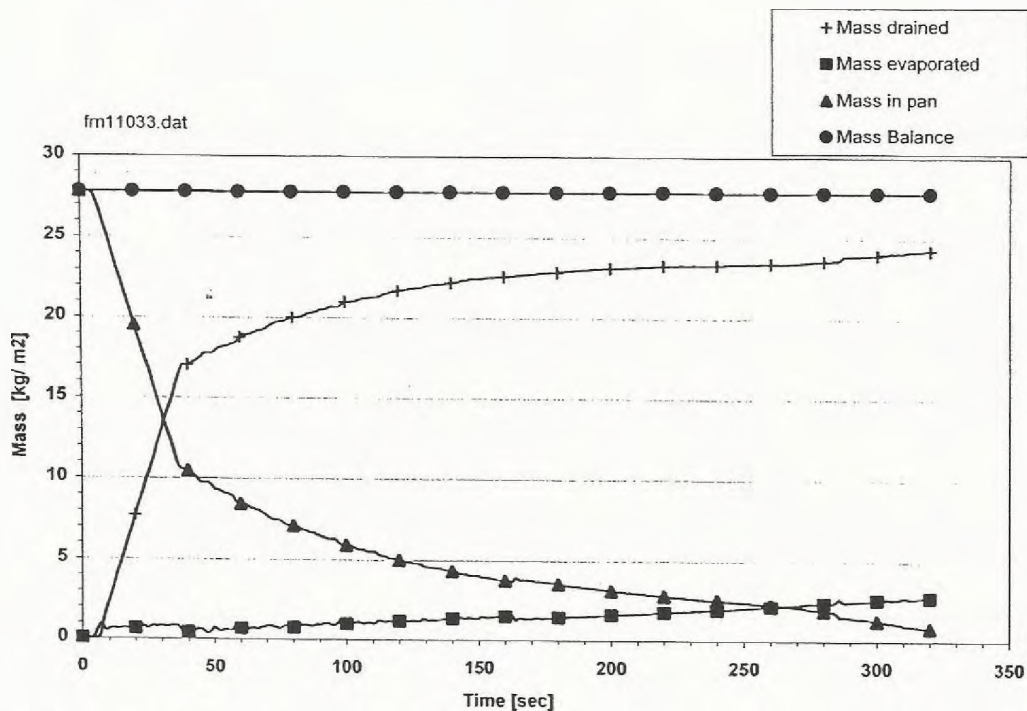


Fig. C97- Mass data in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 2.71, irradiance= 50kW/m2, initial foam height= 75mm.

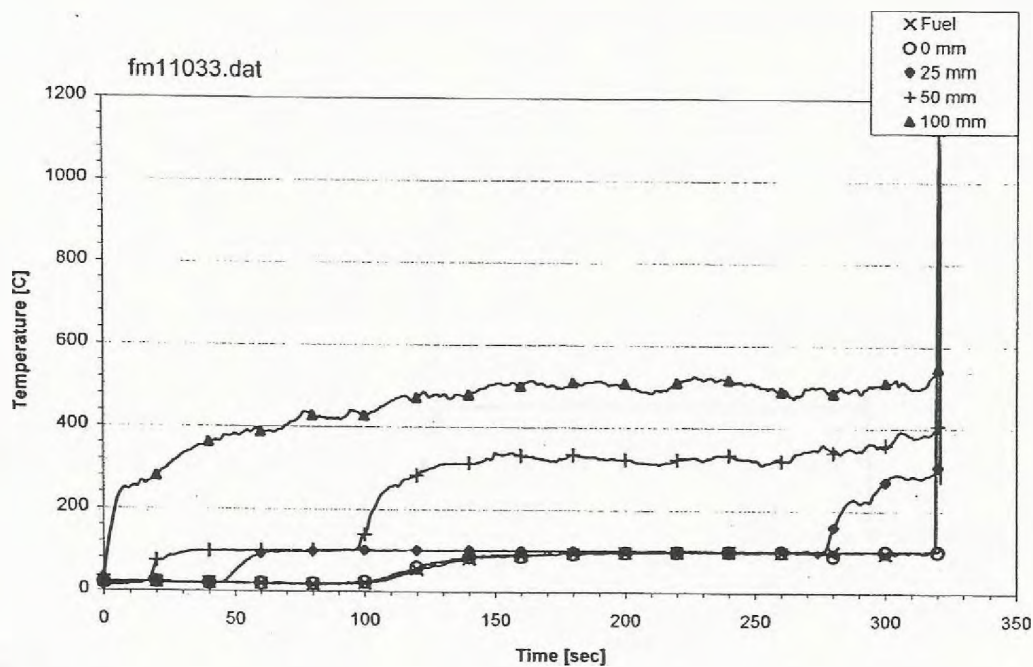


Fig. C98- Foam temperature in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 2.71, irradiance= 50kW/m2, initial foam height= 75mm.

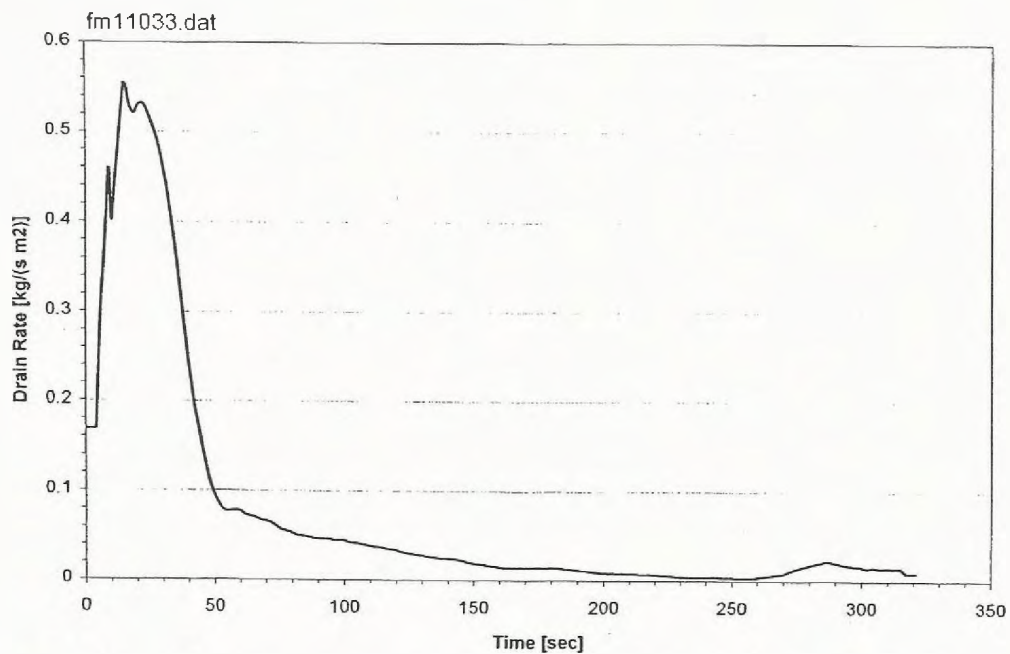


Fig. C99- Drain rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 2.71, irradiance= 50kW/m², initial foam height= 75mm.

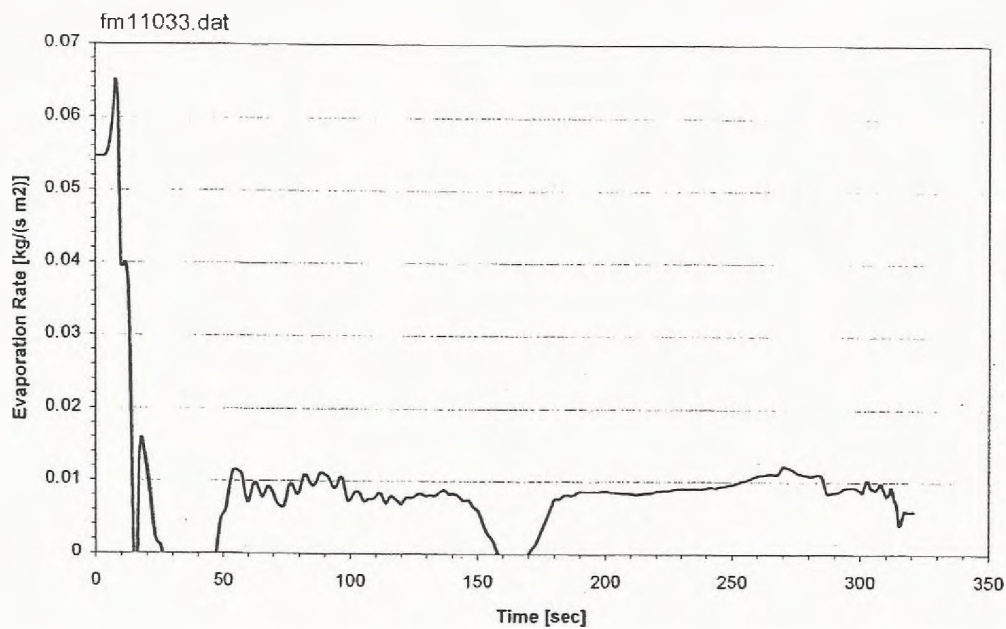


Fig. C100- Evaporation rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 2.71, irradiance= 50kW/m², initial foam height= 75mm.

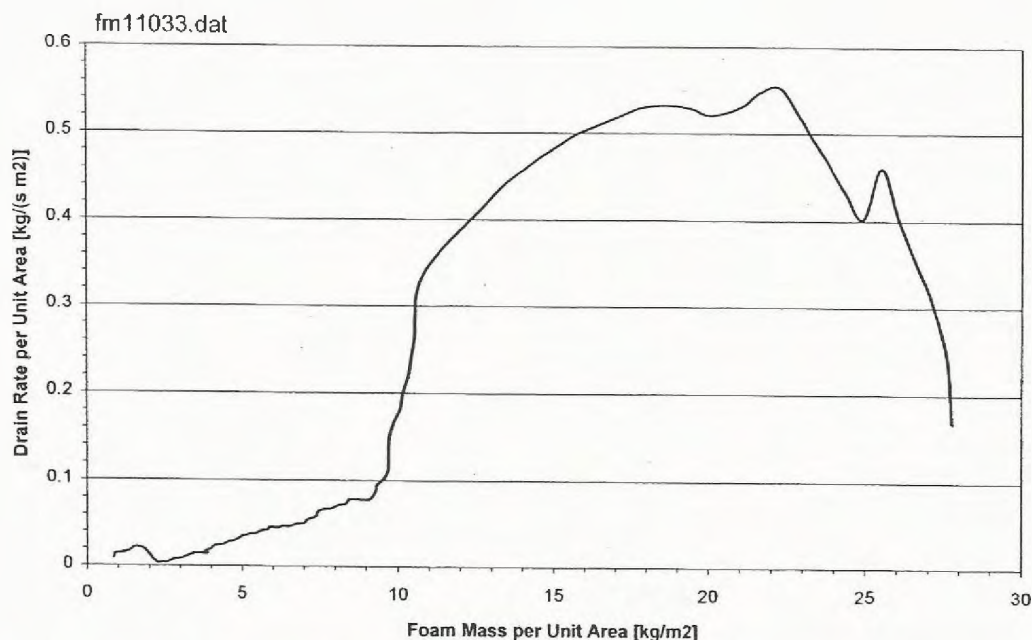


Fig. C101- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 2.71, irradiance= 50kW/m2, initial foam height= 75mm.

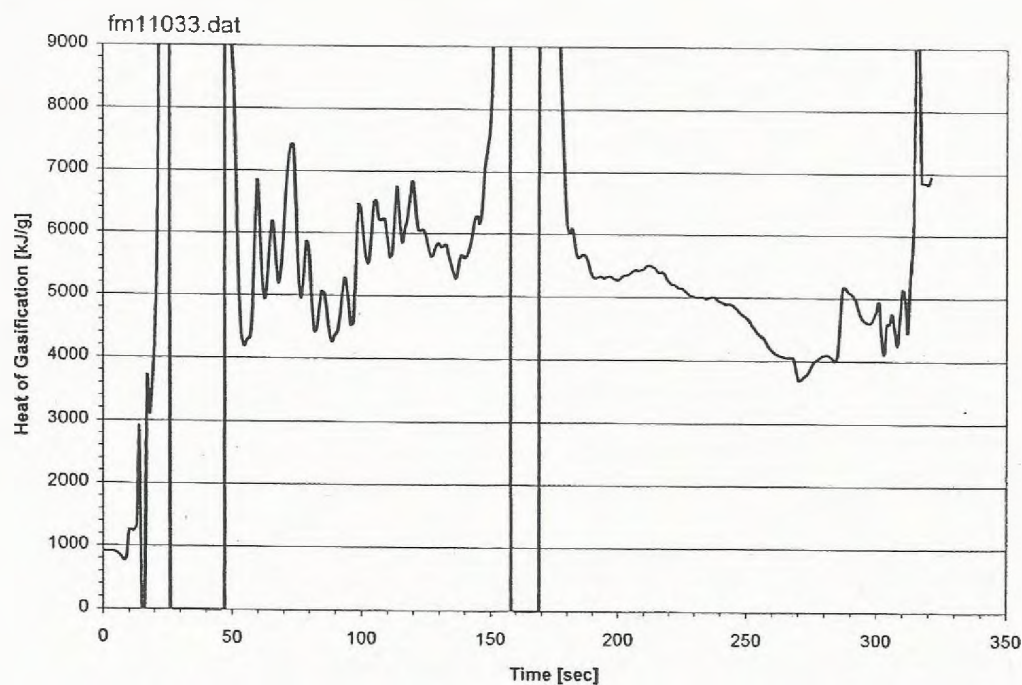


Fig. C102- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 2.71, irradiance= 50kW/m2, initial foam height= 75mm.

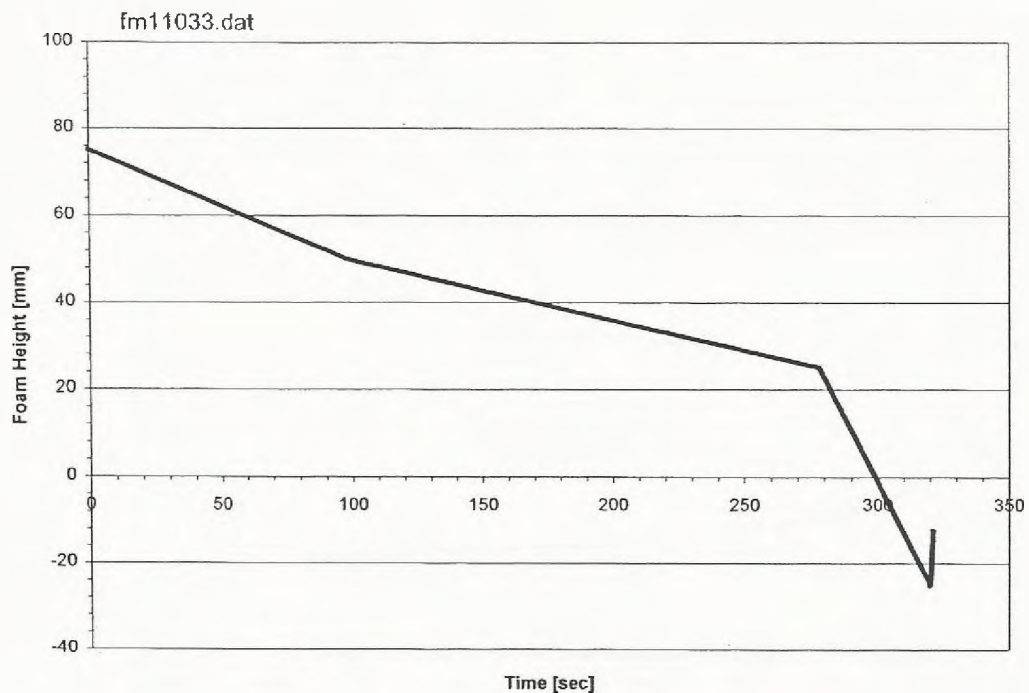


Fig. C103- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 2.71, irradiance= 50kW/m2, initial foam height= 75mm.

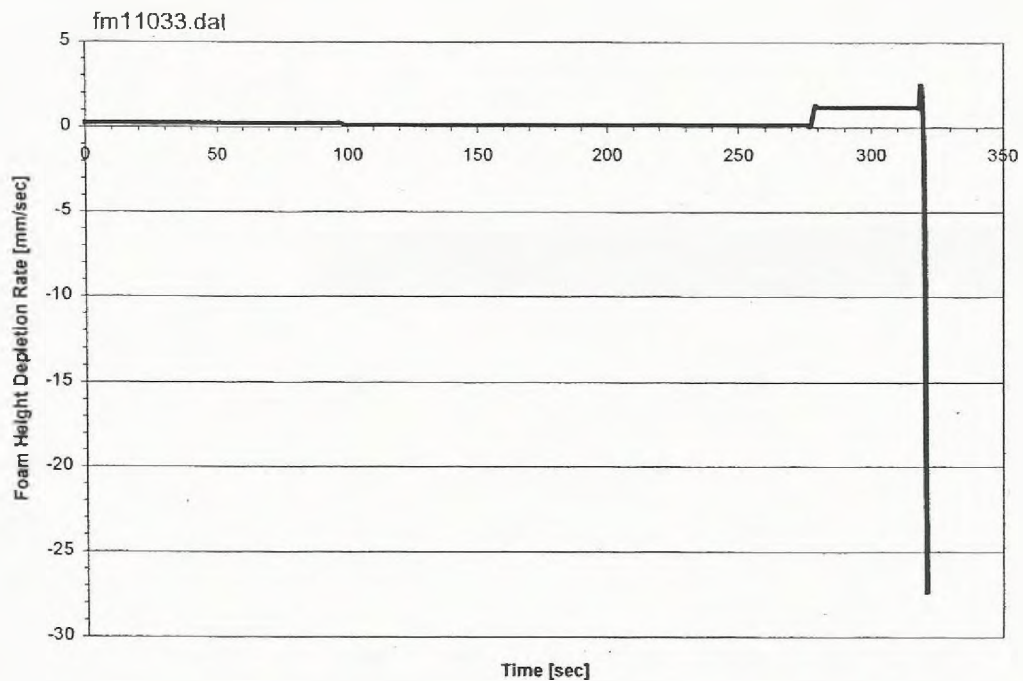


Fig. C104- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 2.71, irradiance= 50kW/m2, initial foam height= 75mm.

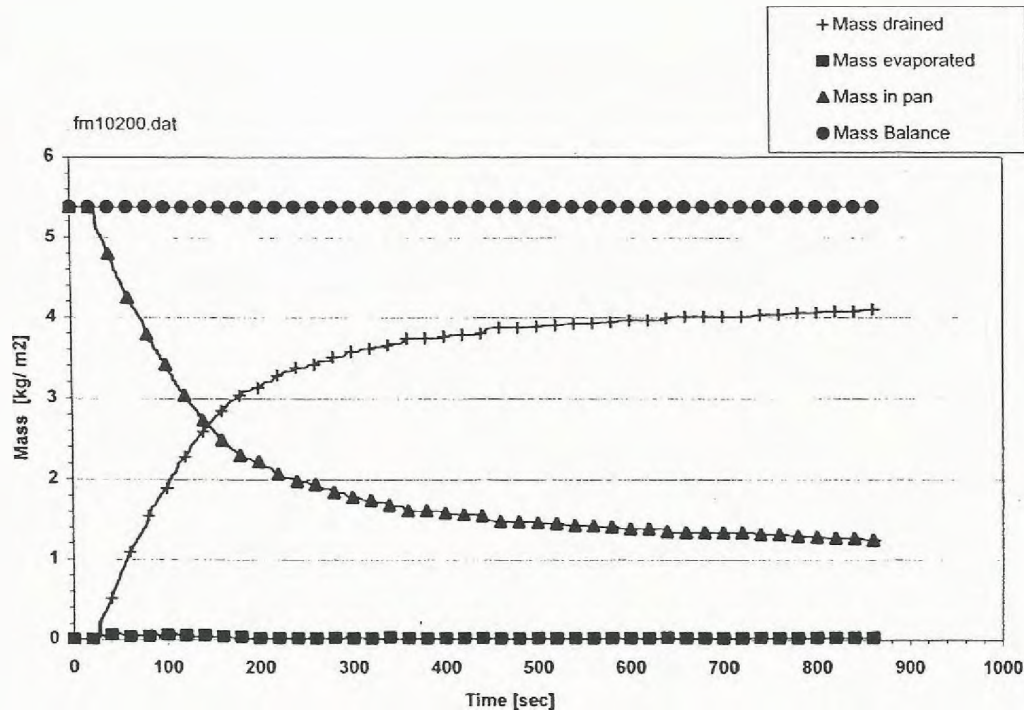


Fig. C105- Mass data in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 4.67, irradiance= 0kW/m², initial foam height= 25mm.

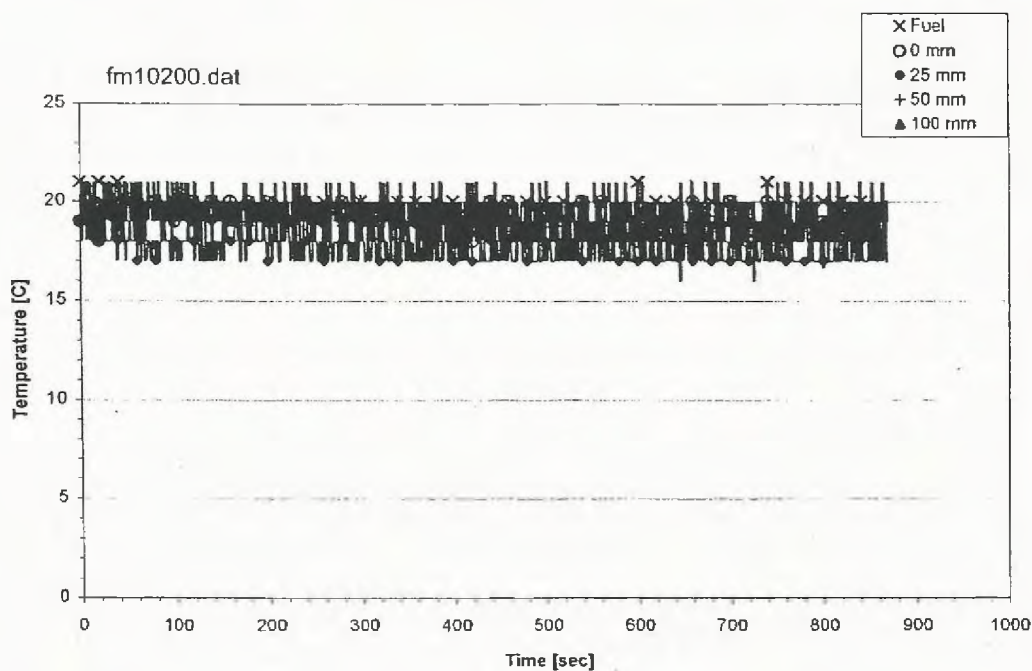


Fig. C106- Foam temperature in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 4.67, irradiance= 0kW/m², initial foam height= 25mm.

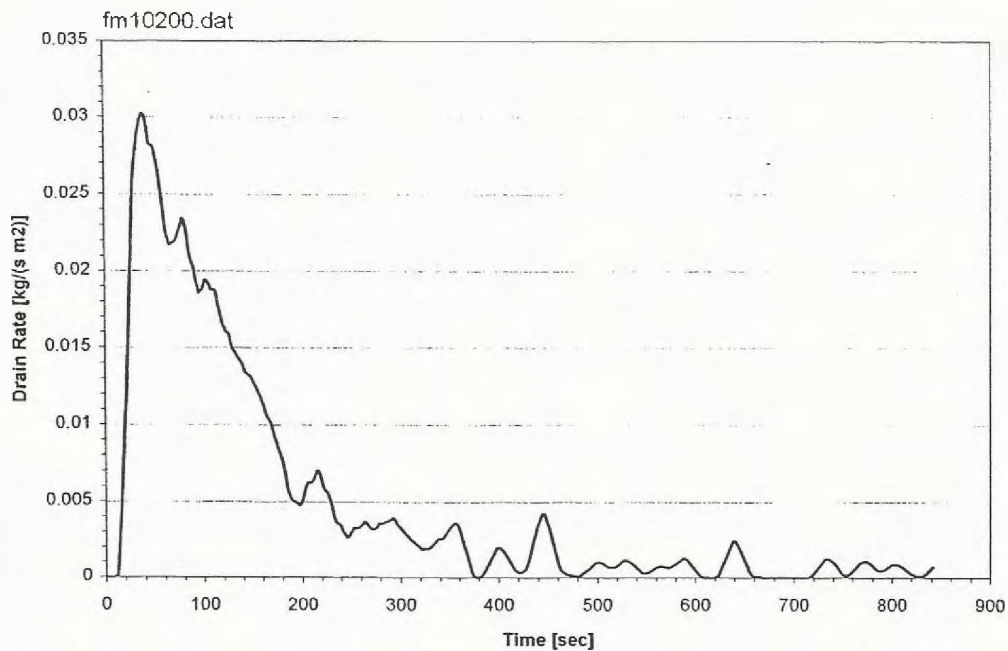


Fig. C107- Drain rate in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 4.67, irradiance= 0kW/m², initial foam height= 25mm.

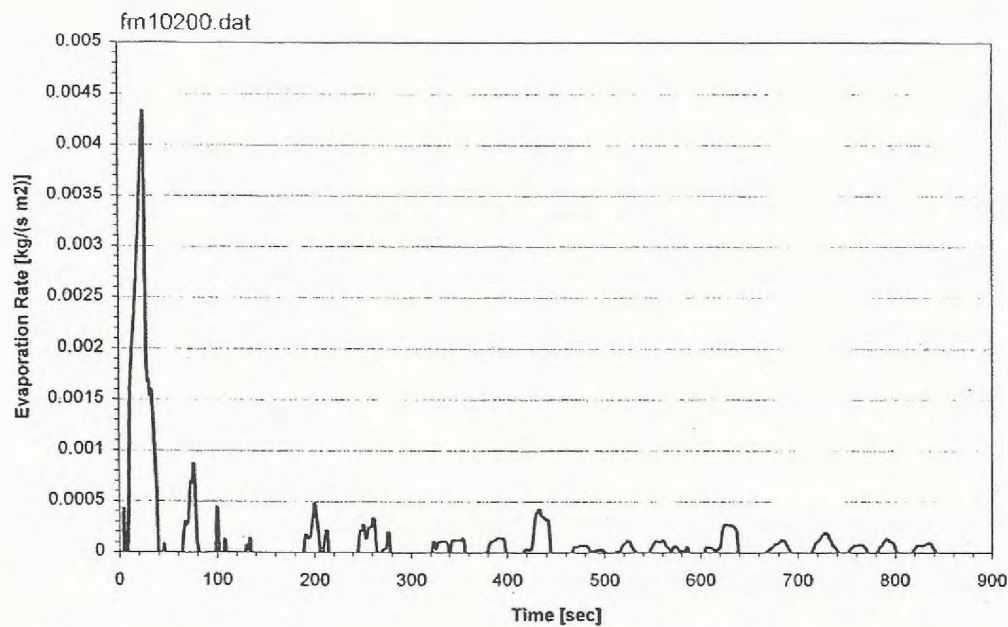


Fig. C108- Evaporation rate in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 4.67, irradiance= 0kW/m², initial foam height= 25mm.

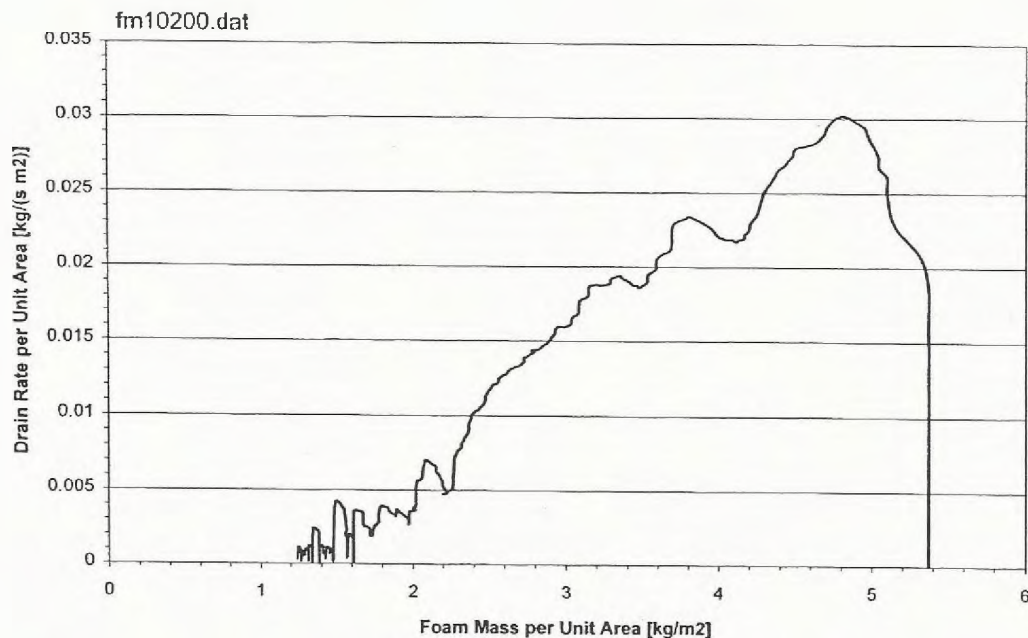


Fig. C109- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 4.67, irradiance= 0kW/m², initial foam height= 25mm.

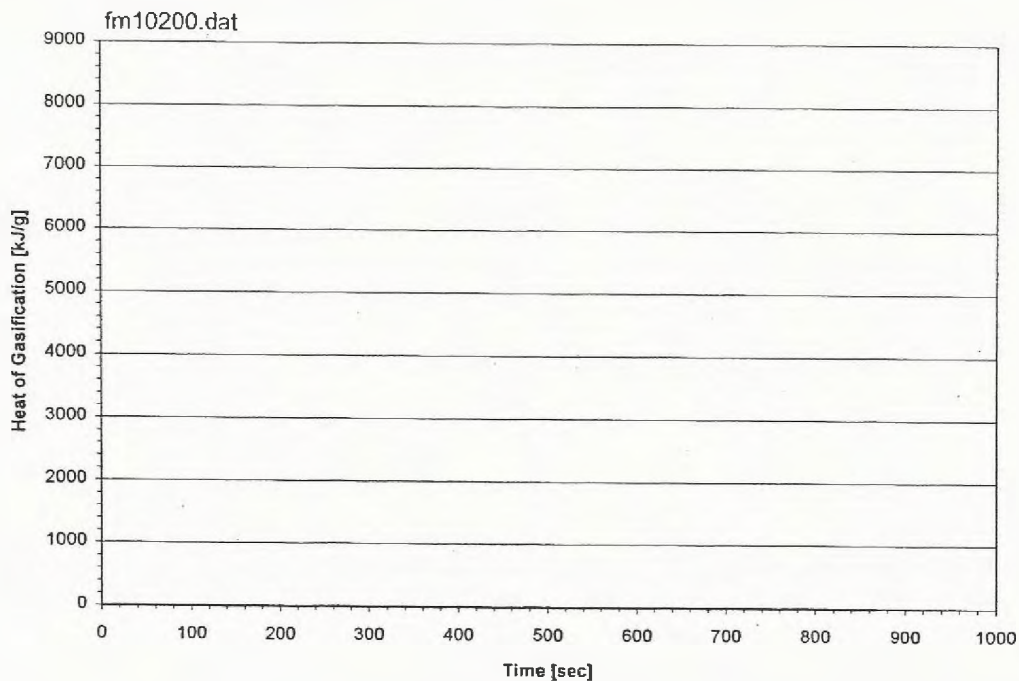


Fig. C110- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 4.67, irradiance= 0kW/m², initial foam height= 25mm.

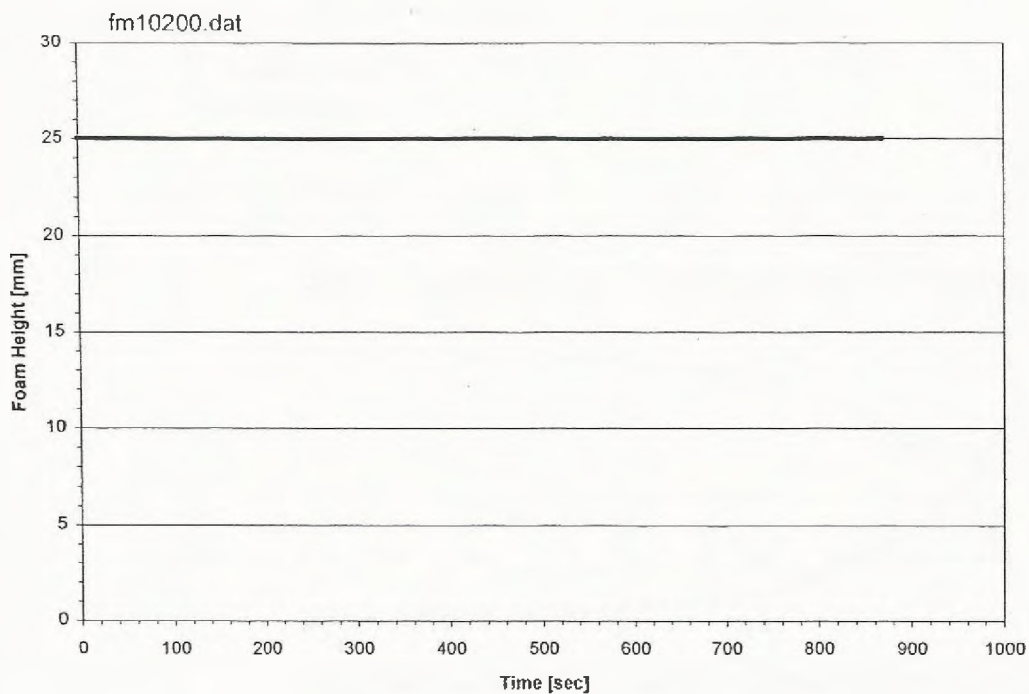


Fig. C111- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 4.67, irradiance= 0kW/m², initial foam height= 25mm.

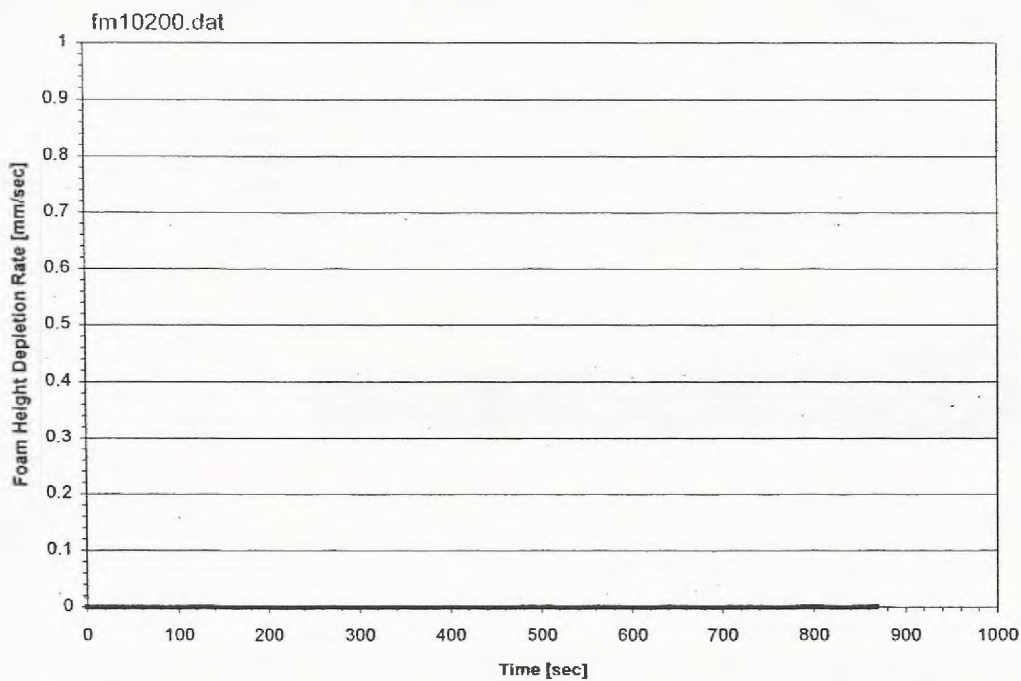


Fig. C112- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 4.67, irradiance= 0kW/m², initial foam height= 25mm.

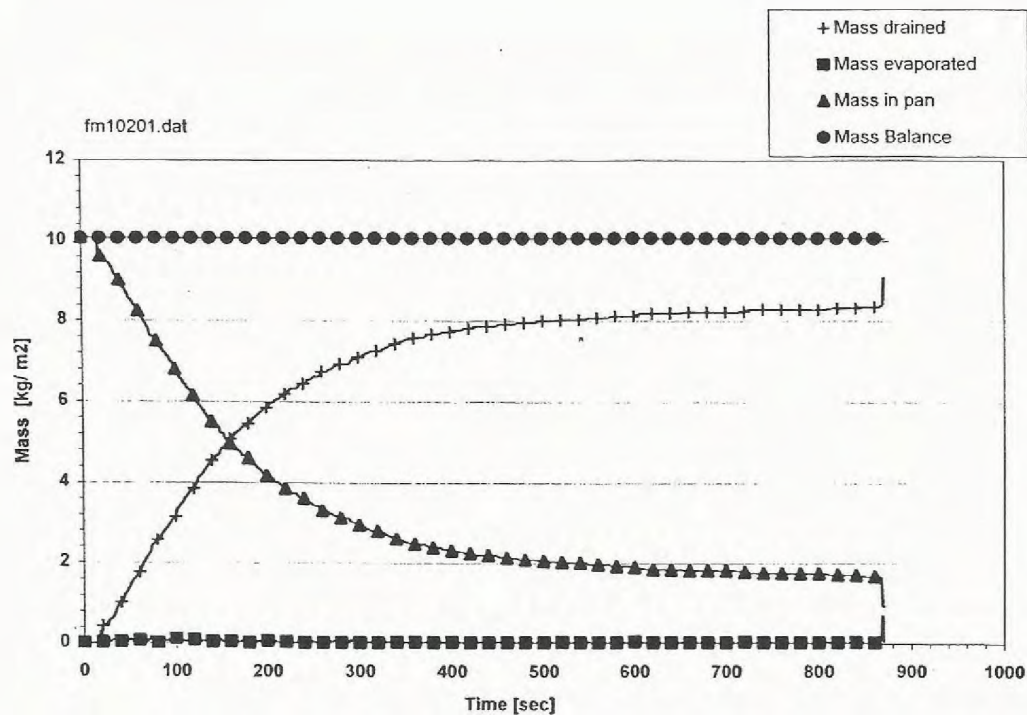


Fig. C113- Mass data in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 4.98, irradiance= 0kW/m², initial foam height= 50mm.

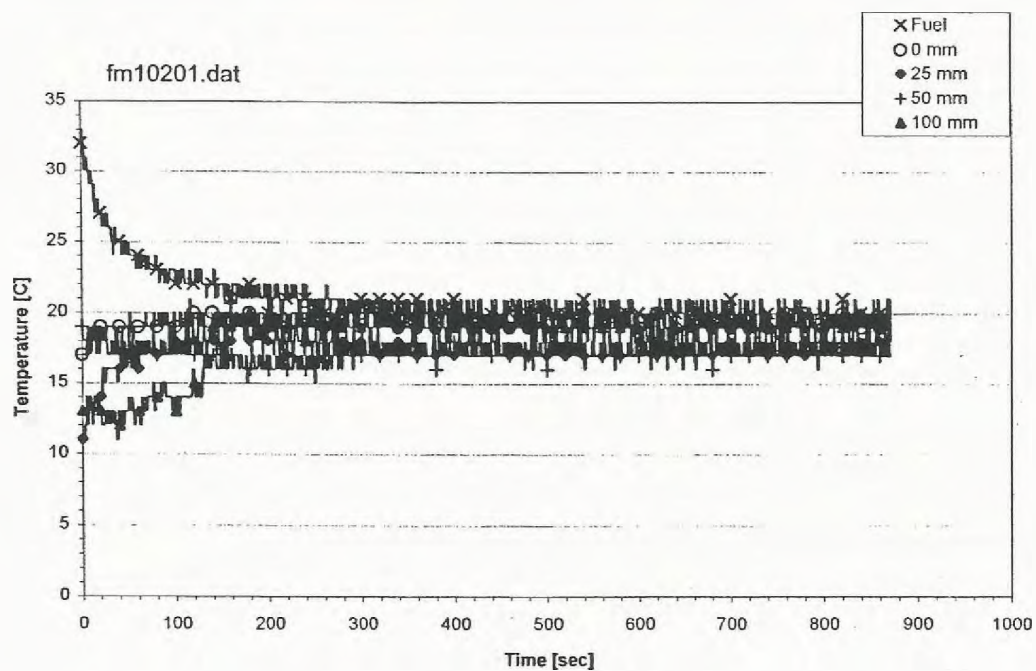


Fig. C114- Foam temperature in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 4.98, irradiance= 0kW/m², initial foam height= 50mm.

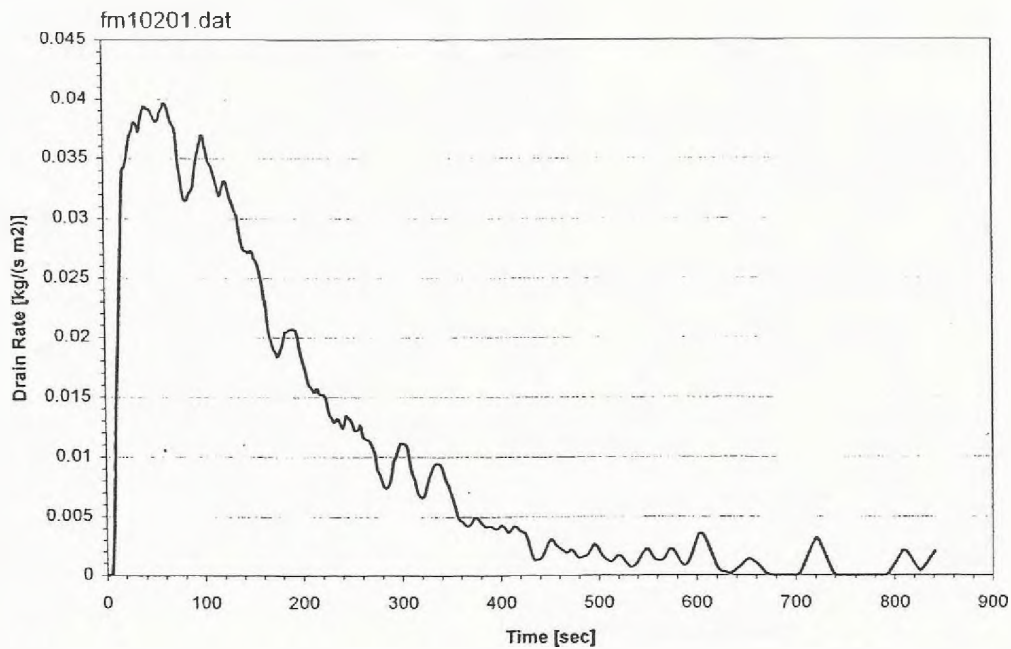


Fig. C115- Drain rate in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 4.98, irradiance= 0kW/m², initial foam height= 50mm.

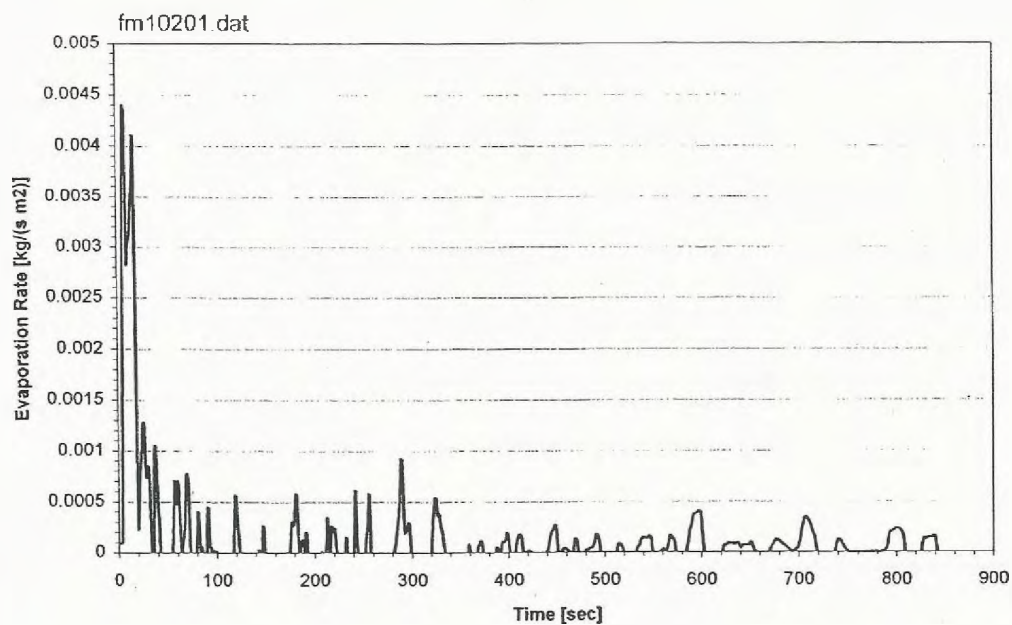


Fig. C116- Evaporation rate in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 4.98, irradiance= 0kW/m², initial foam height= 50mm.

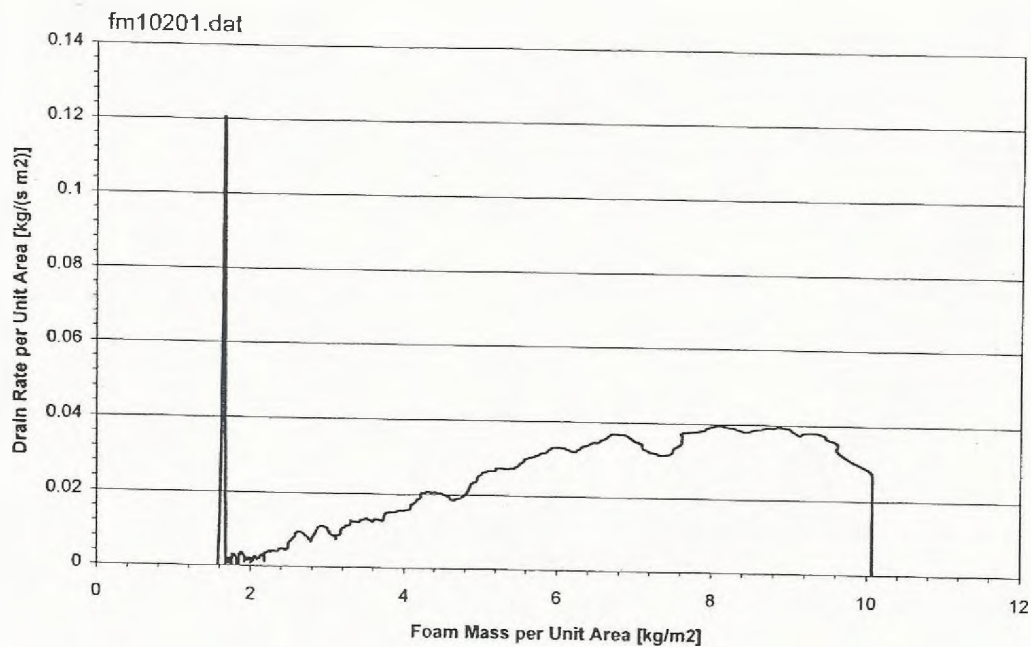


Fig. C117- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 4.98, irradiance= 0kW/m², initial foam height= 50mm.

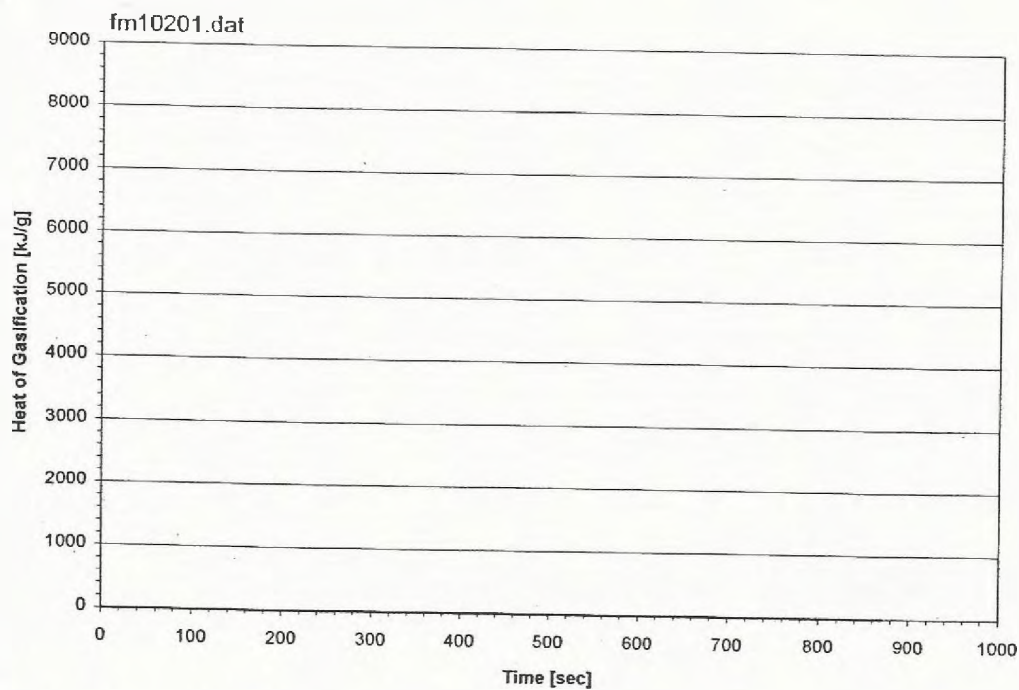


Fig. C118- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 4.98, irradiance= 0kW/m², initial foam height= 50mm.

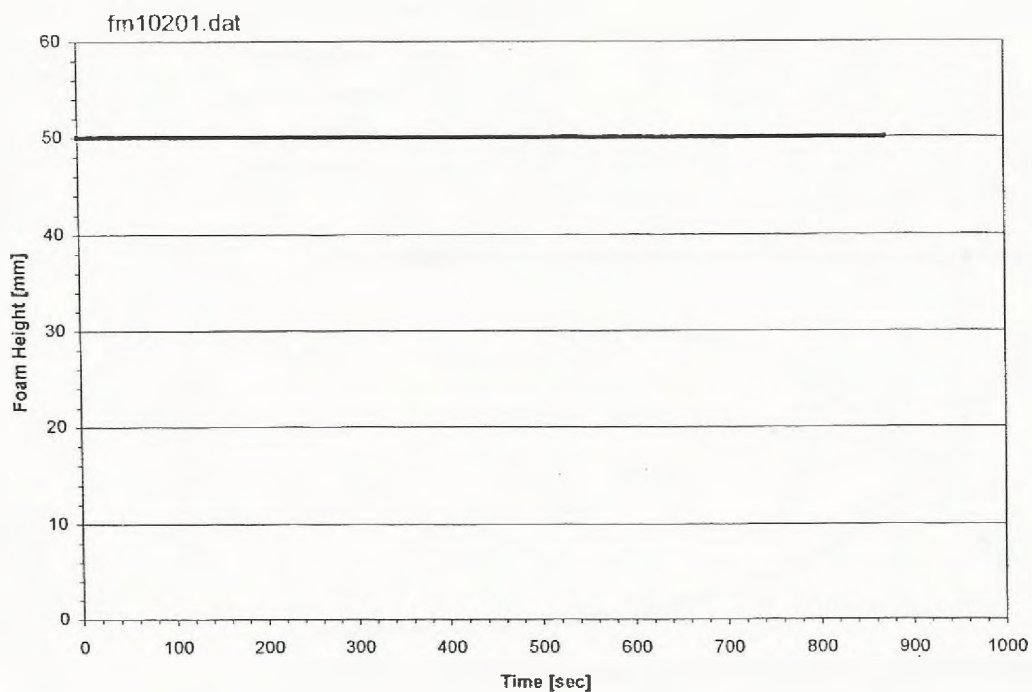


Fig. C119- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 4.98, irradiance= 0kW/m², initial foam height= 50mm.

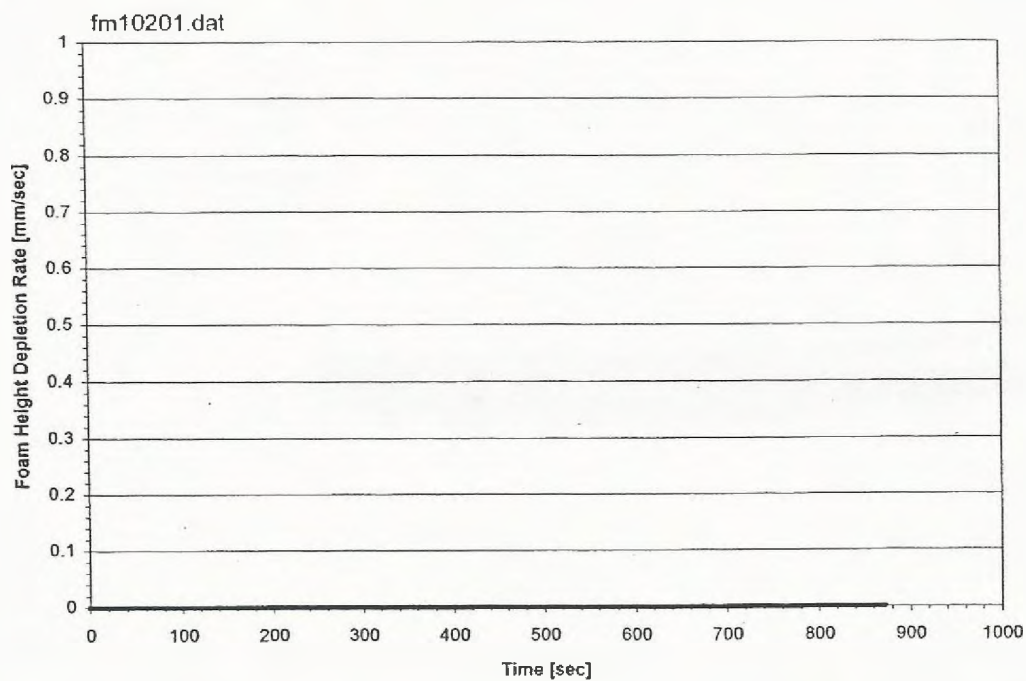


Fig. C120- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 4.98, irradiance= 0kW/m², initial foam height= 50mm.

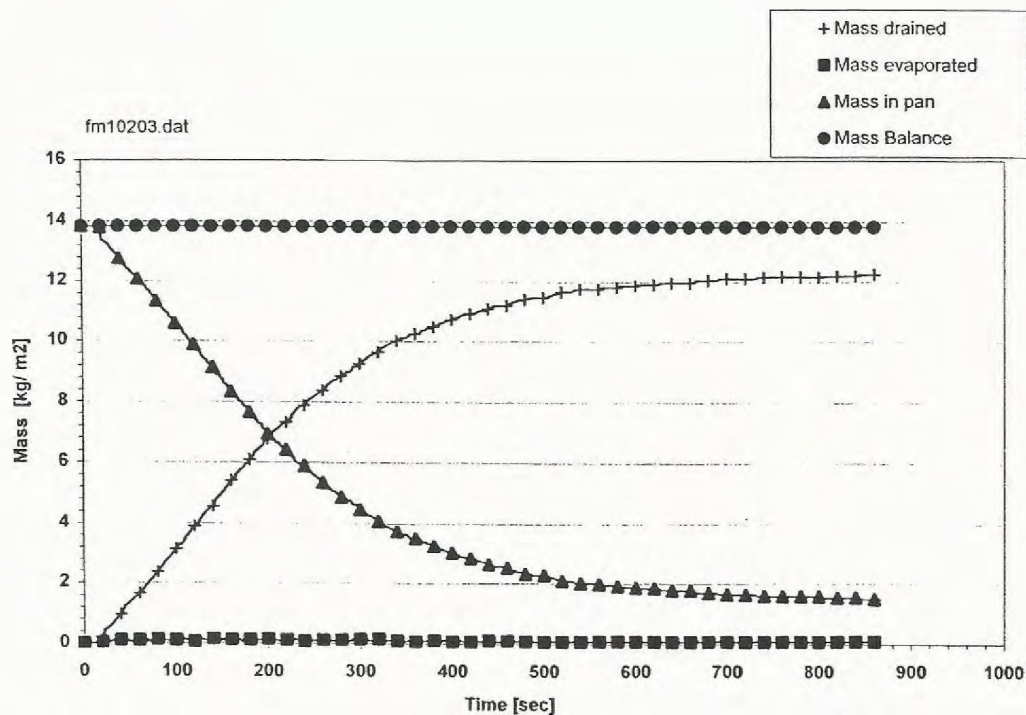


Fig. C121- Mass data in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.45, irradiance= 0kW/m2, initial foam height= 75mm.

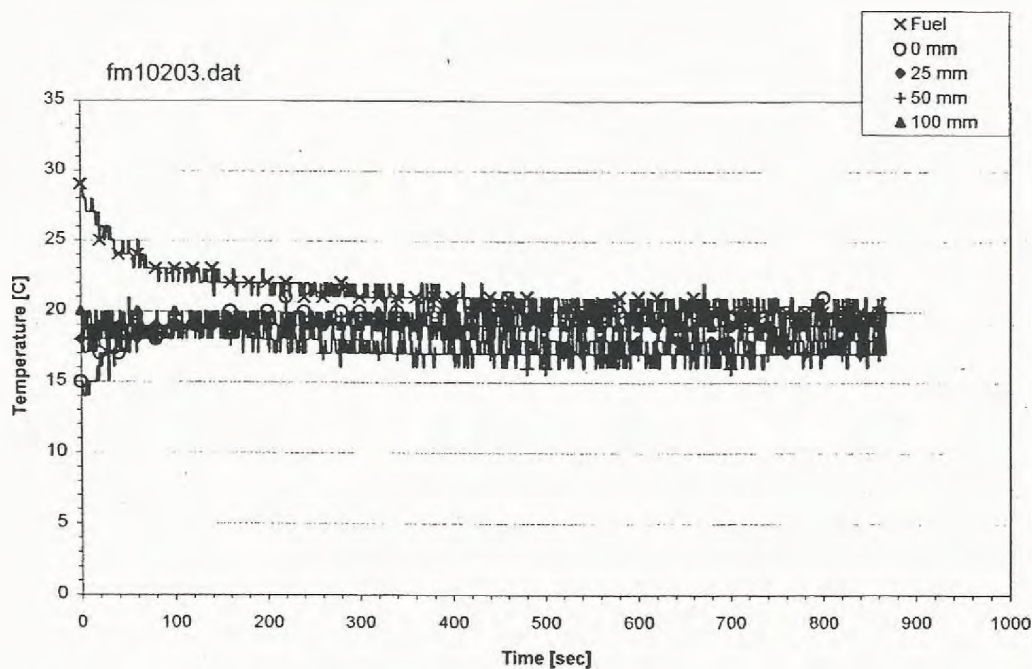


Fig. C122- Foam temperature in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.45, irradiance= 0kW/m2, initial foam height= 75mm.

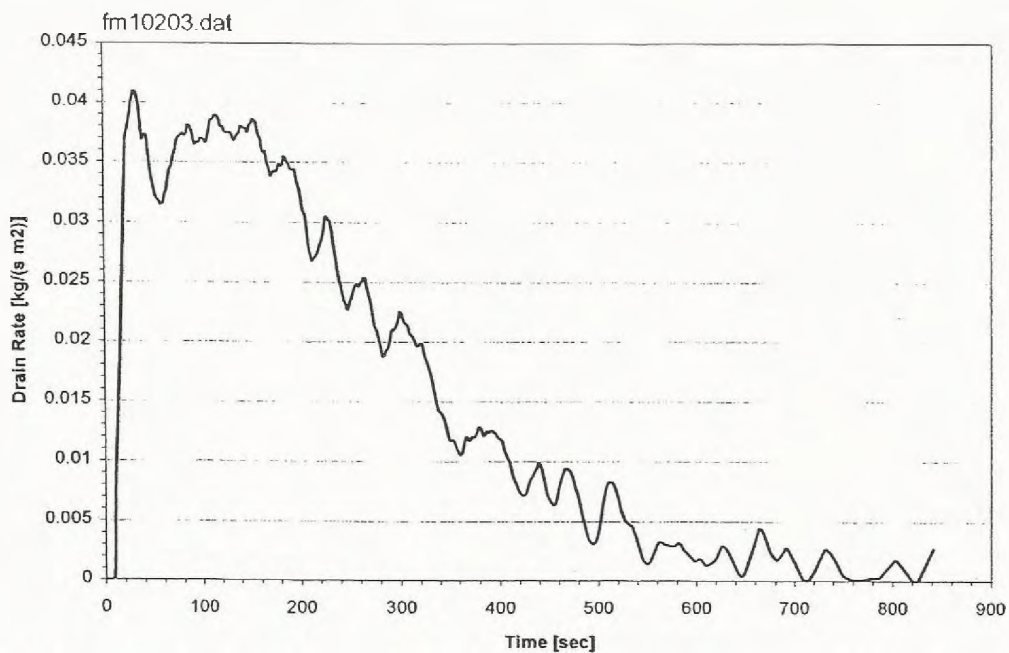


Fig. C123- Drain rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.45, irradiance= 0kW/m², initial foam height= 75mm.

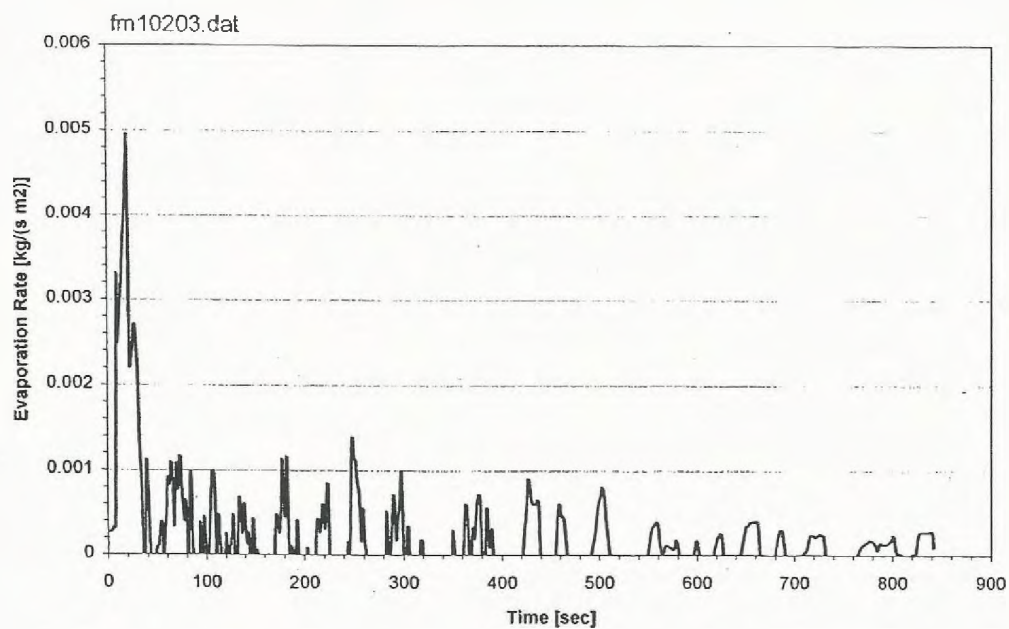


Fig. C124- Evaporation rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.45, irradiance= 0kW/m², initial foam height= 75mm.

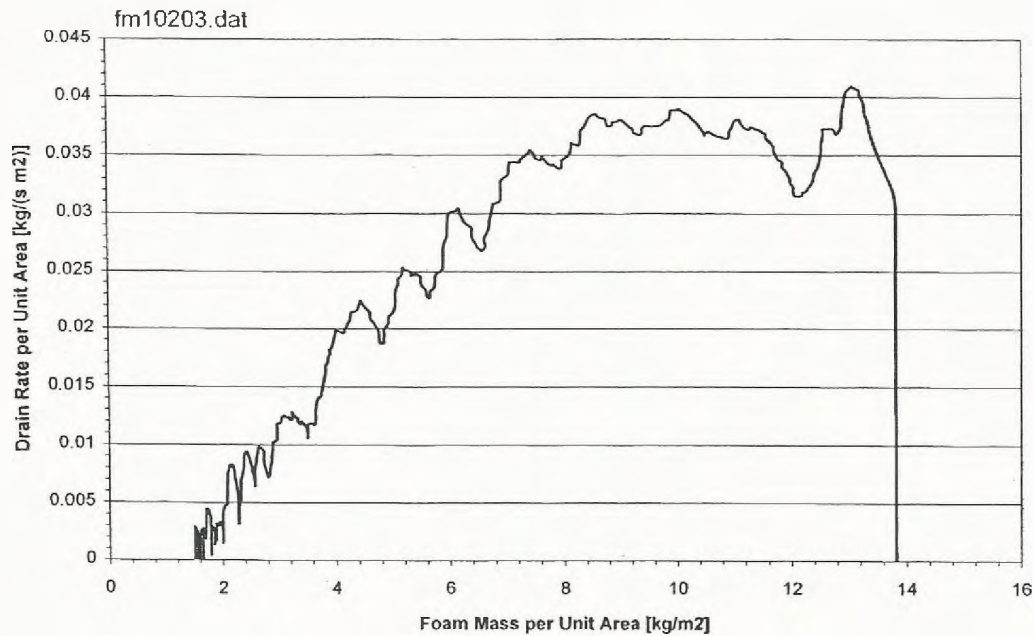


Fig. C125- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.45, irradiance= 0kW/m2, initial foam height= 75mm.

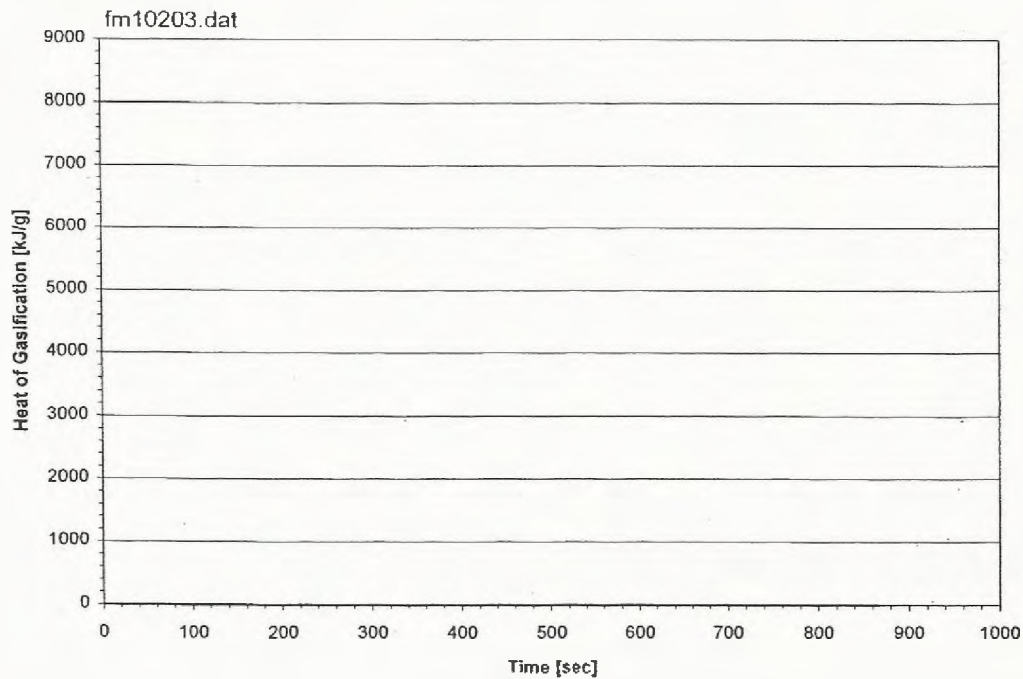


Fig. C126- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.45, irradiance= 0kW/m2, initial foam height= 75mm.

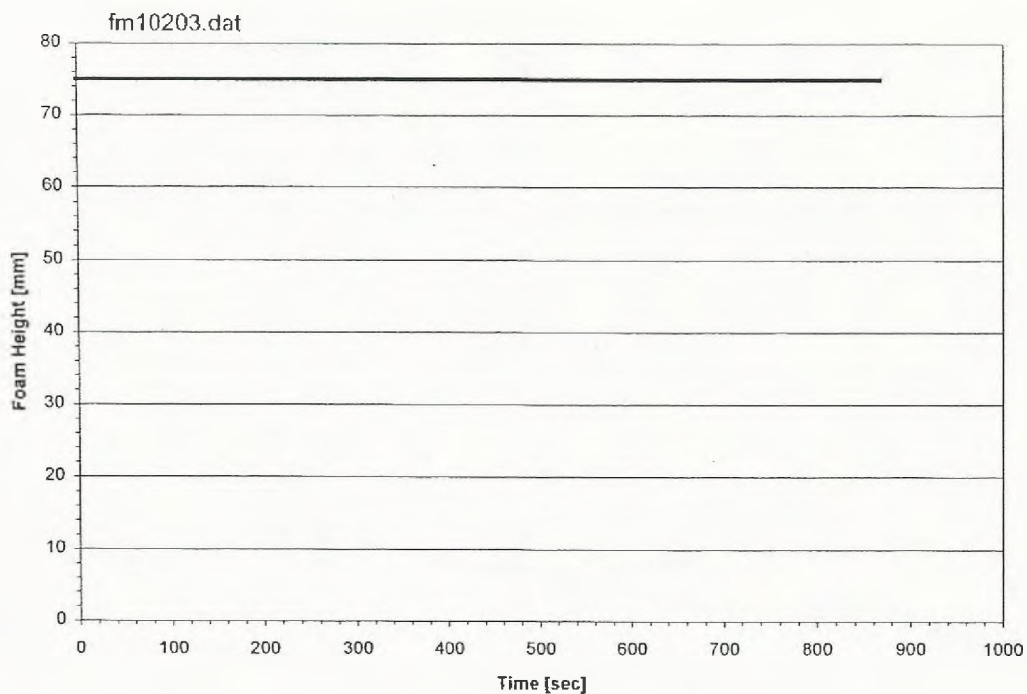


Fig. C127- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.45, irradiance= 0kW/m², initial foam height= 75mm.

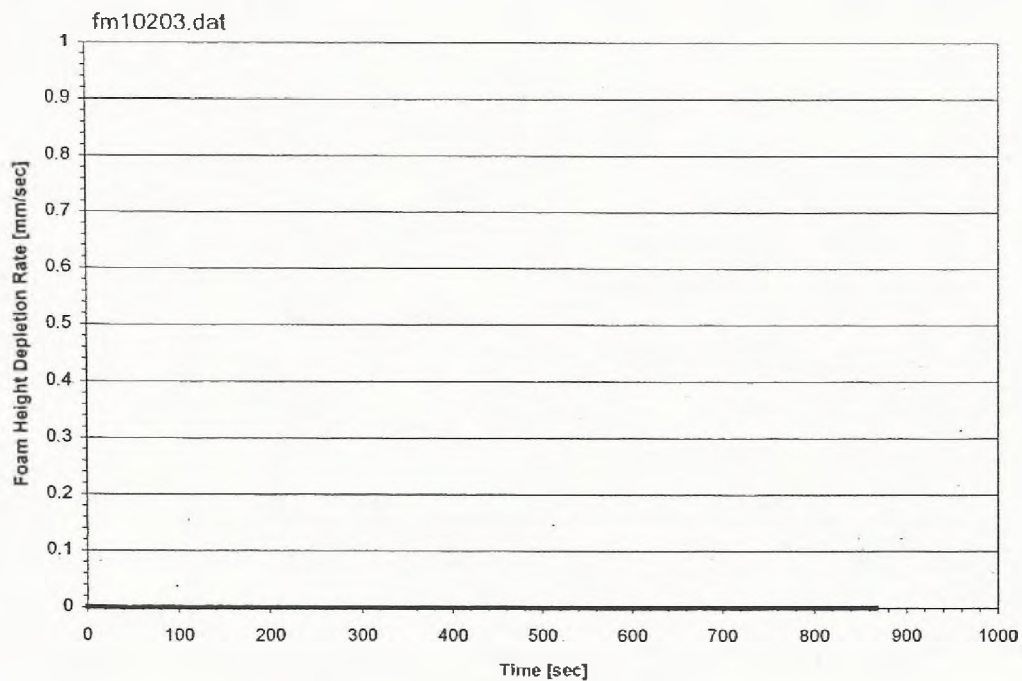


Fig. C128- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.45, irradiance= 0kW/m², initial foam height= 75mm.

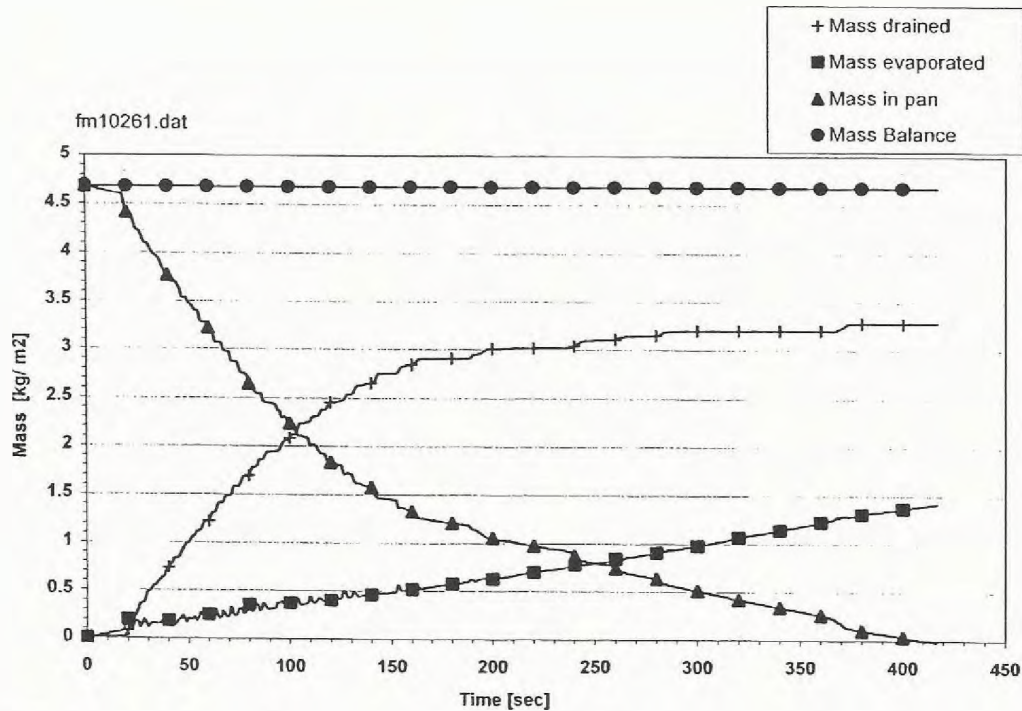


Fig. C129- Mass data in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.37, irradiance= 20kW/m2, initial foam height= 25mm.

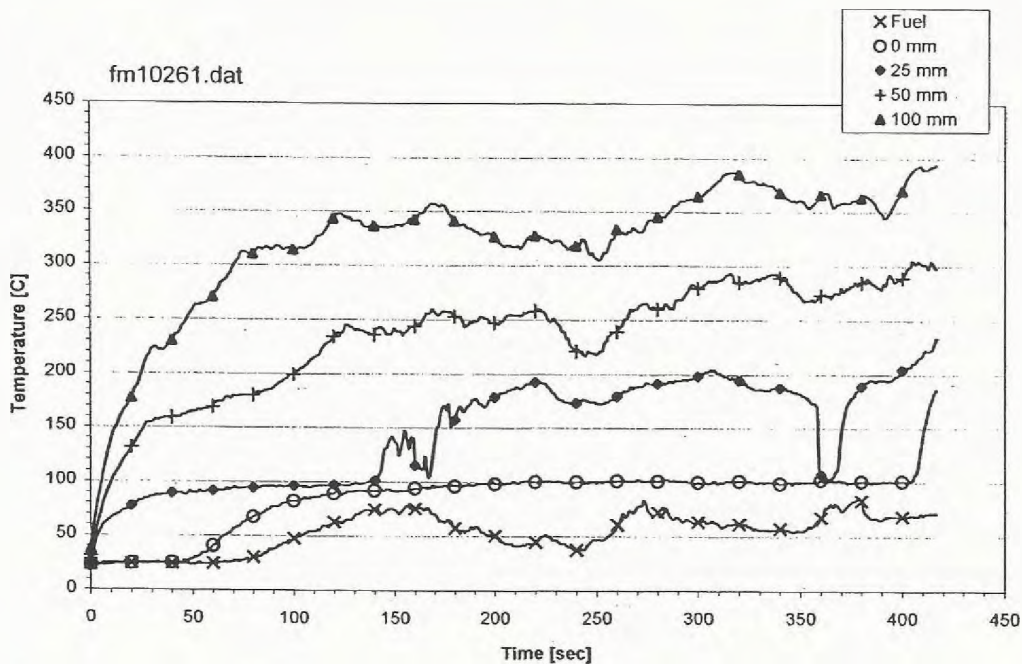


Fig. C130- Foam temperature in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.37, irradiance= 20kW/m2, initial foam height= 25mm.

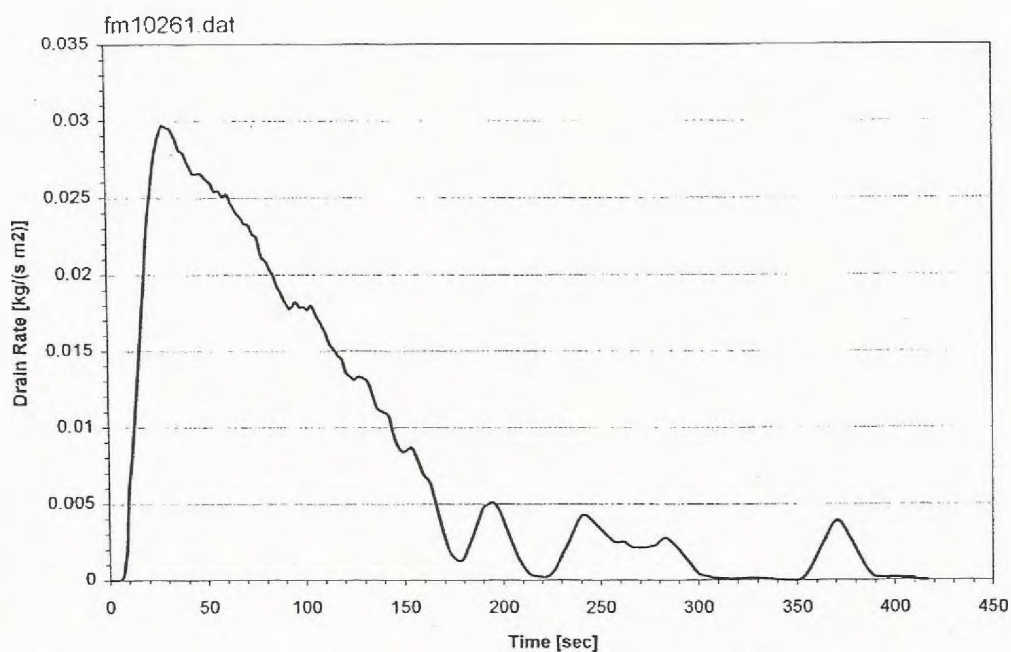


Fig. C131- Drain rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.37, irradiance= 20kW/m², initial foam height= 25mm.

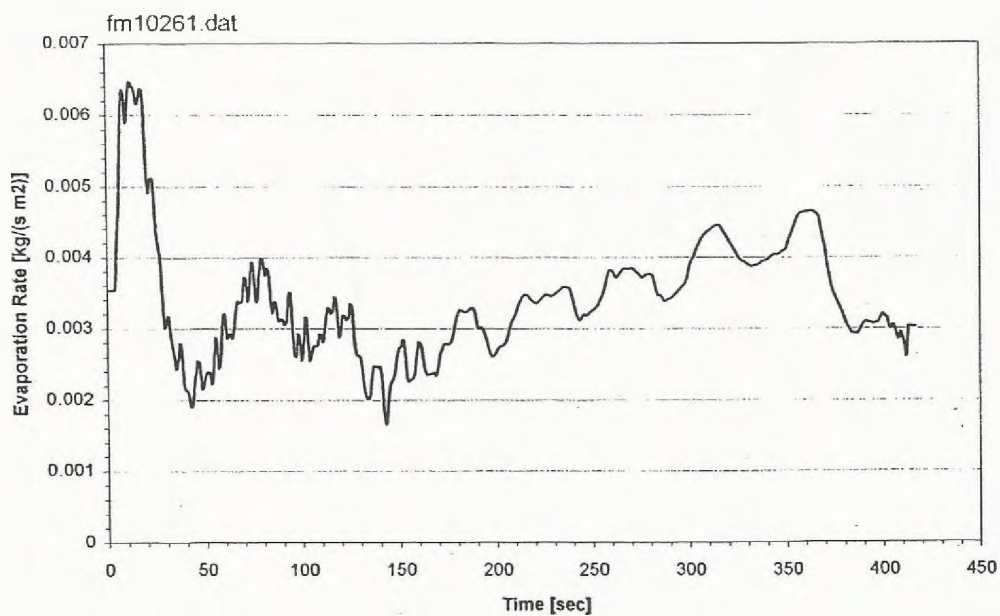


Fig. C132- Evaporation rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.37, irradiance= 20kW/m², initial foam height= 25mm.

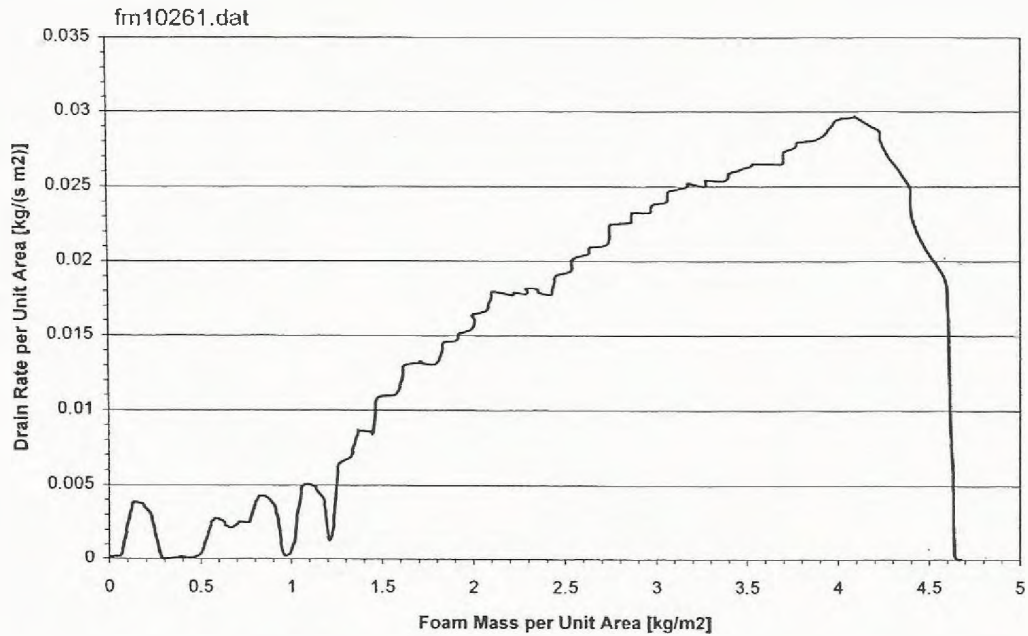


Fig. C133- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.37, irradiance= 20kW/m², initial foam height= 25mm.

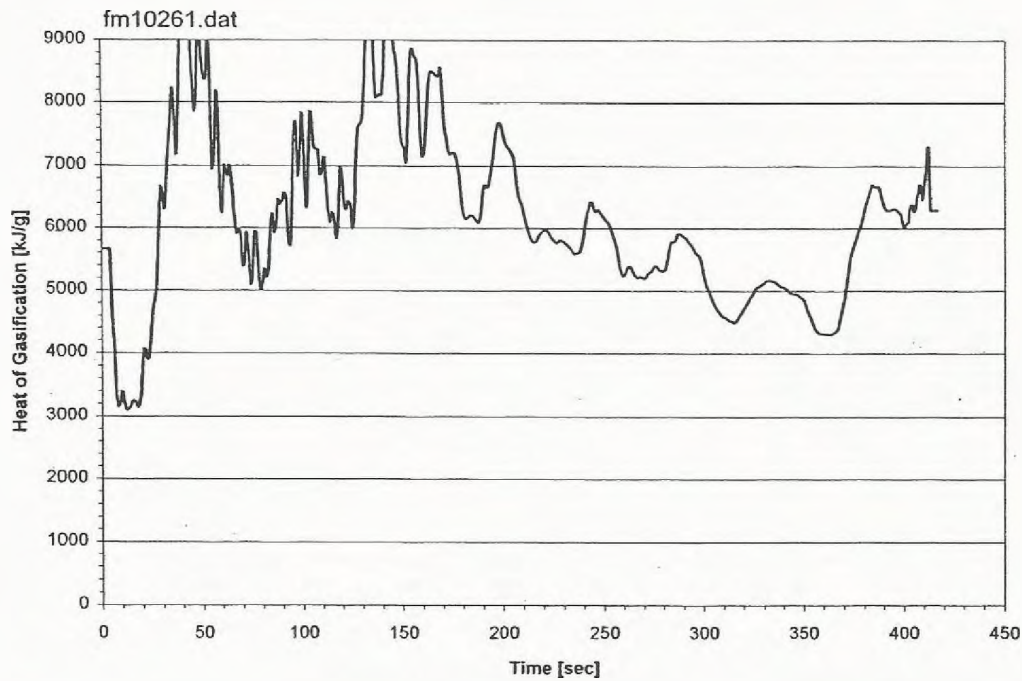


Fig. C134- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.37, irradiance= 20kW/m², initial foam height= 25mm.

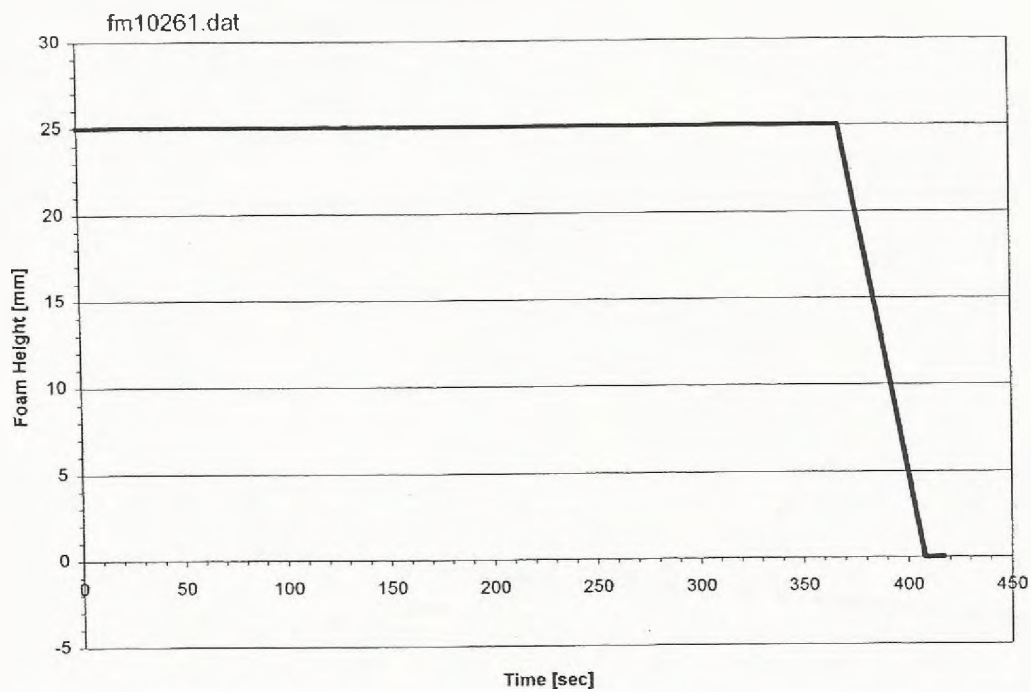


Fig. C135- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.37, irradiance= 20kW/m², initial foam height= 25mm.

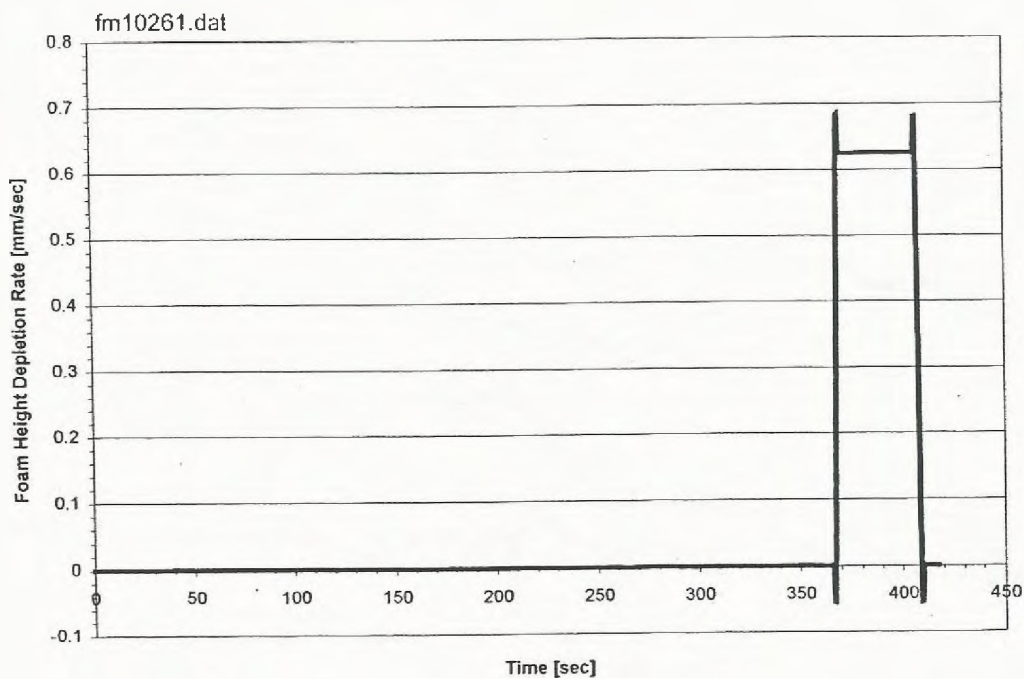


Fig. C136- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.37, irradiance= 20kW/m², initial foam height= 25mm.

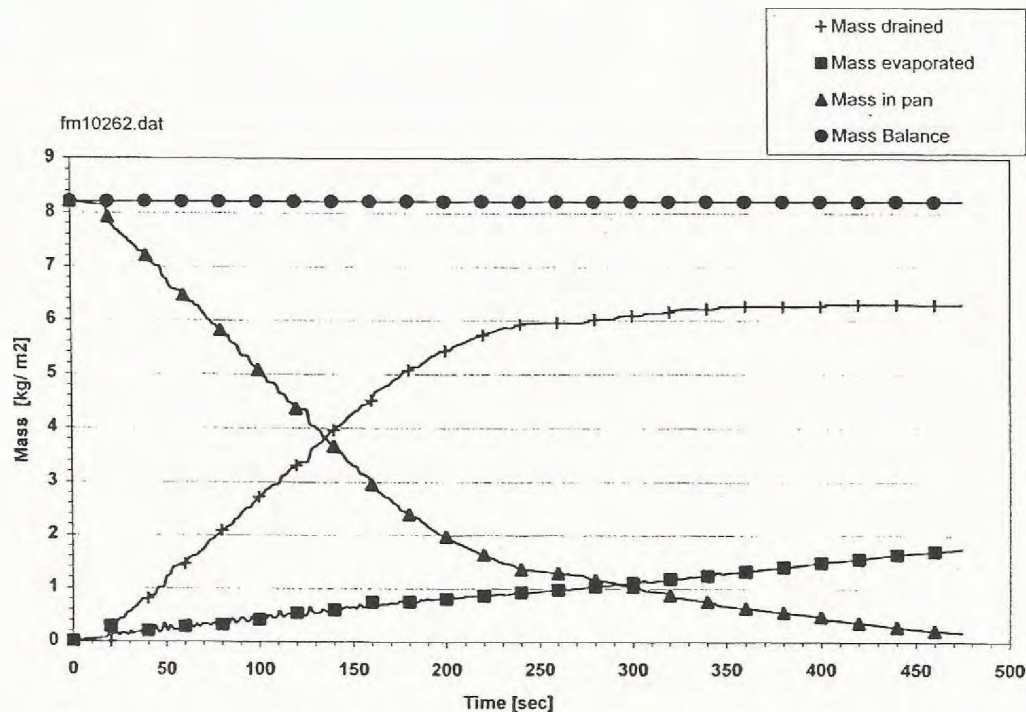


Fig. C137- Mass data in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 6.12, irradiance= 20kW/m², initial foam height= 50mm.

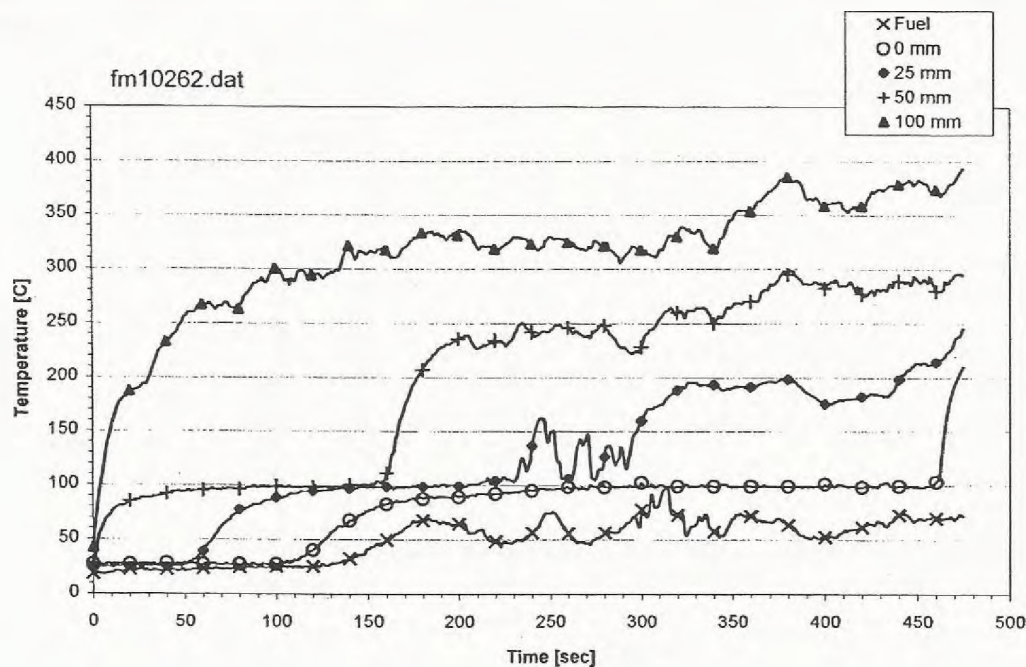


Fig. C138- Foam temperature in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 6.12, irradiance= 20kW/m², initial foam height= 50mm.

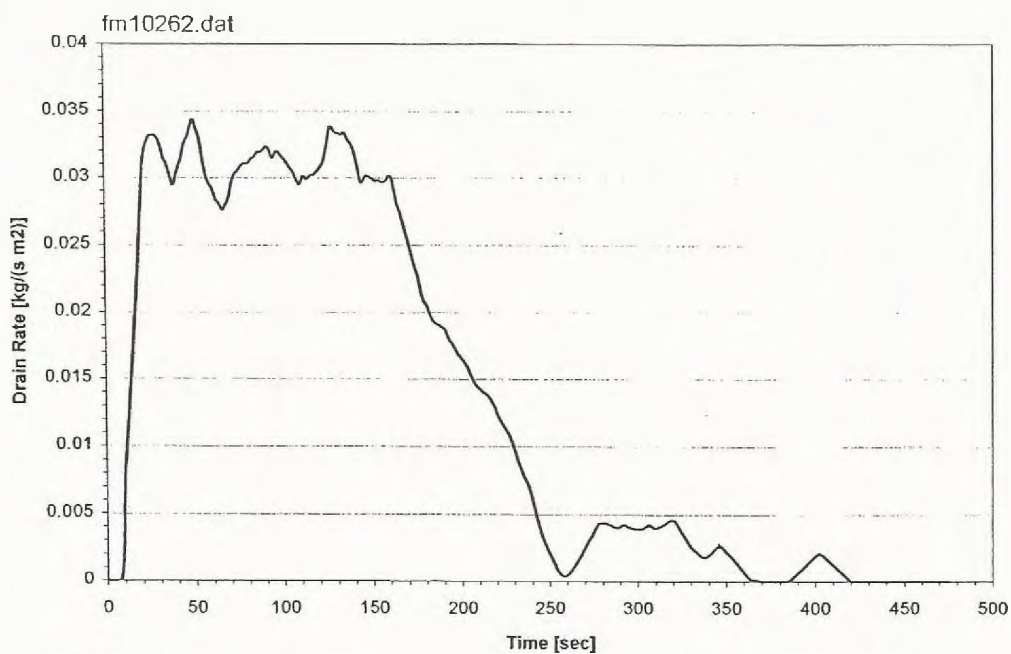


Fig. C139- Drain rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 6.12, irradiance= 20kW/m², initial foam height= 50mm.

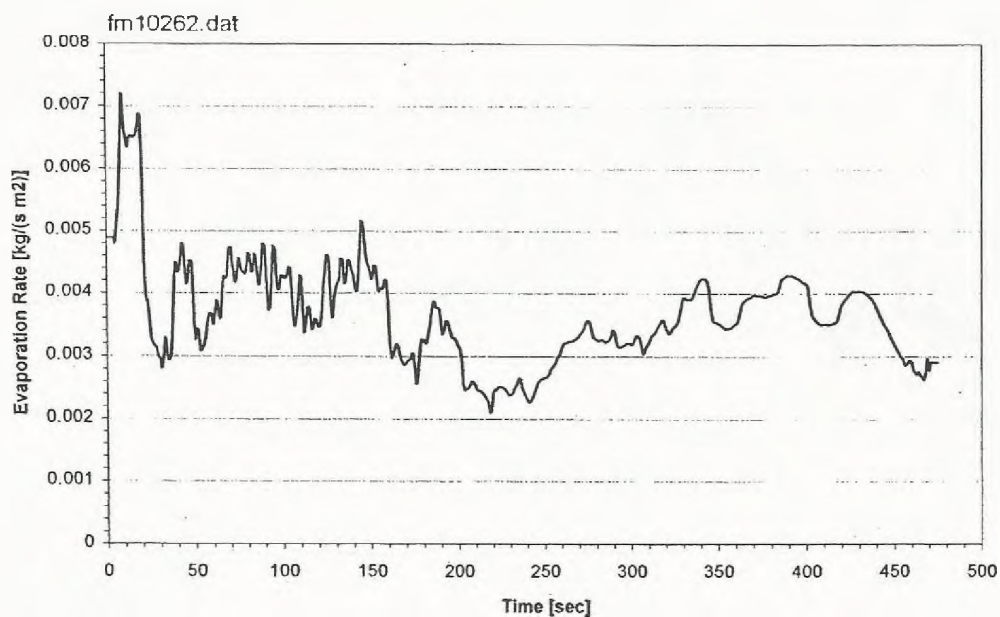


Fig. C140- Evaporation rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 6.12, irradiance= 20kW/m², initial foam height= 50mm.

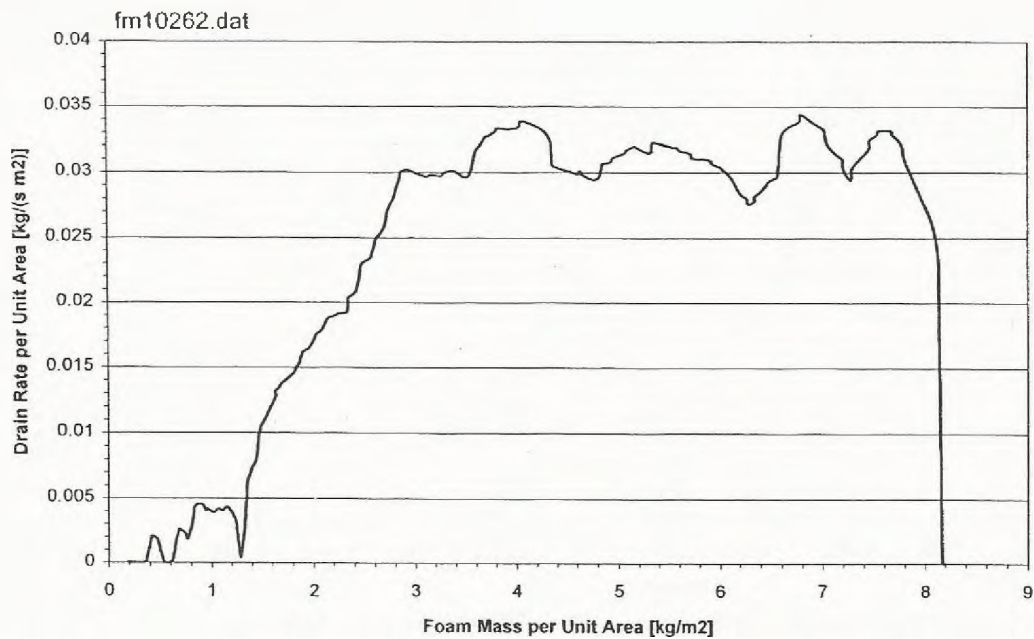


Fig. C141- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 6.12, irradiance= 20kW/m², initial foam height= 50mm.

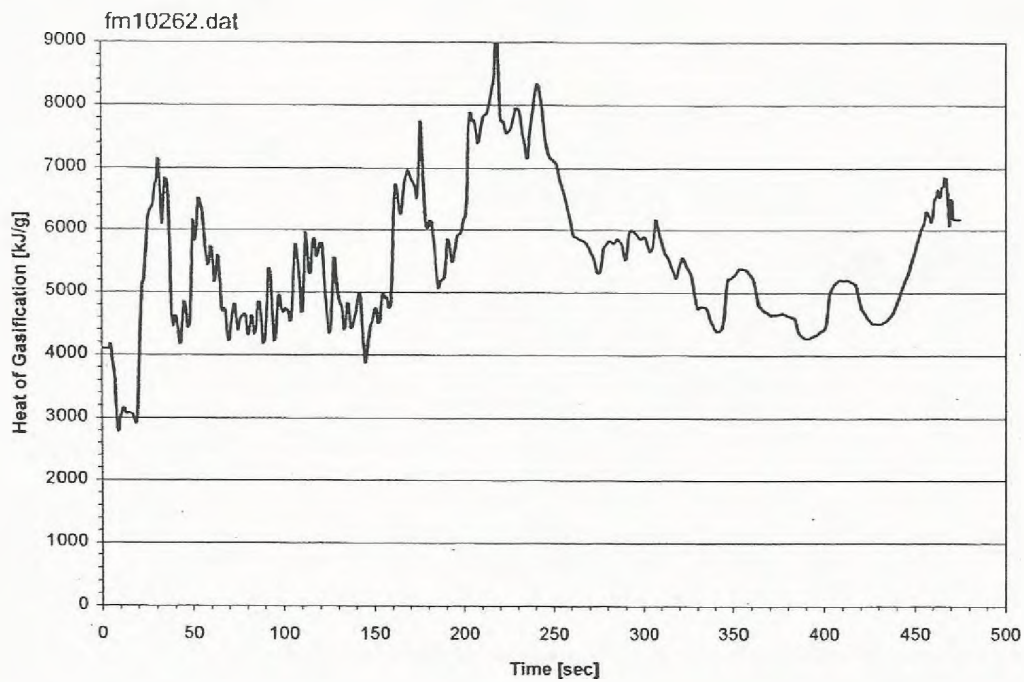


Fig. C142- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 6.12, irradiance= 20kW/m², initial foam height= 50mm.

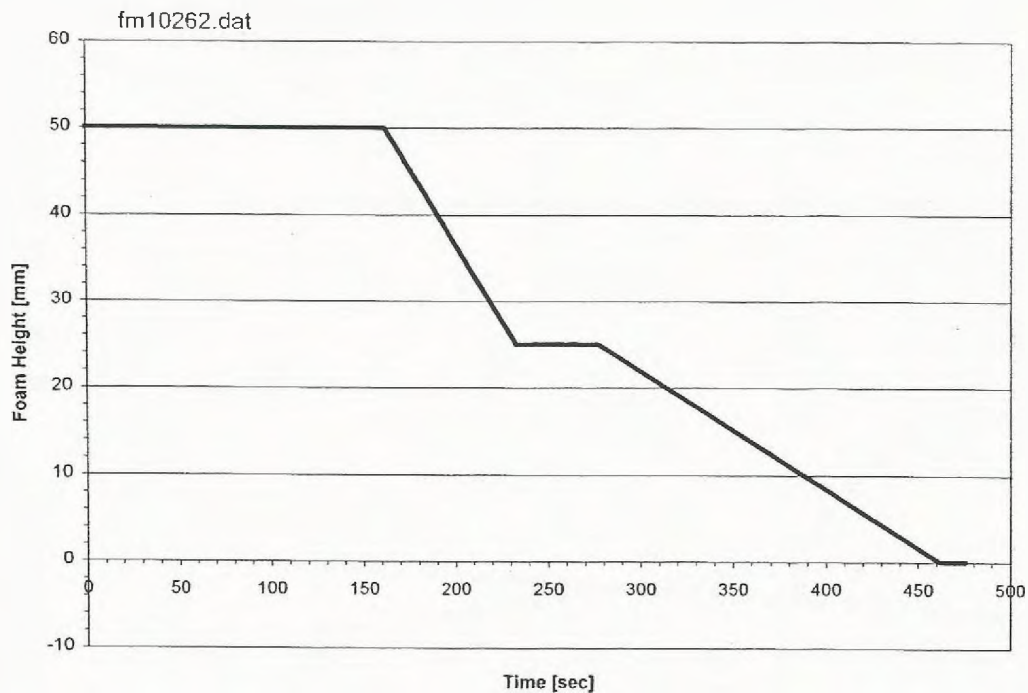


Fig. C143- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 6.12, irradiance= 20kW/m², initial foam height= 50mm.

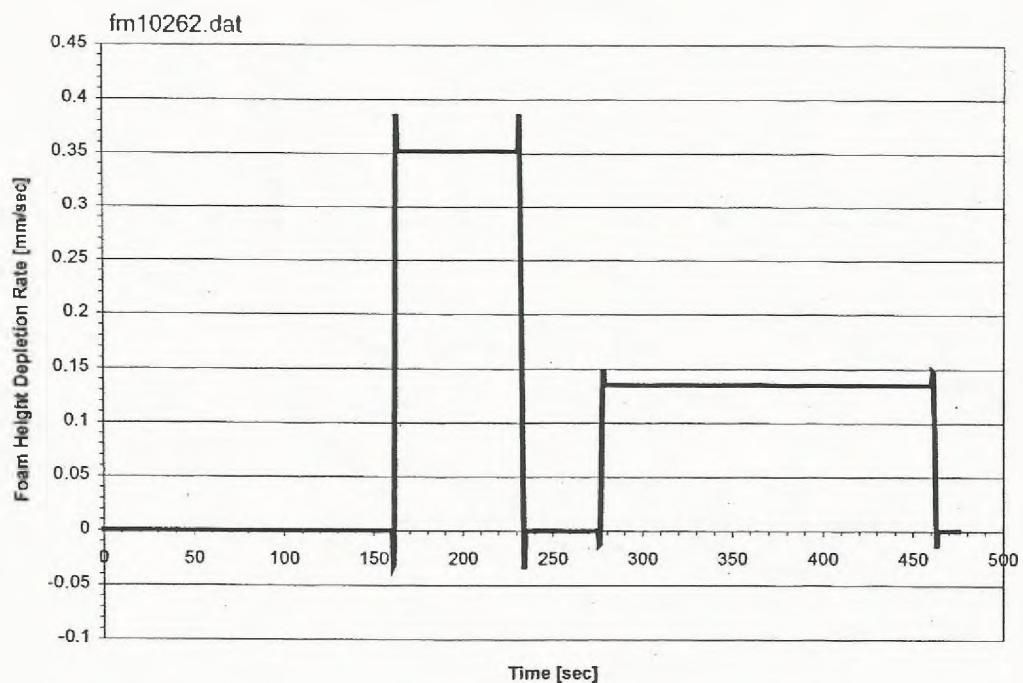


Fig. C144- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 6.12, irradiance= 20kW/m², initial foam height= 50mm.

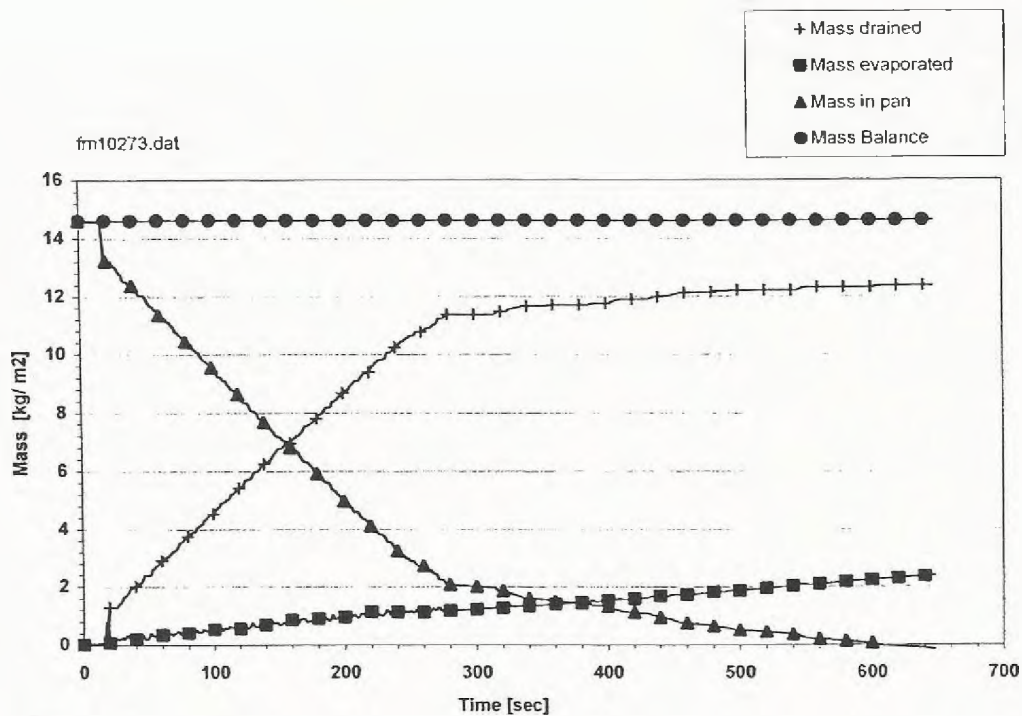


Fig. C145- Mass data in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.16, irradiance= 20kW/m², initial foam height= 75mm.

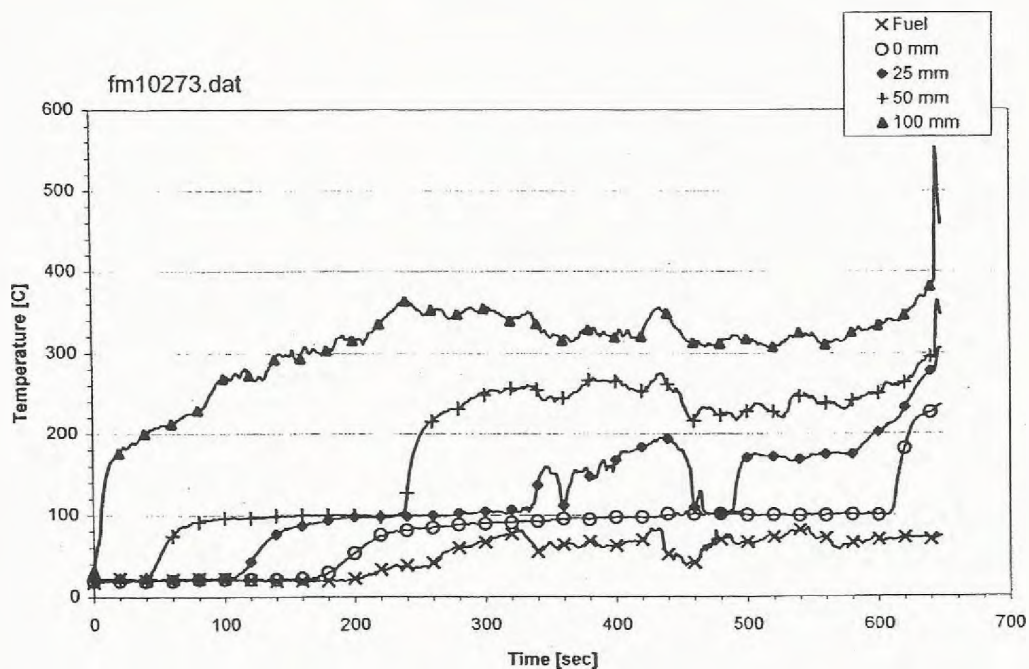


Fig. C146- Foam temperature in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.16, irradiance= 20kW/m², initial foam height= 75mm.

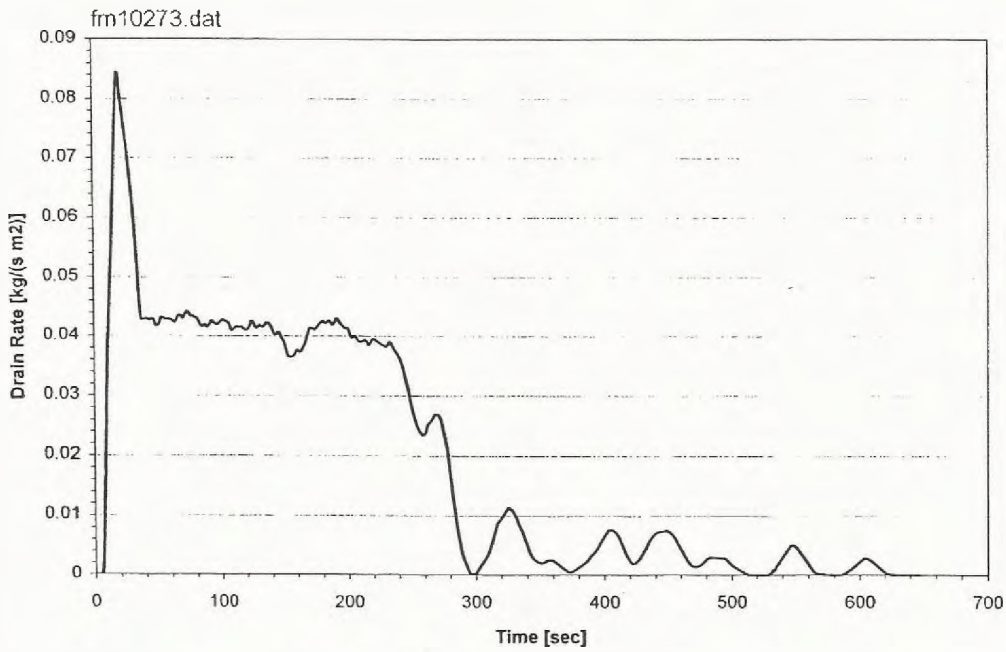


Fig. C147- Drain rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.16, irradiance= 20kW/m², initial foam height= 75mm.

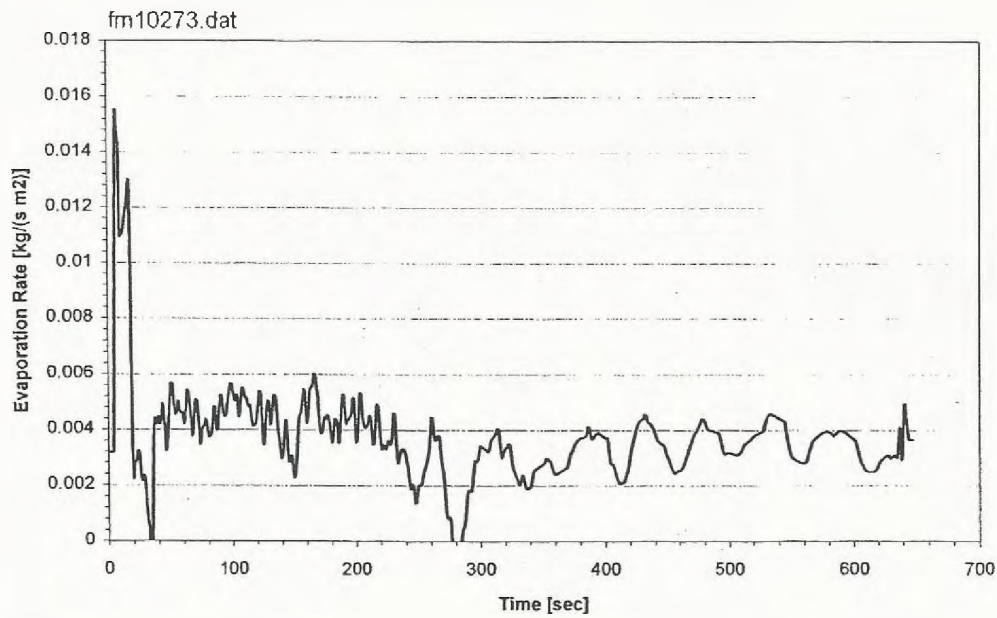


Fig. C148- Evaporation rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.16, irradiance= 20kW/m², initial foam height= 75mm.

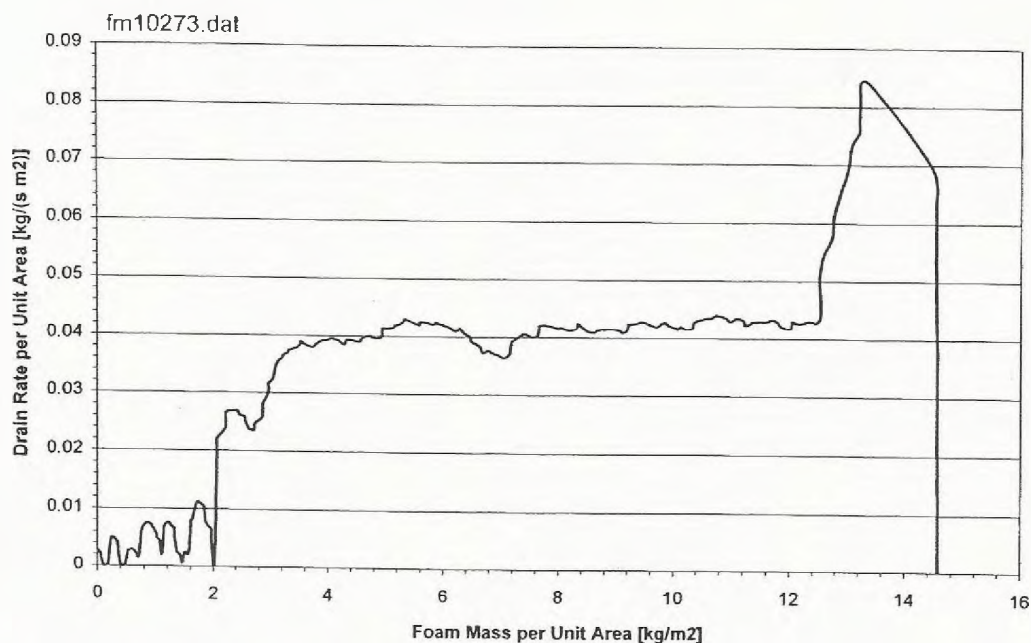


Fig. C149- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.16, irradiance= 20kW/m², initial foam height= 75mm.

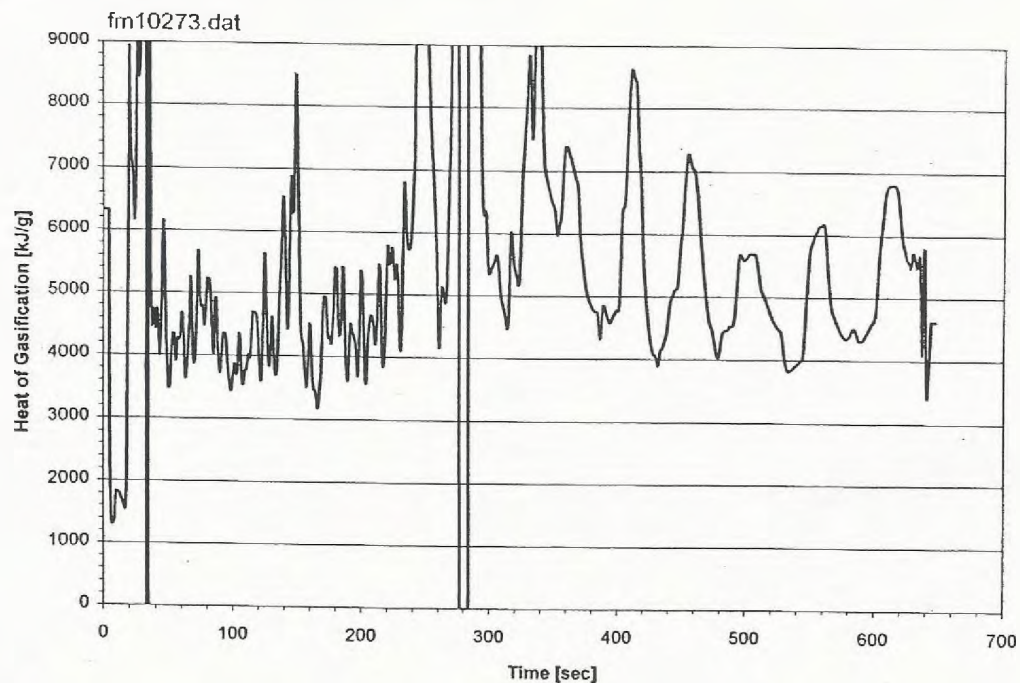


Fig. C150- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.16, irradiance= 20kW/m², initial foam height= 75mm.

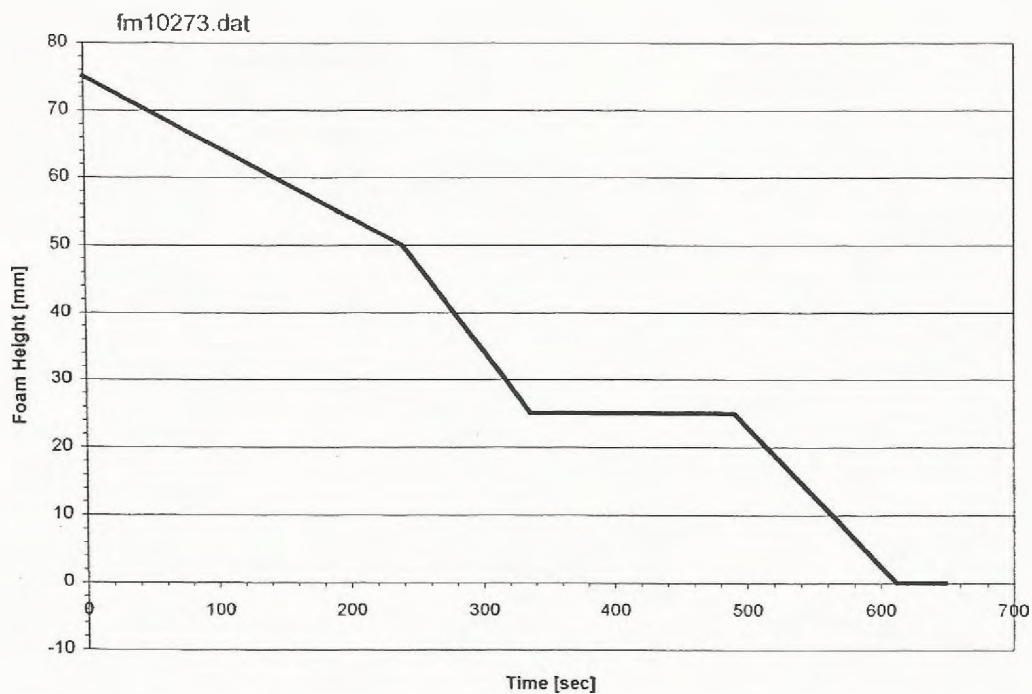


Fig. C151- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.16, irradiance= 20kW/m², initial foam height= 75mm.

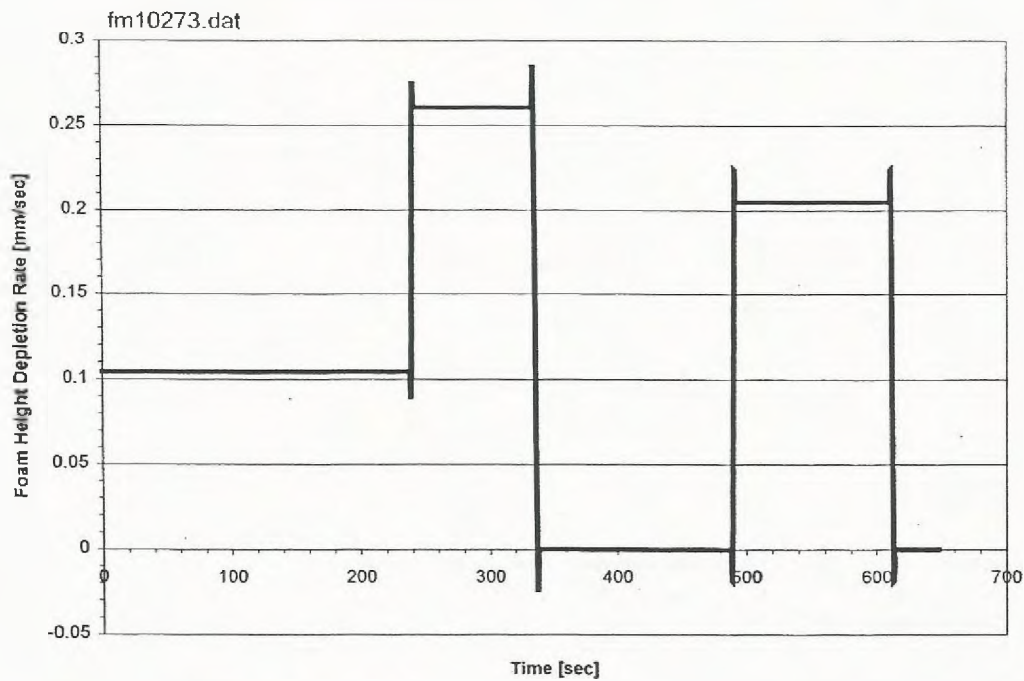


Fig. C152- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.16, irradiance= 20kW/m², initial foam height= 75mm.

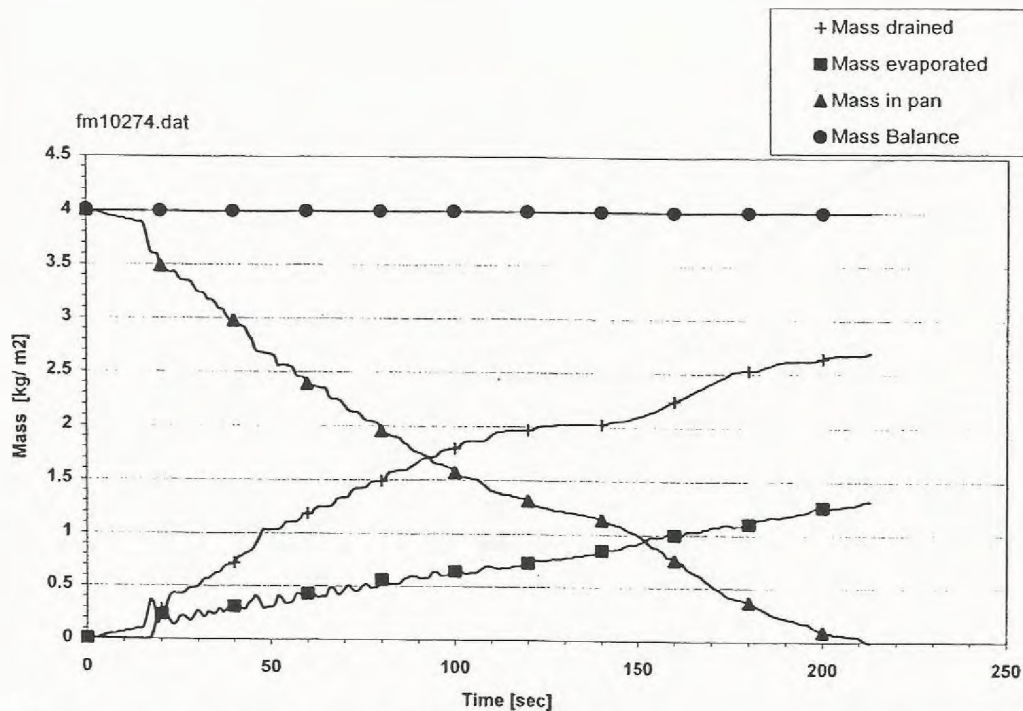


Fig. C153- Mass data in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 6.27, irradiance= 35kW/m², initial foam height= 25mm.

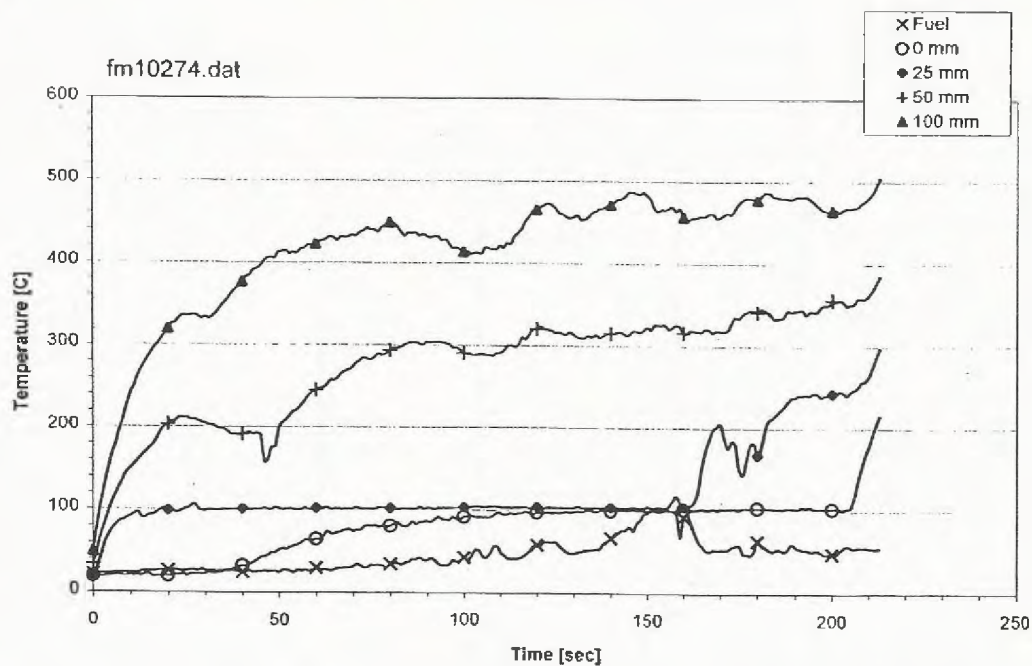


Fig. C154- Foam temperature in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 6.27, irradiance= 35kW/m², initial foam height= 25mm.

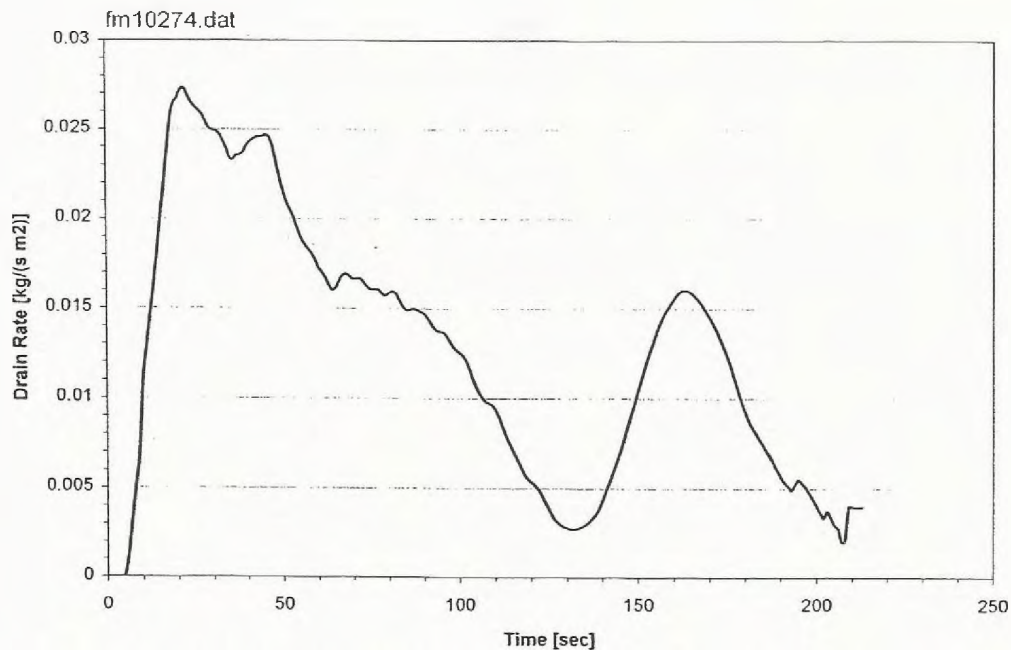


Fig. C155- Drain rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 6.27, irradiance= 35kW/m2, initial foam height= 25mm.

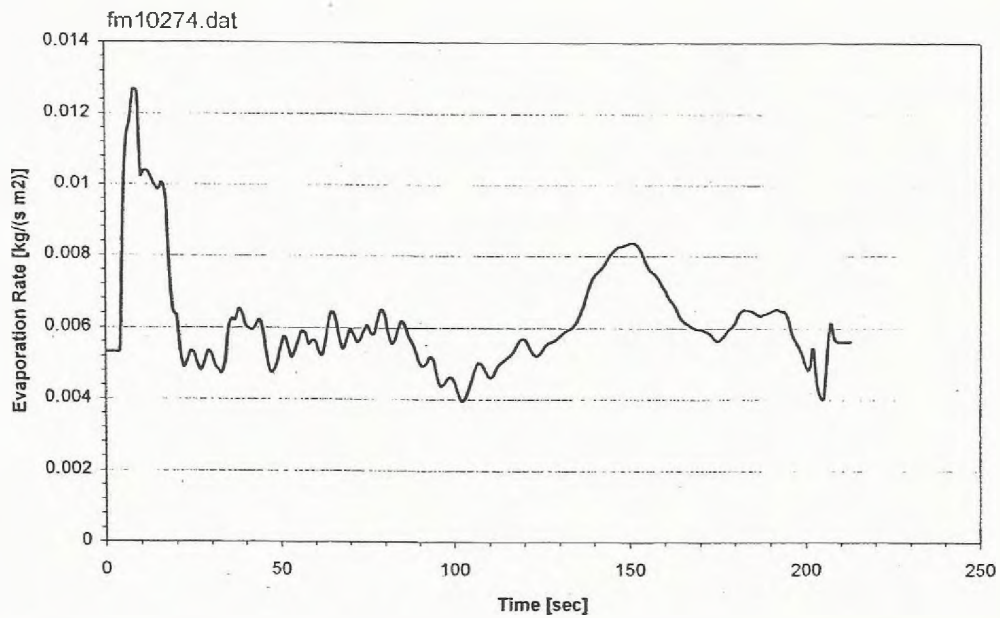


Fig. C156- Evaporation rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 6.27, irradiance= 35kW/m2, initial foam height= 25mm.

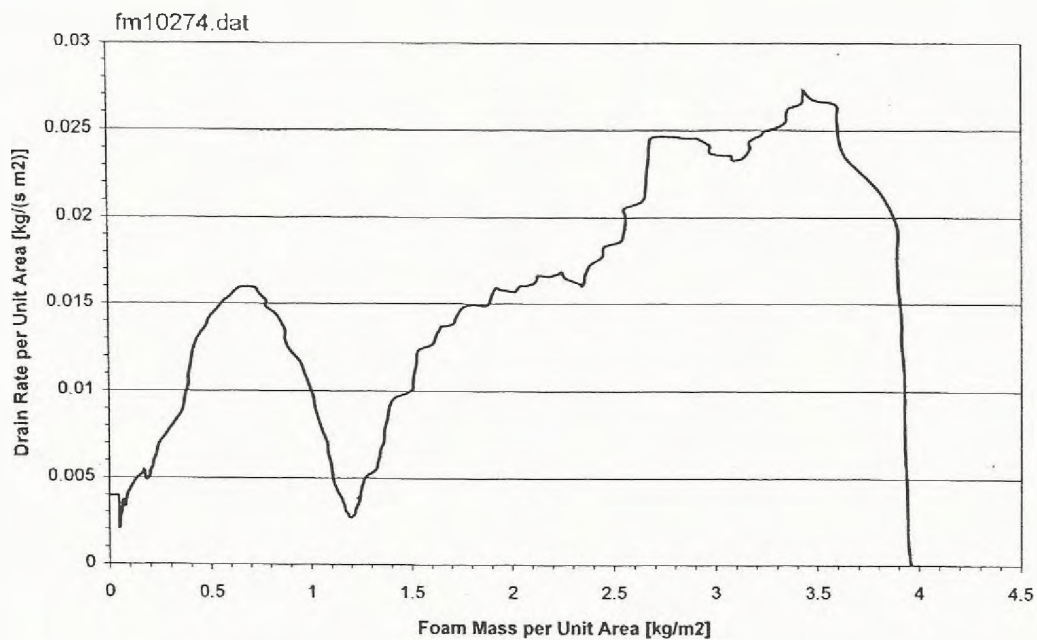


Fig. C157- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 6.27, irradiance= 35kW/m2, initial foam height= 25mm.

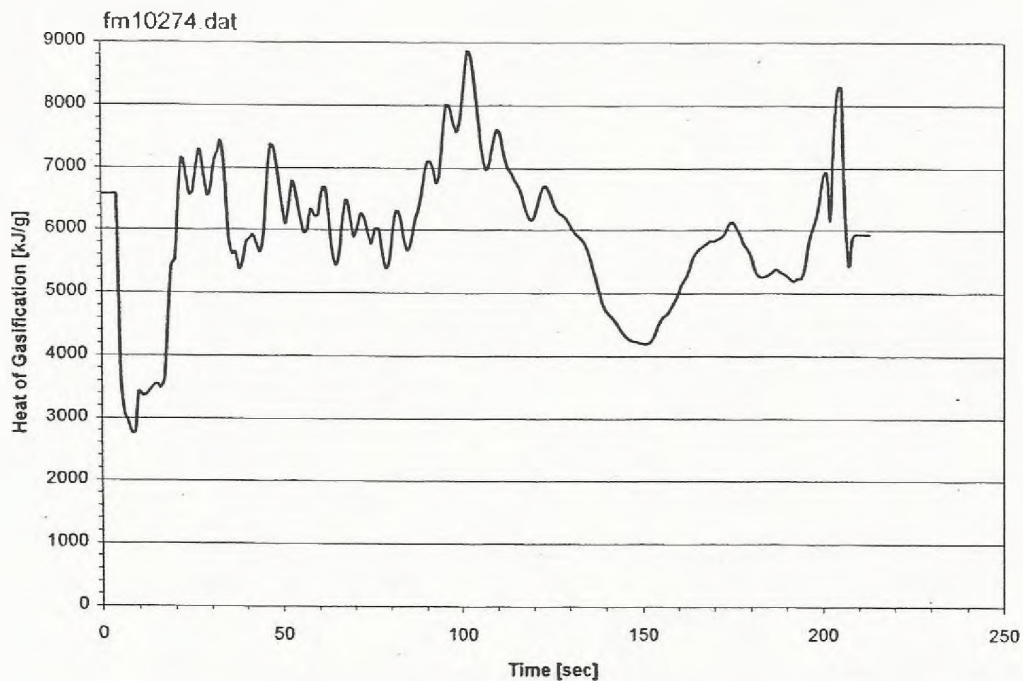


Fig. C158- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 6.27, irradiance= 35kW/m2, initial foam height= 25mm.

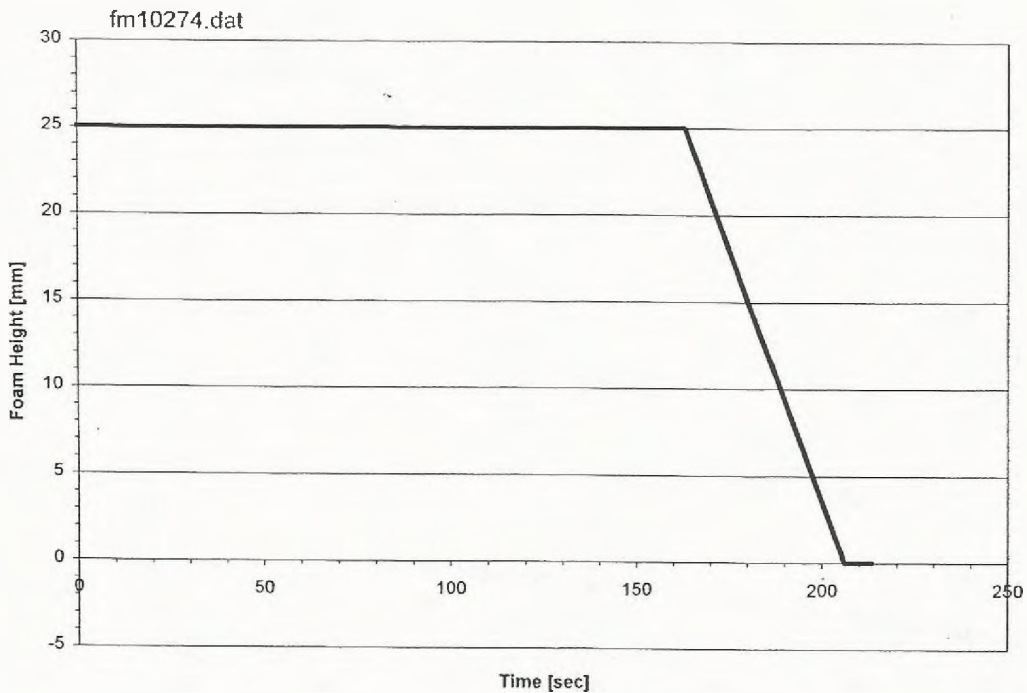


Fig. C159- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 6.27, irradiance= 35kW/m2, initial foam height= 25mm.

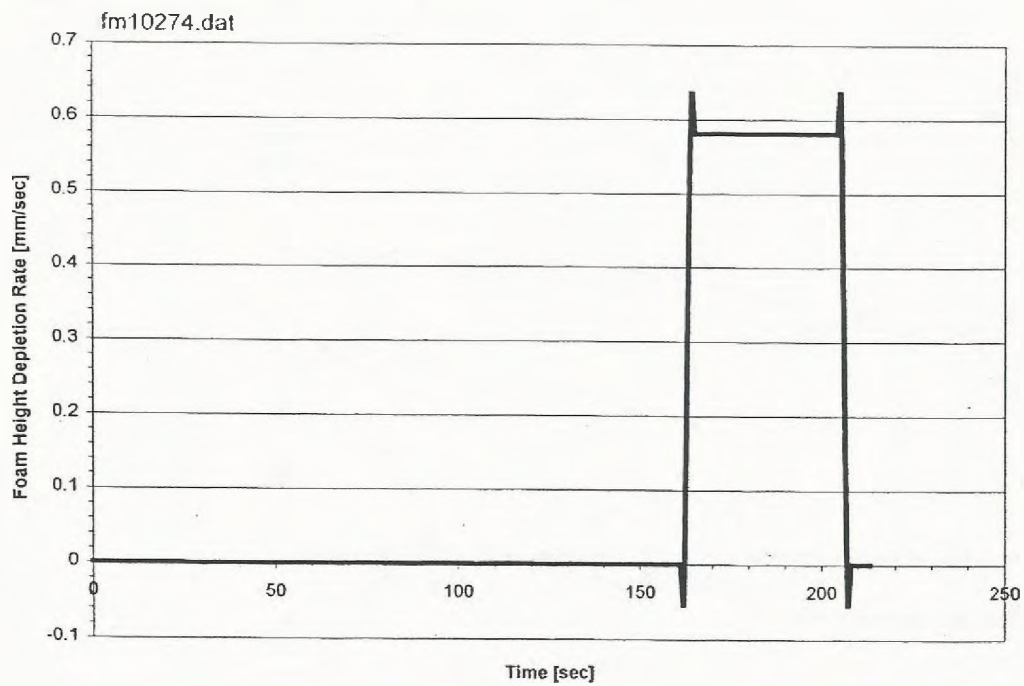


Fig. C160- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 6.27, irradiance= 35kW/m2, initial foam height= 25mm.

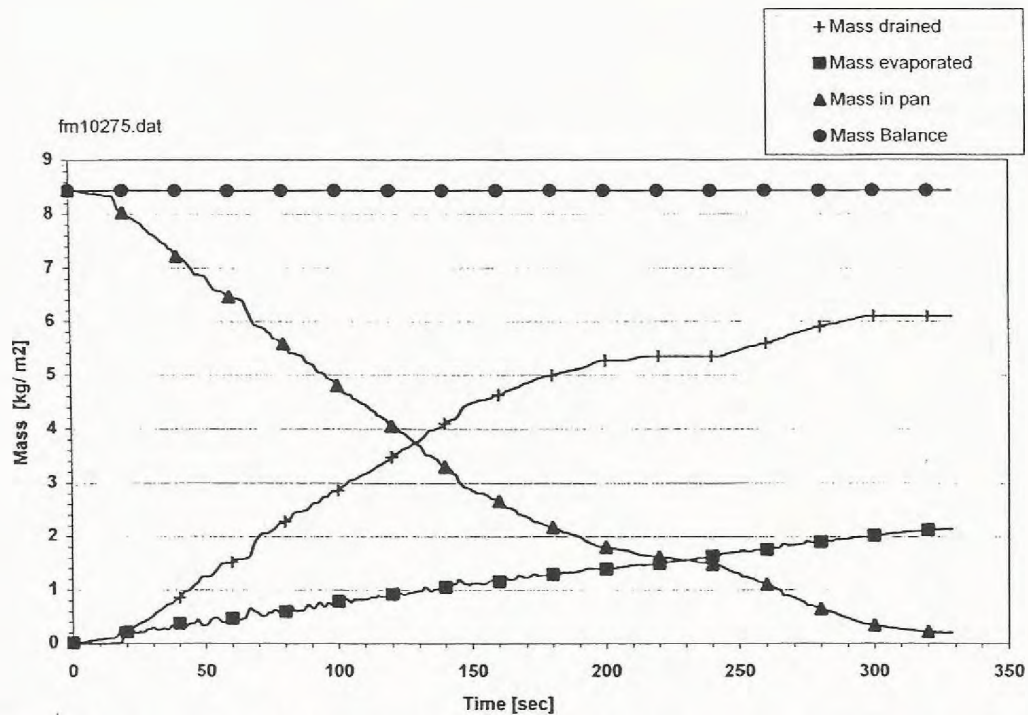


Fig. C161- Mass data in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.95, irradiance= 35kW/m2, initial foam height= 50mm.

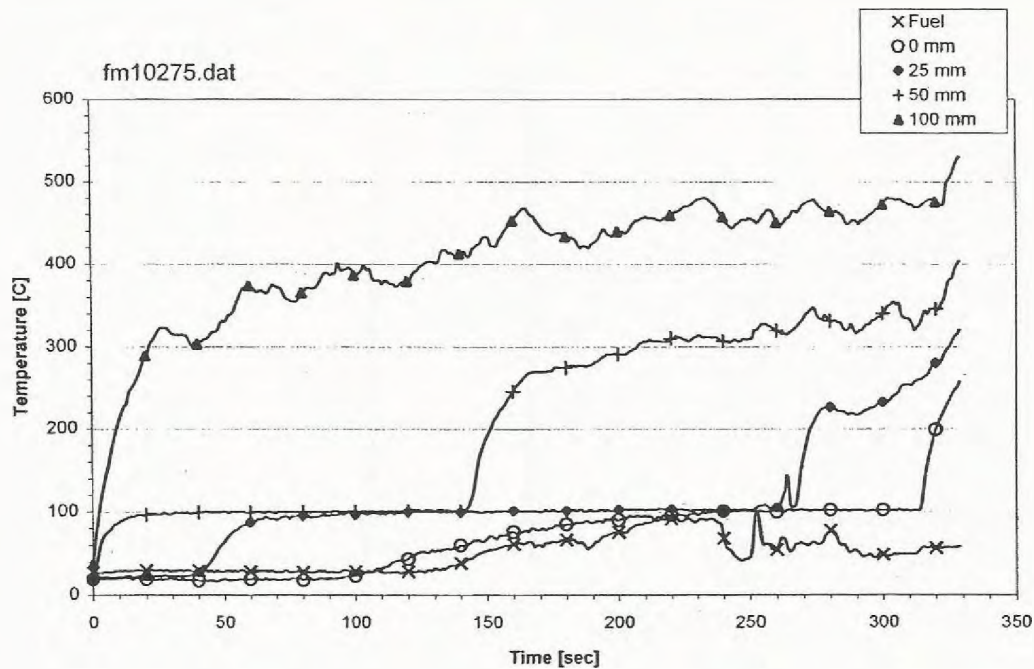


Fig. C162- Foam temperature in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.95, irradiance= 35kW/m2, initial foam height= 50mm.



Fig. C163- Drain rate in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 5.95, irradiance= 35kW/m², initial foam height= 50mm.

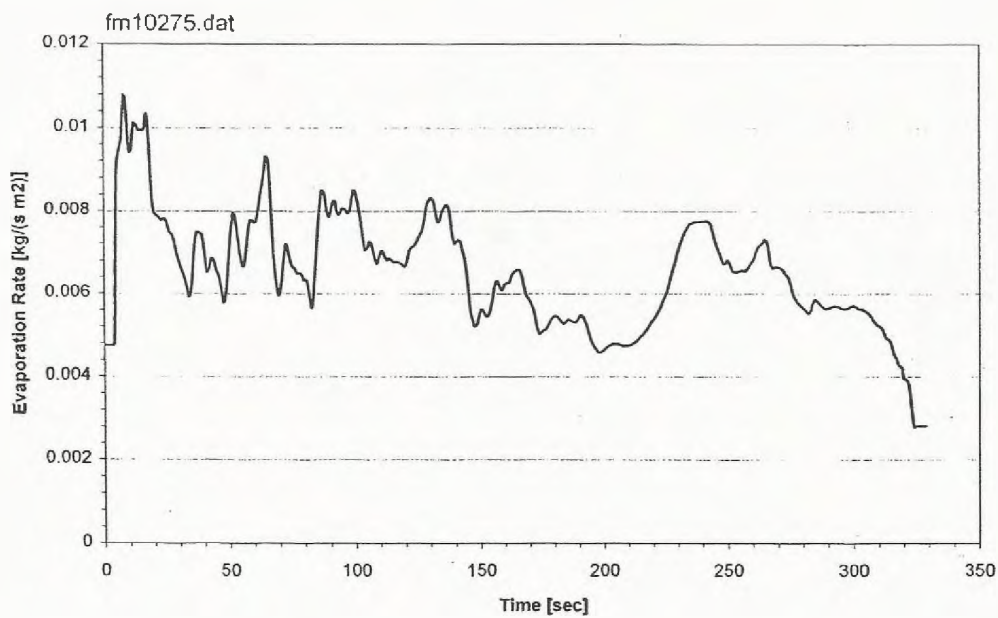


Fig. C164- Evaporation rate in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 5.95, irradiance= 35kW/m², initial foam height= 50mm.

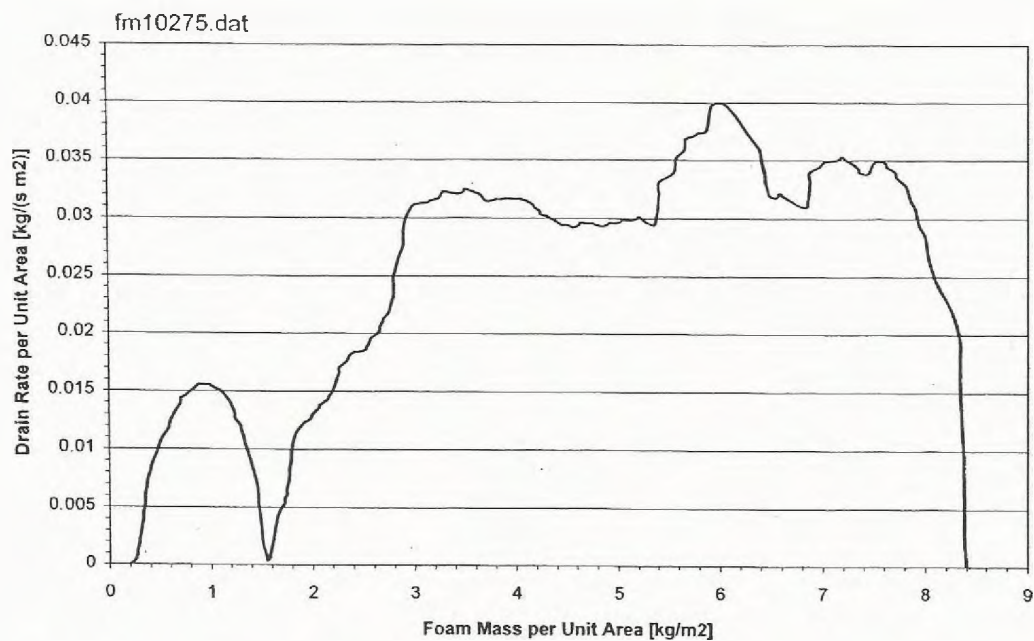


Fig. C165- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.95, irradiance= 35kW/m², initial foam height= 50mm.

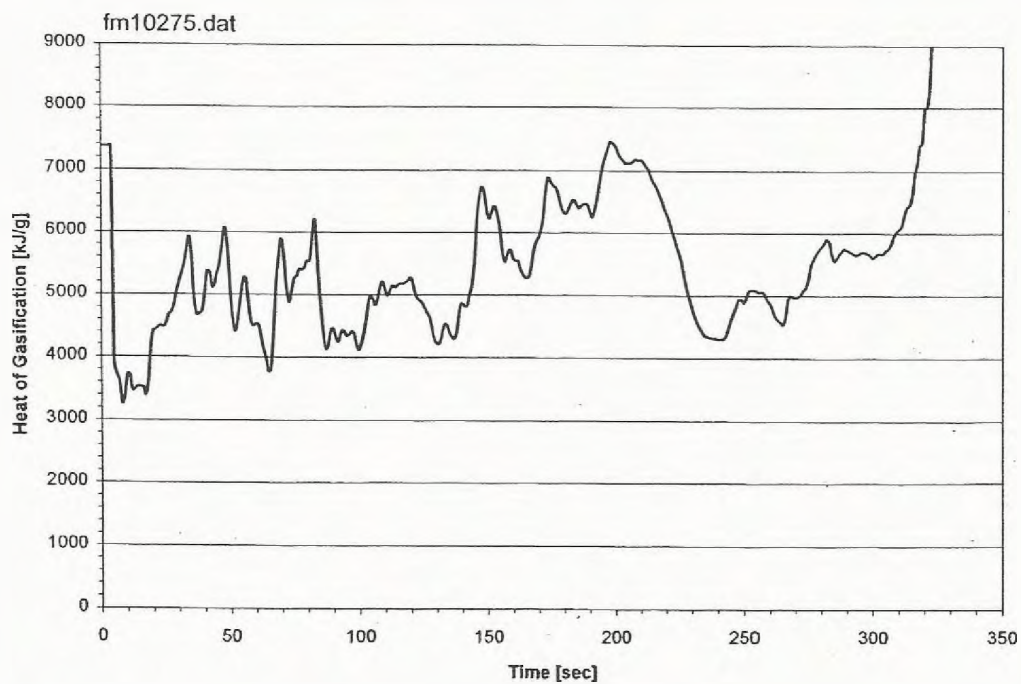


Fig. C166- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.95, irradiance= 35kW/m², initial foam height= 50mm.

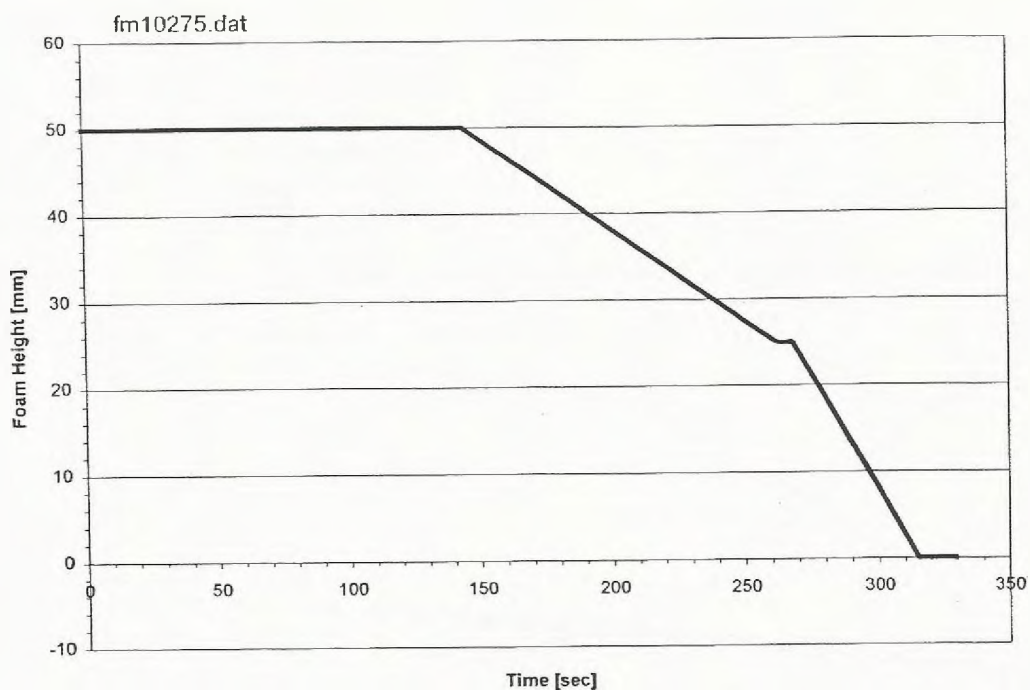


Fig. C167- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.95, irradiance= 35kW/m2, initial foam height= 50mm.

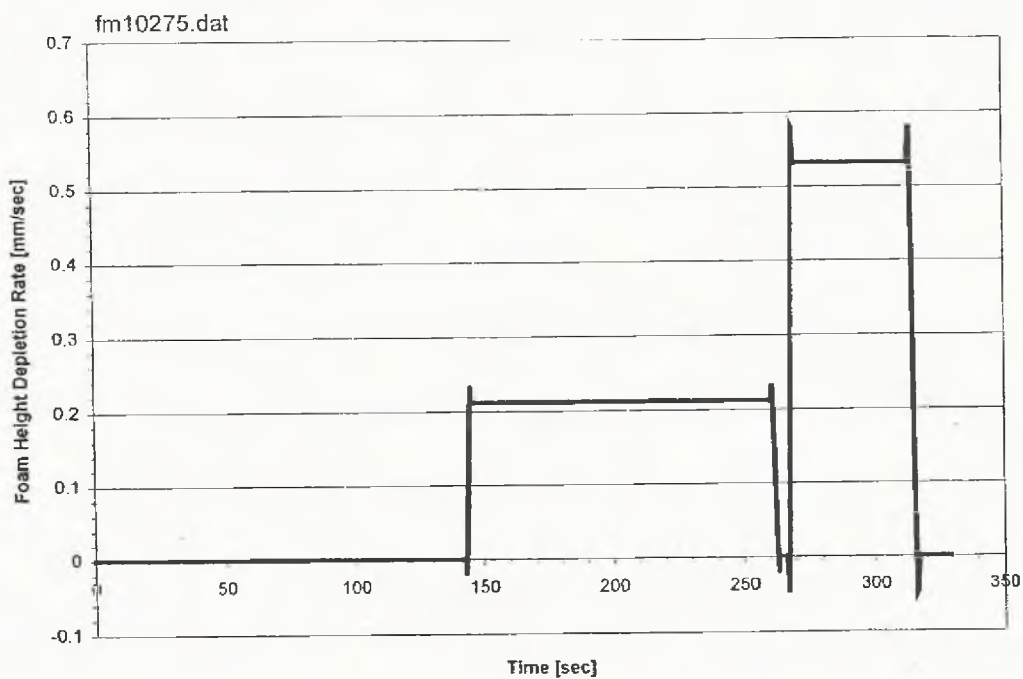


Fig. C168- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.95, irradiance= 35kW/m2, initial foam height= 50mm.

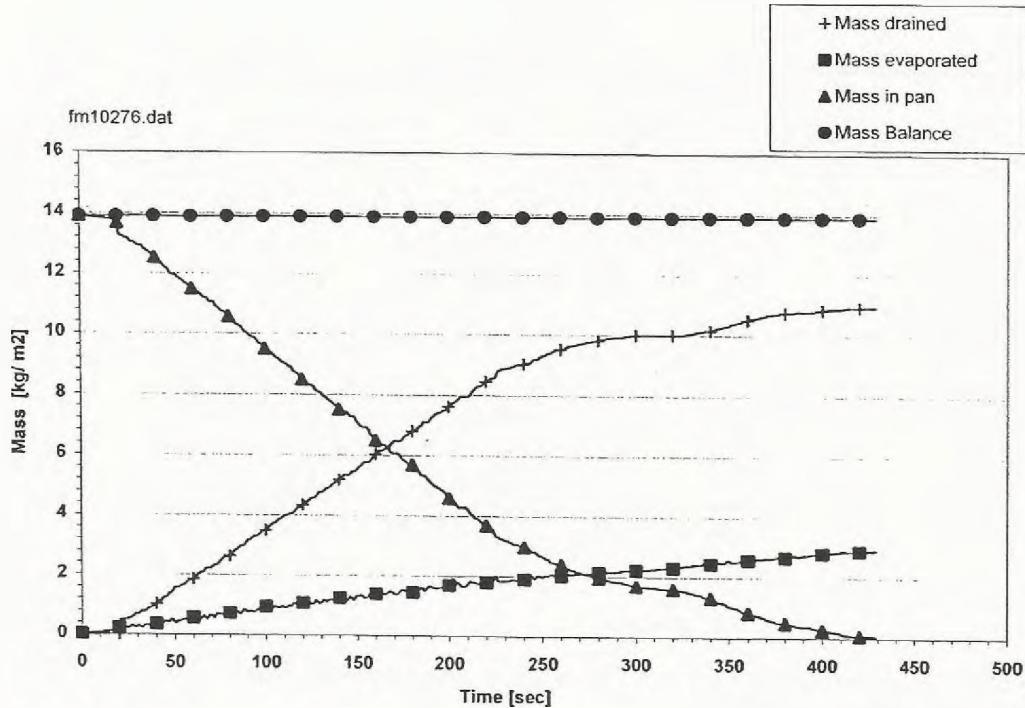


Fig. C169- Mass data in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.42, irradiance= 35kW/m², initial foam height= 75mm.

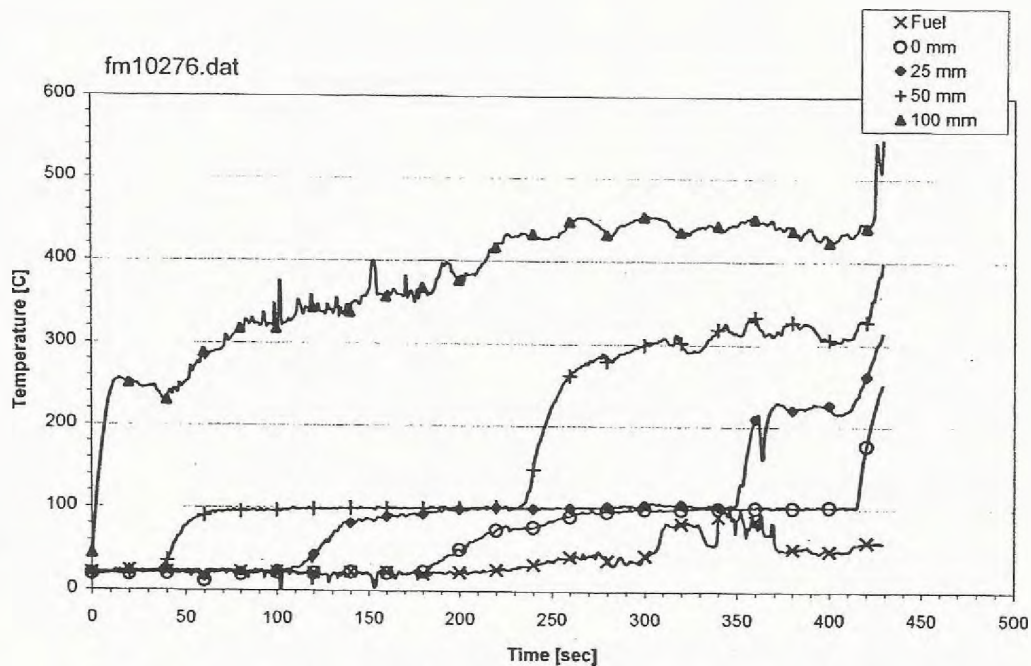


Fig. C170- Foam temperature in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.42, irradiance= 35kW/m², initial foam height= 75mm.

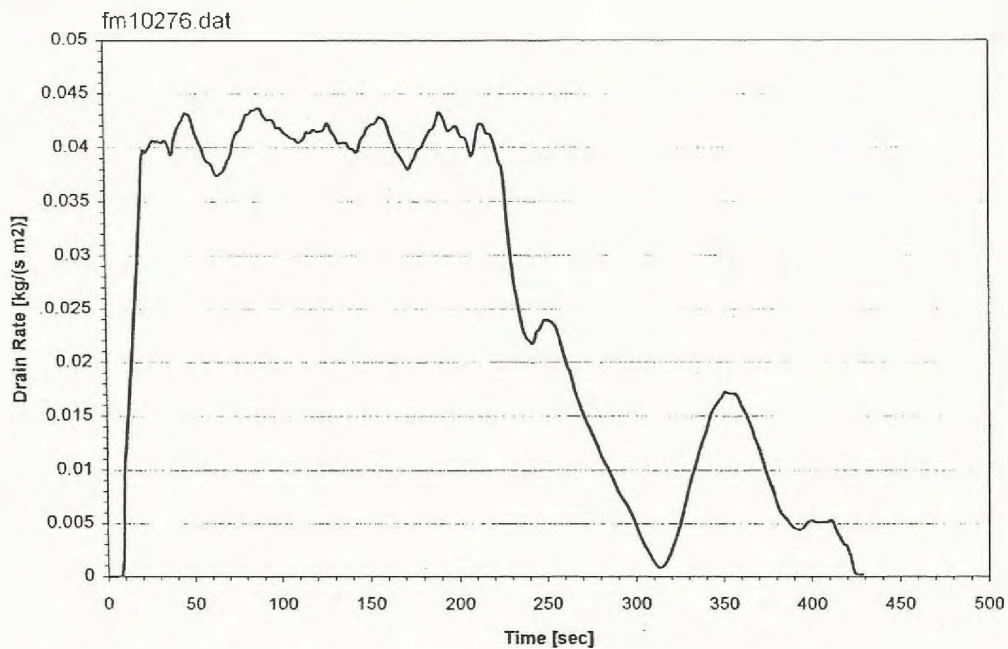


Fig. C171- Drain rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.42, irradiance= 35kW/m², initial foam height= 75mm.

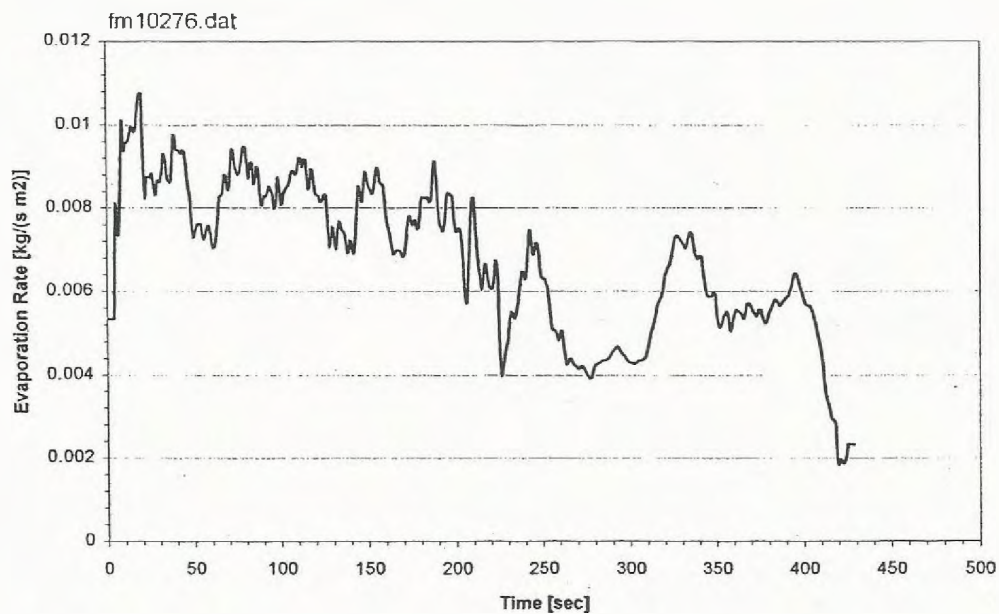


Fig. C172- Evaporation rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.42, irradiance= 35kW/m², initial foam height= 75mm.

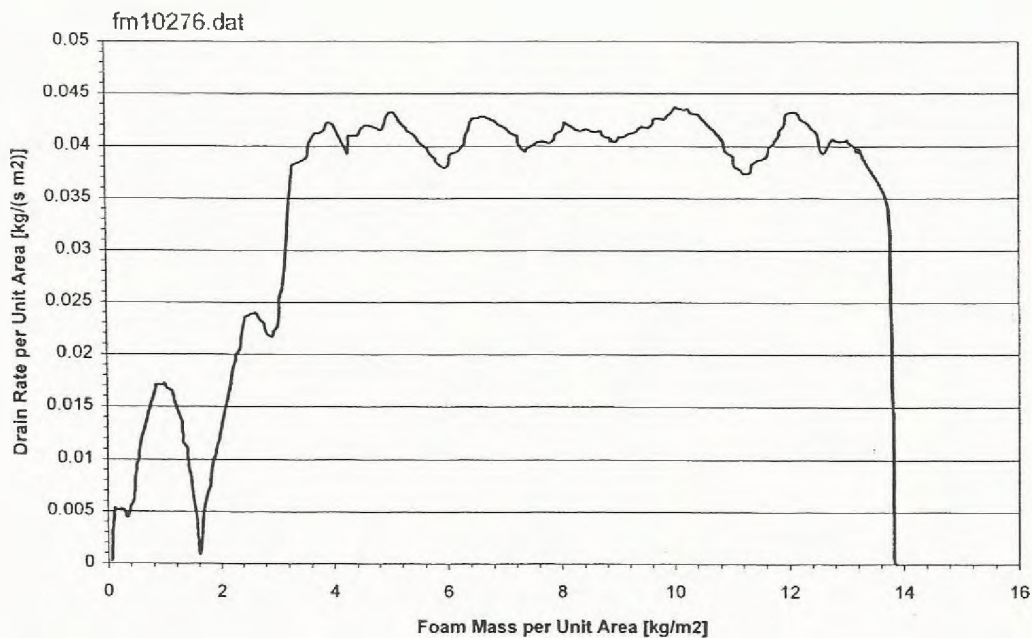


Fig. C173- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.42, irradiance= 35kW/m2, initial foam height= 75mm.

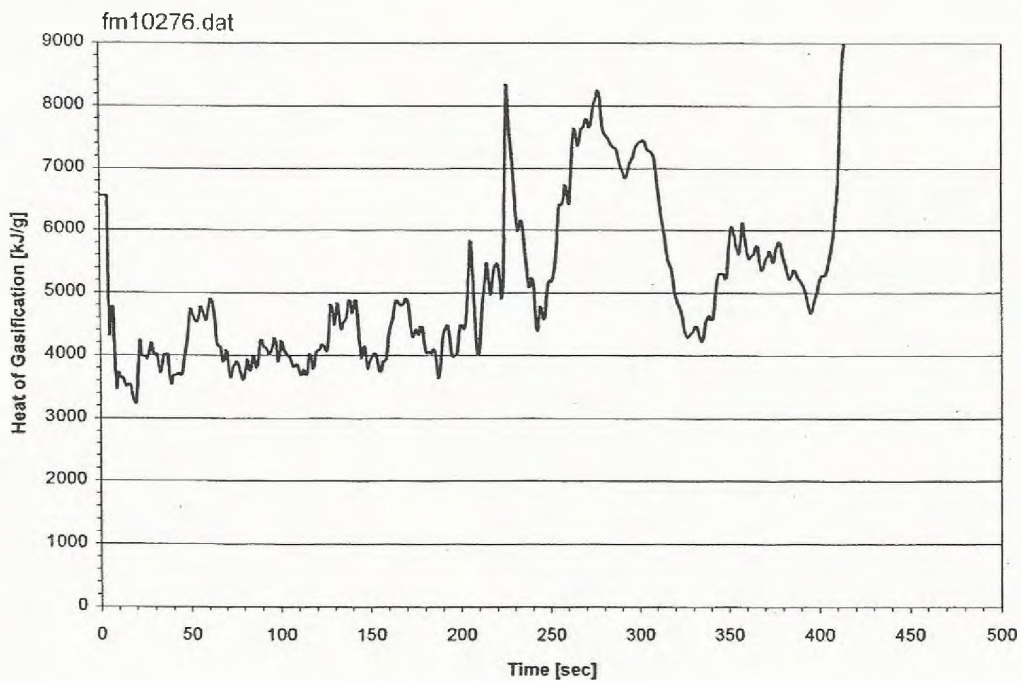


Fig. C174- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.42, irradiance= 35kW/m2, initial foam height= 75mm.

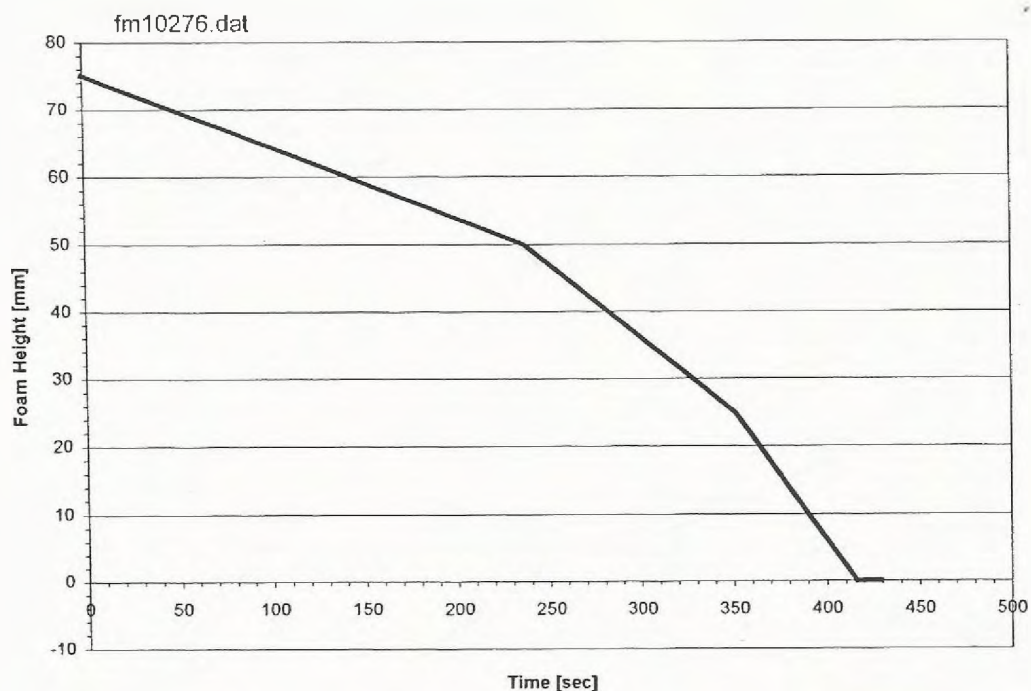


Fig. C175- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.42, irradiance= 35kW/m², initial foam height= 75mm.

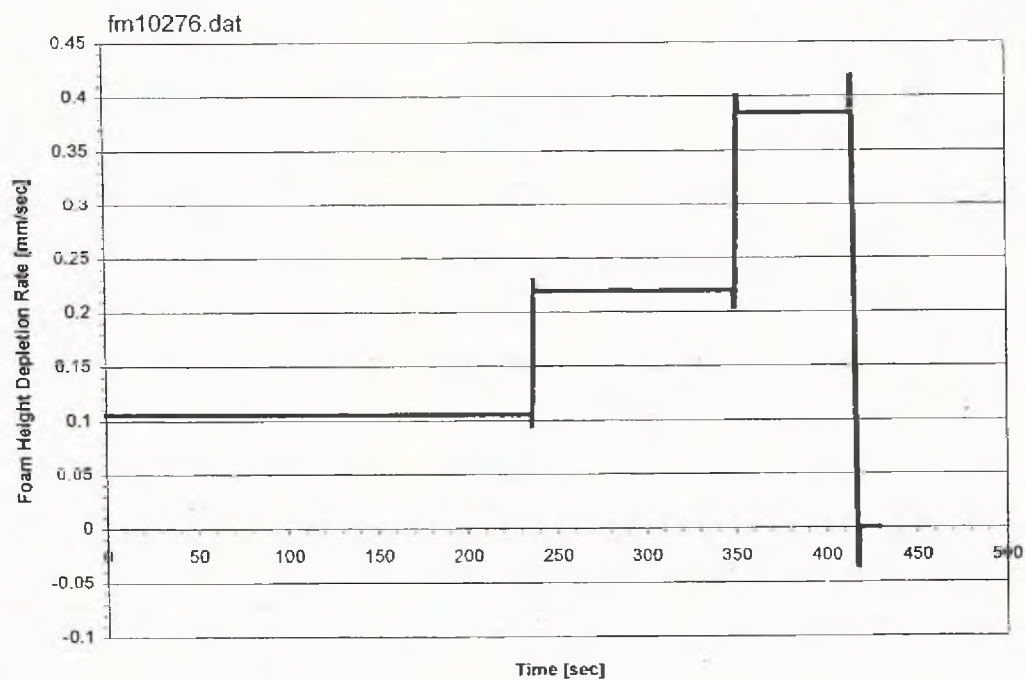


Fig. C176- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.42, irradiance= 35kW/m², initial foam height= 75mm.

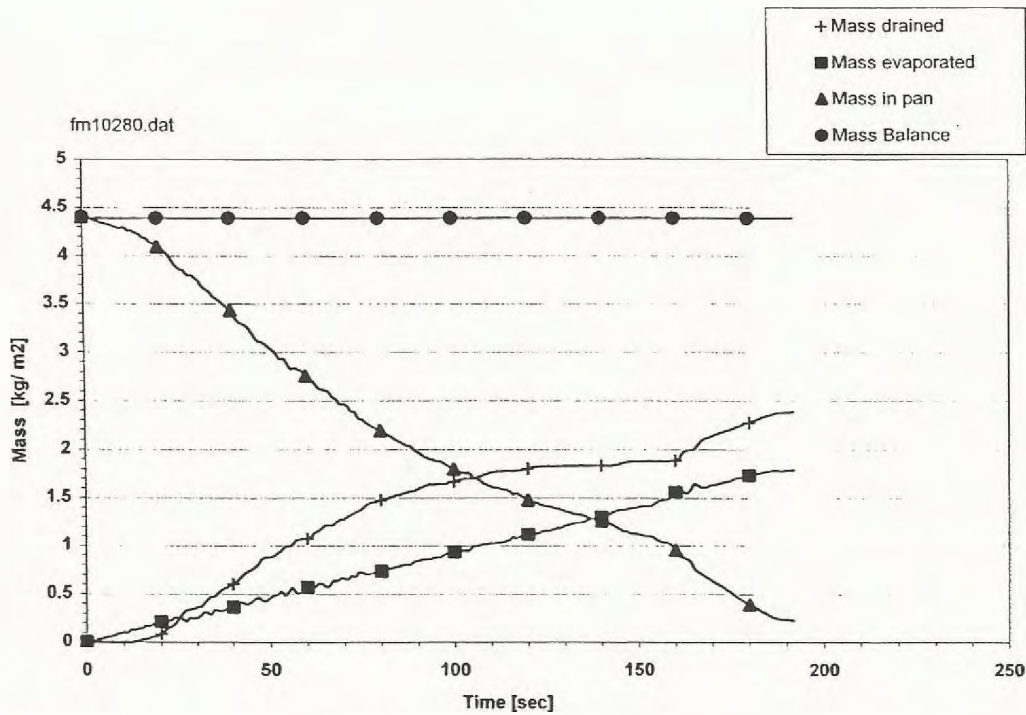


Fig. C177- Mass data in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.71, irradiance= 50kW/m2, initial foam height= 25mm.

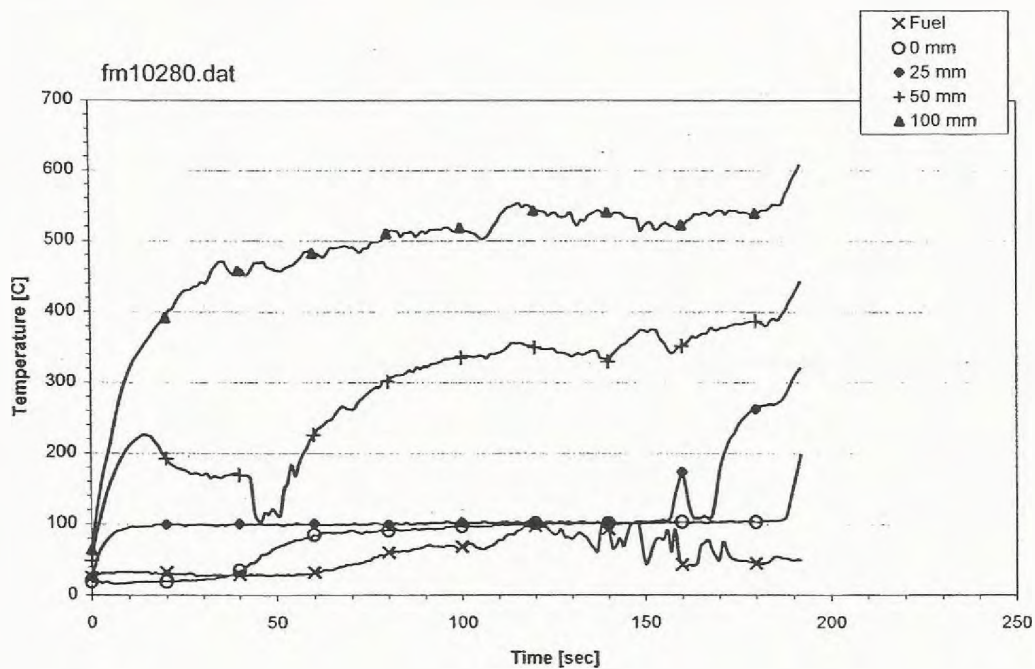


Fig. C178- Foam temperature in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.71, irradiance= 50kW/m2, initial foam height= 25mm.

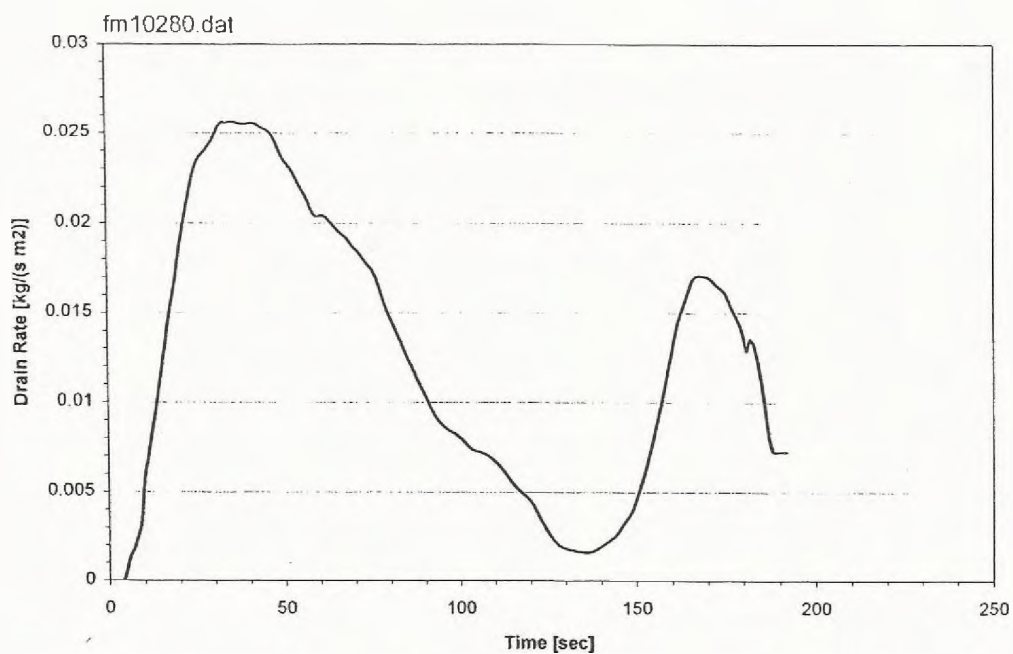


Fig. C179- Drain rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.71, irradiance= 50kW/m2, initial foam height= 25mm.

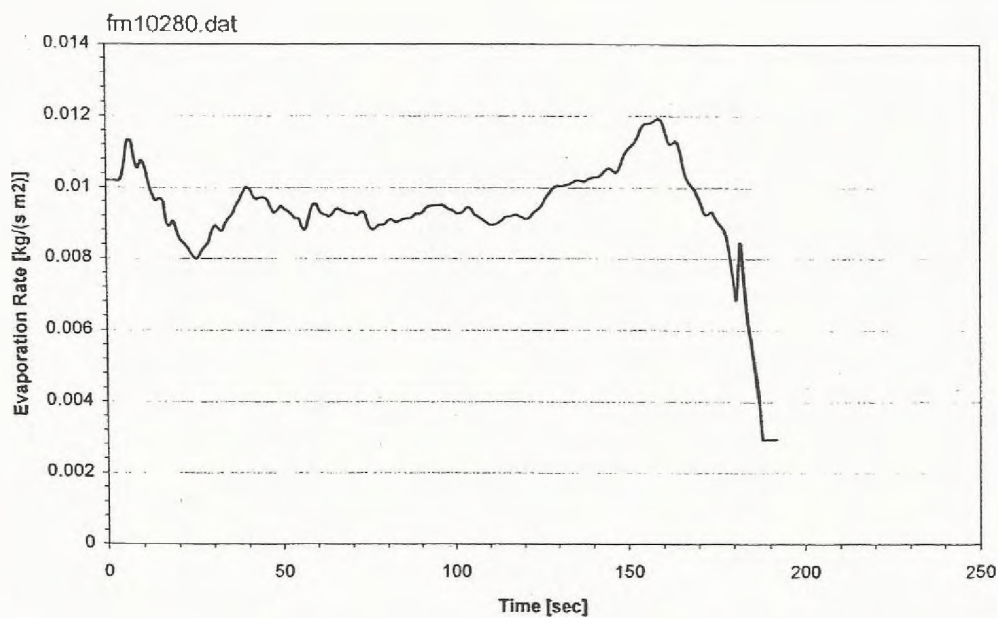


Fig. C180- Evaporation rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.71, irradiance= 50kW/m2, initial foam height= 25mm.

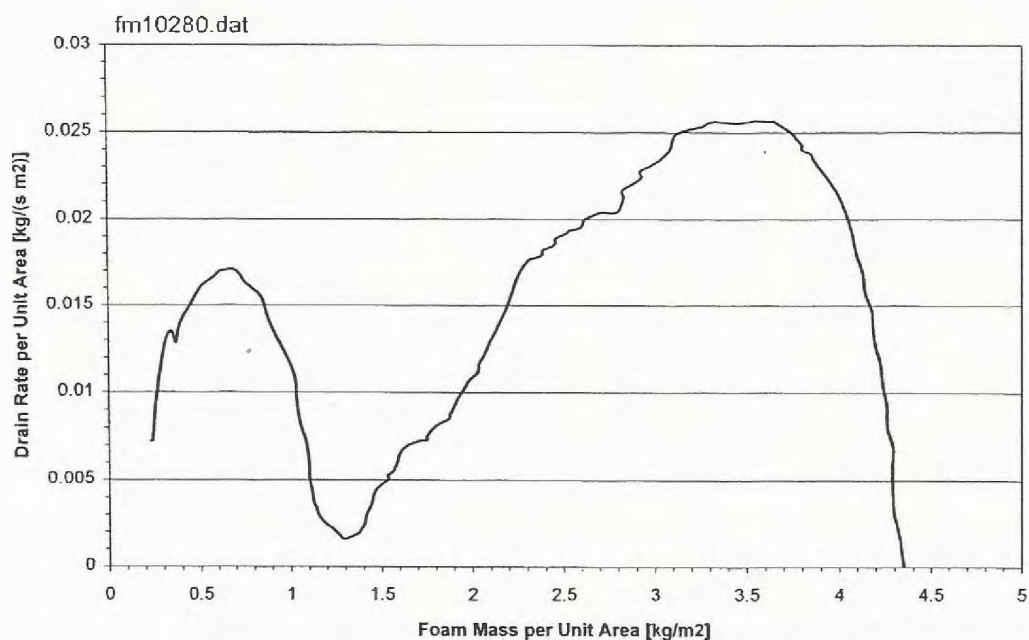


Fig. C181- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.71, irradiance= 50kW/m², initial foam height= 25mm.

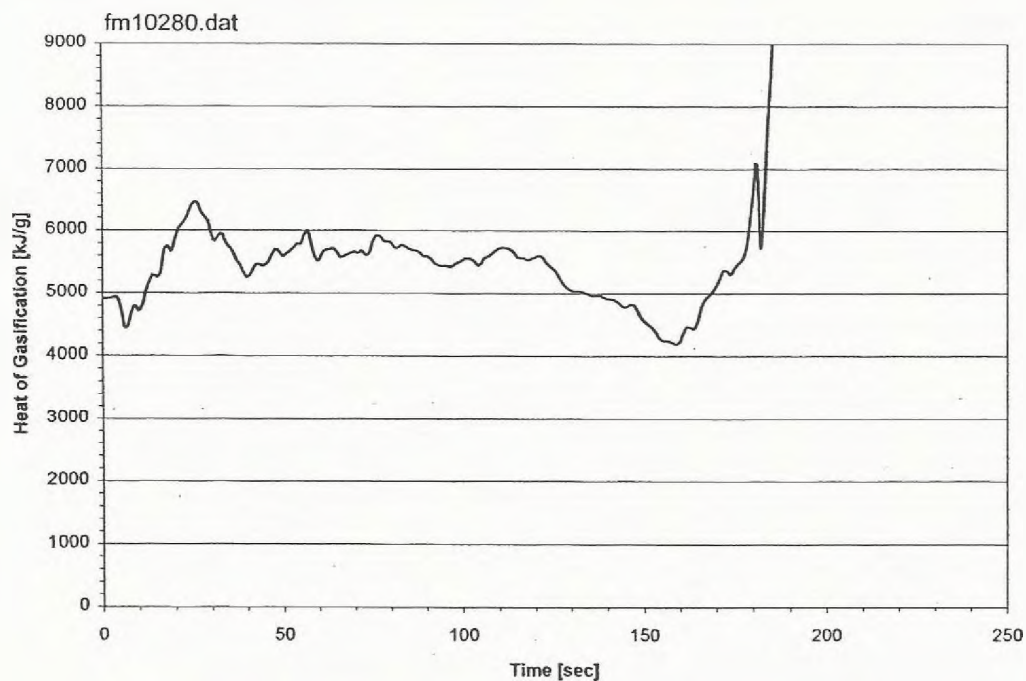


Fig. C182- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.71, irradiance= 50kW/m², initial foam height= 25mm.

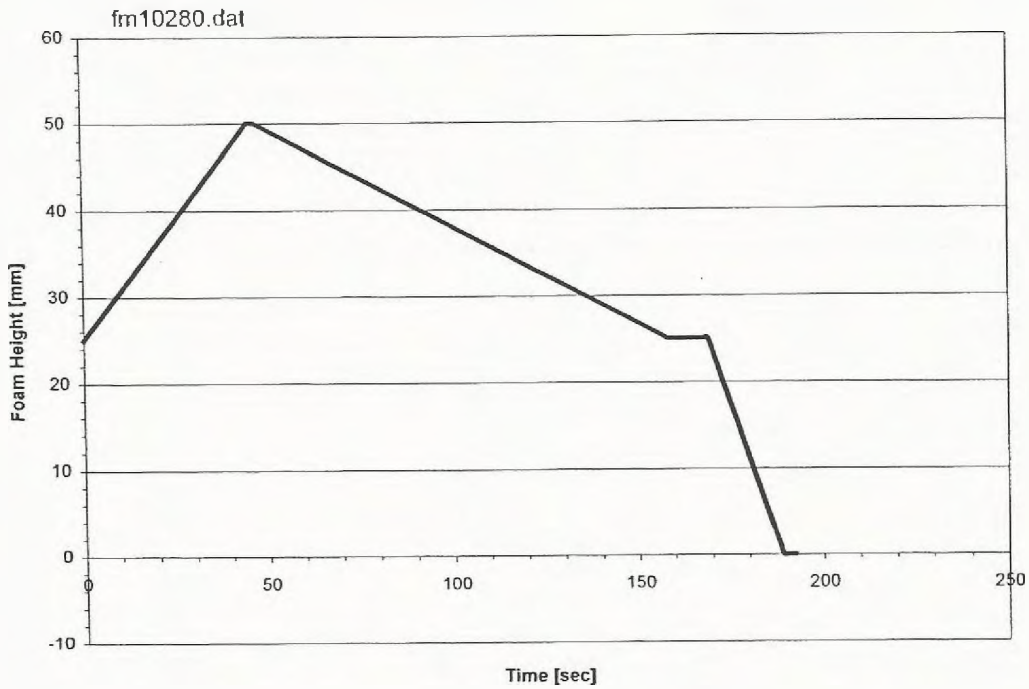


Fig. C183- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.71, irradiance= 50kW/m², initial foam height= 25mm.

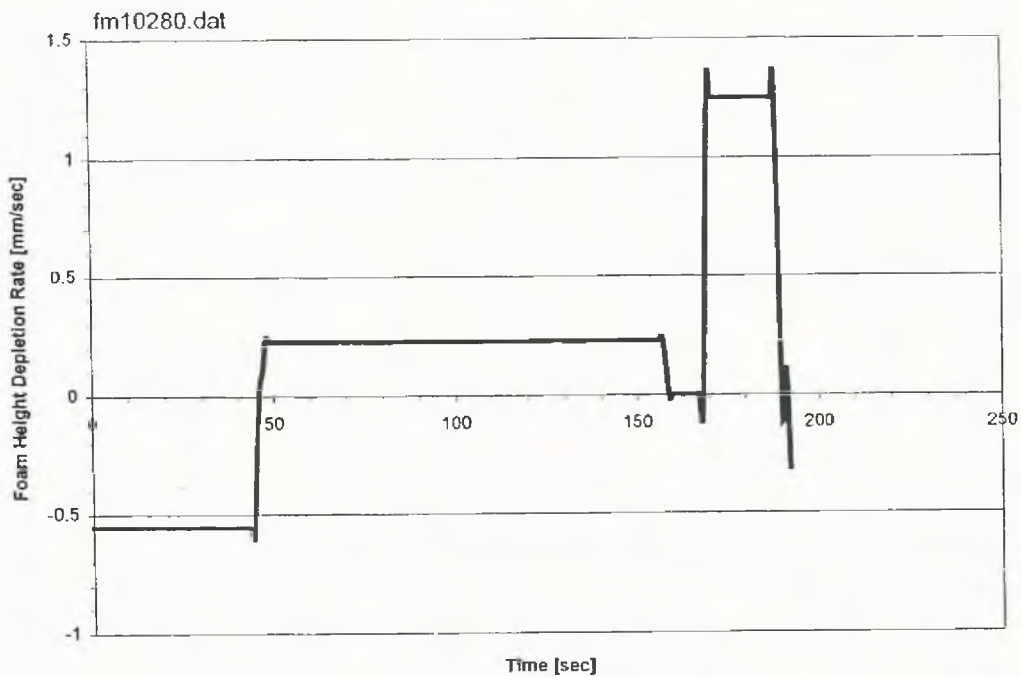


Fig. C184- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.71, irradiance= 50kW/m², initial foam height= 25mm.

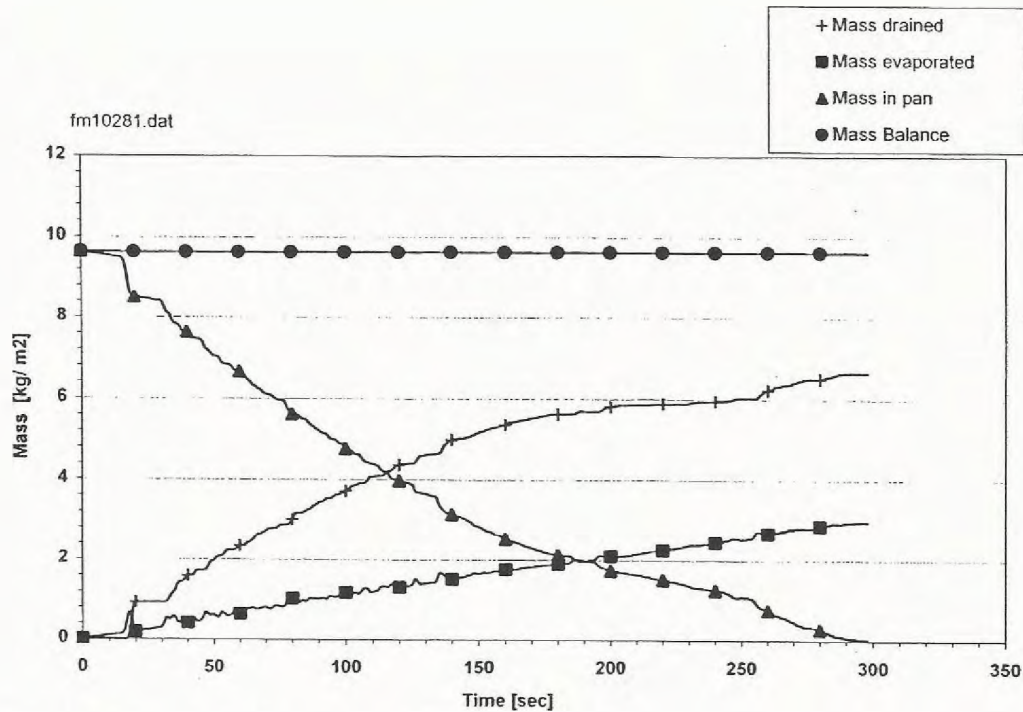


Fig. C185- Mass data in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.2, irradiance= 50kW/m², initial foam height= 50mm.

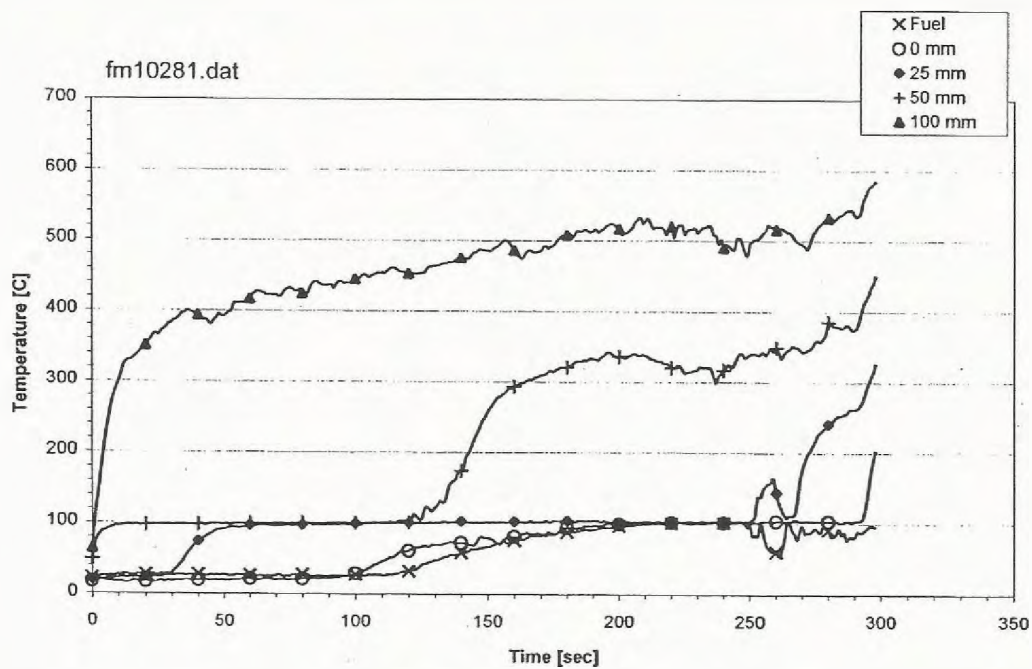


Fig. C186- Foam temperature in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.2, irradiance= 50kW/m², initial foam height= 50mm.

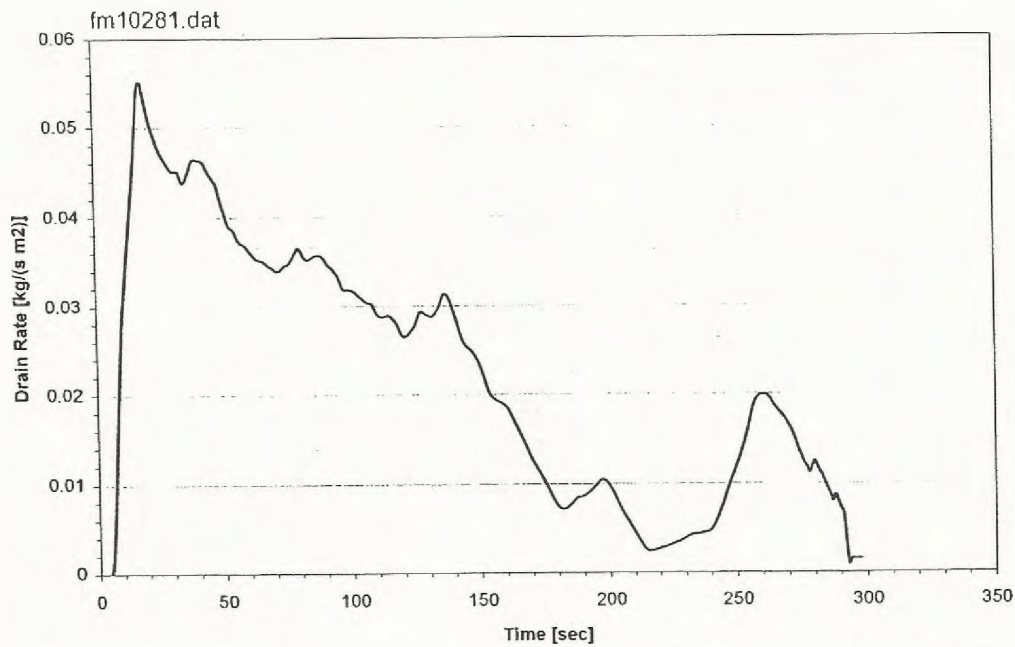


Fig. C187- Drain rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.2, irradiance= 50kW/m2, initial foam height= 50mm.

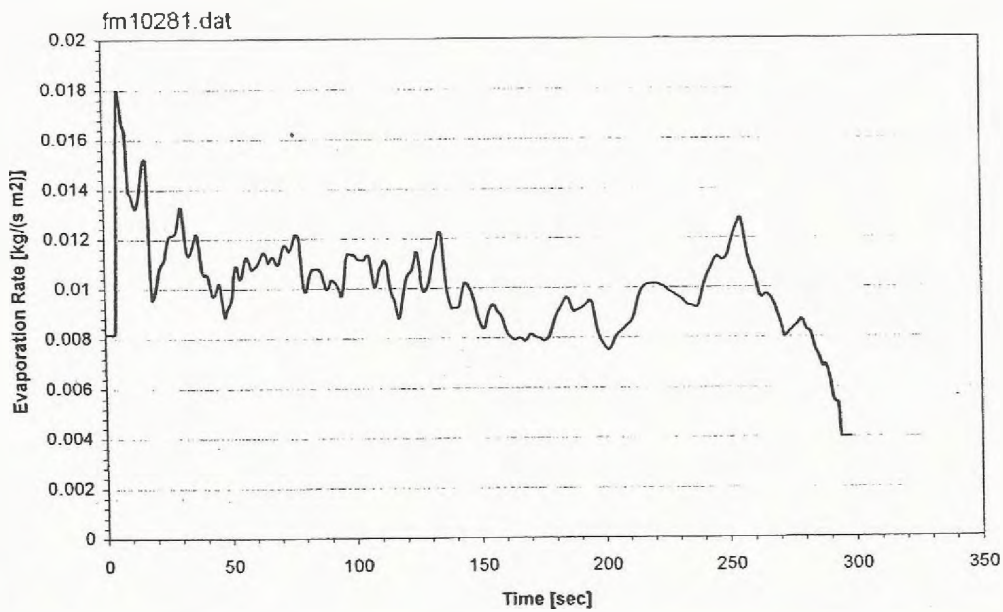


Fig. C188- Evaporation rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.2, irradiance= 50kW/m2, initial foam height= 50mm.

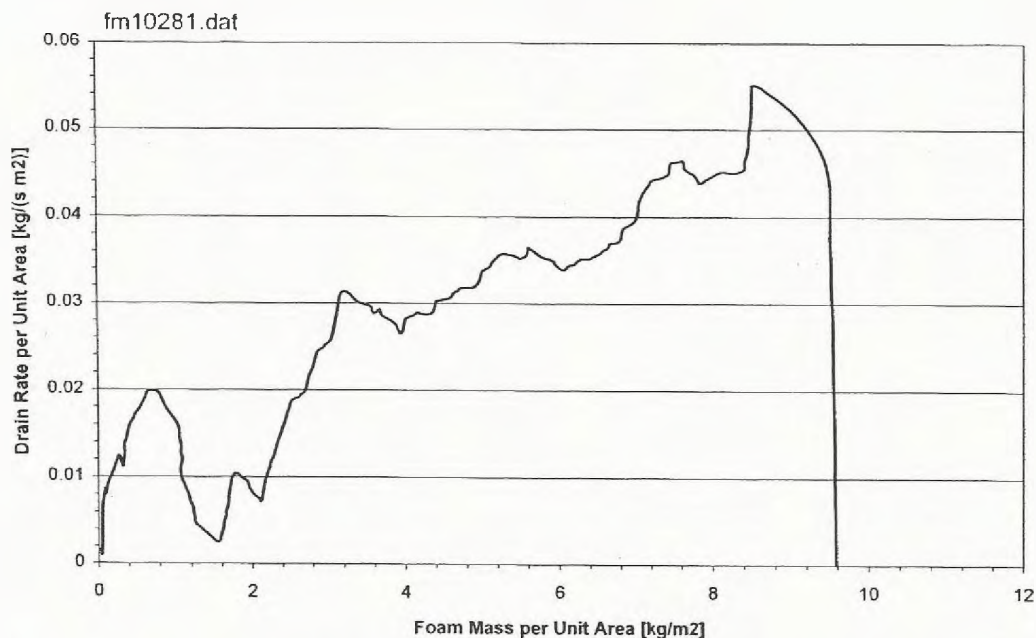


Fig. C189- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.2, irradiance= 50kW/m², initial foam height= 50mm.

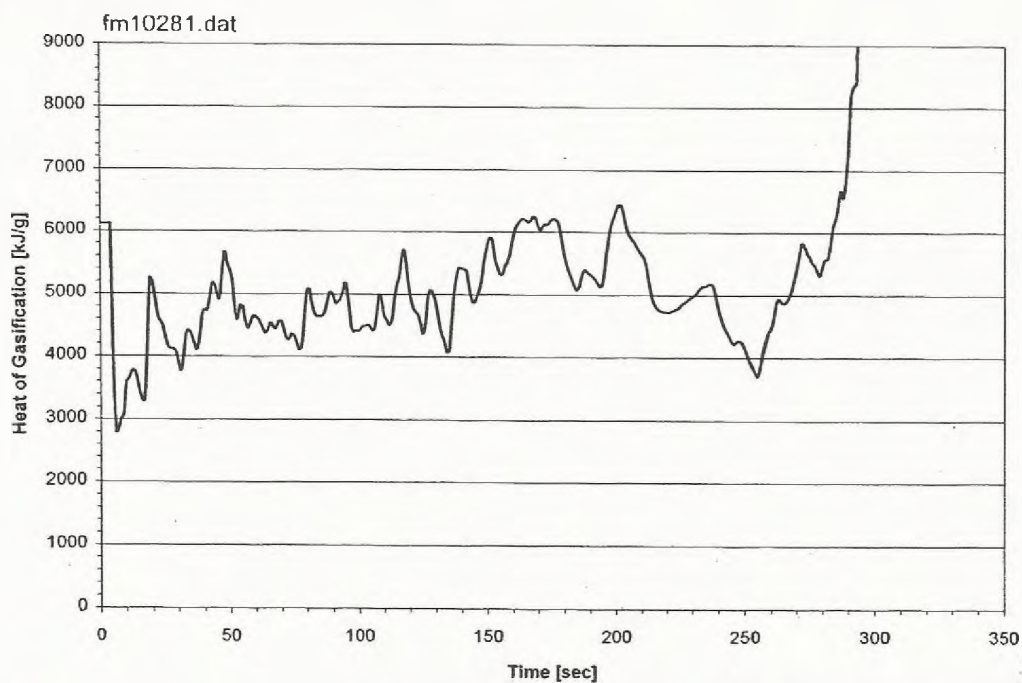


Fig. C190- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.2, irradiance= 50kW/m², initial foam height= 50mm.

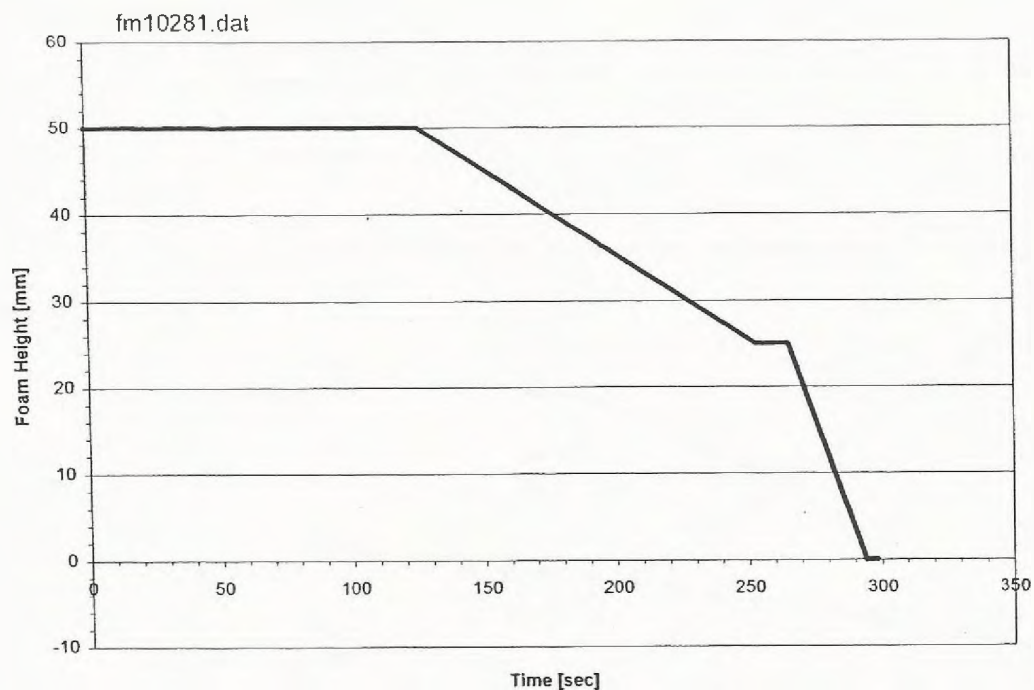


Fig. C191- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.2, irradiance= 50kW/m², initial foam height= 50mm.

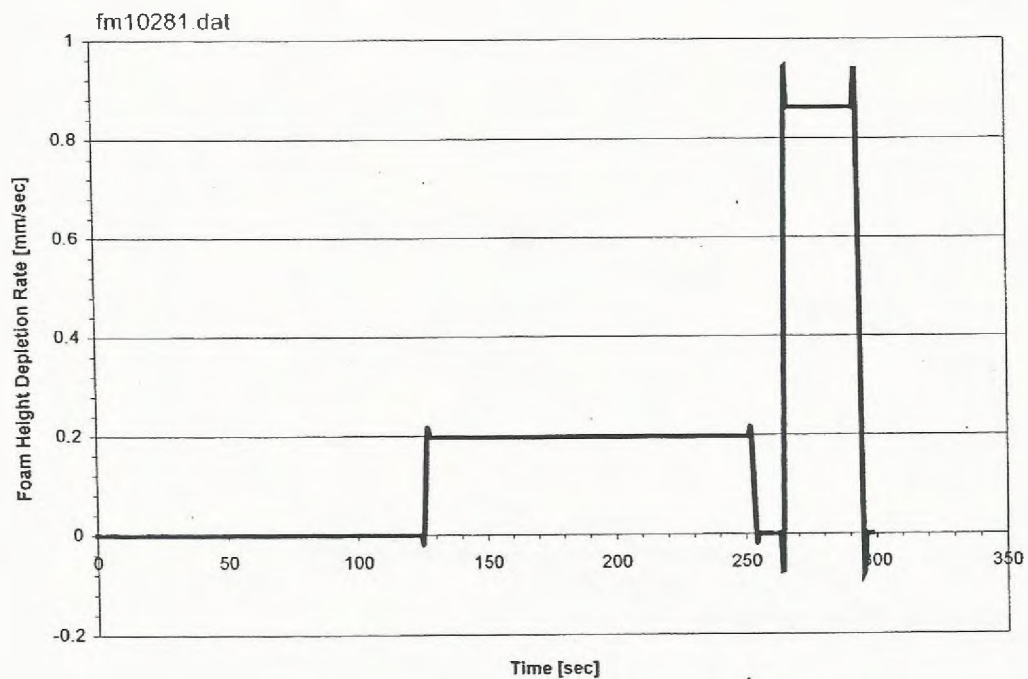


Fig. C192- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.2, irradiance= 50kW/m², initial foam height= 50mm.

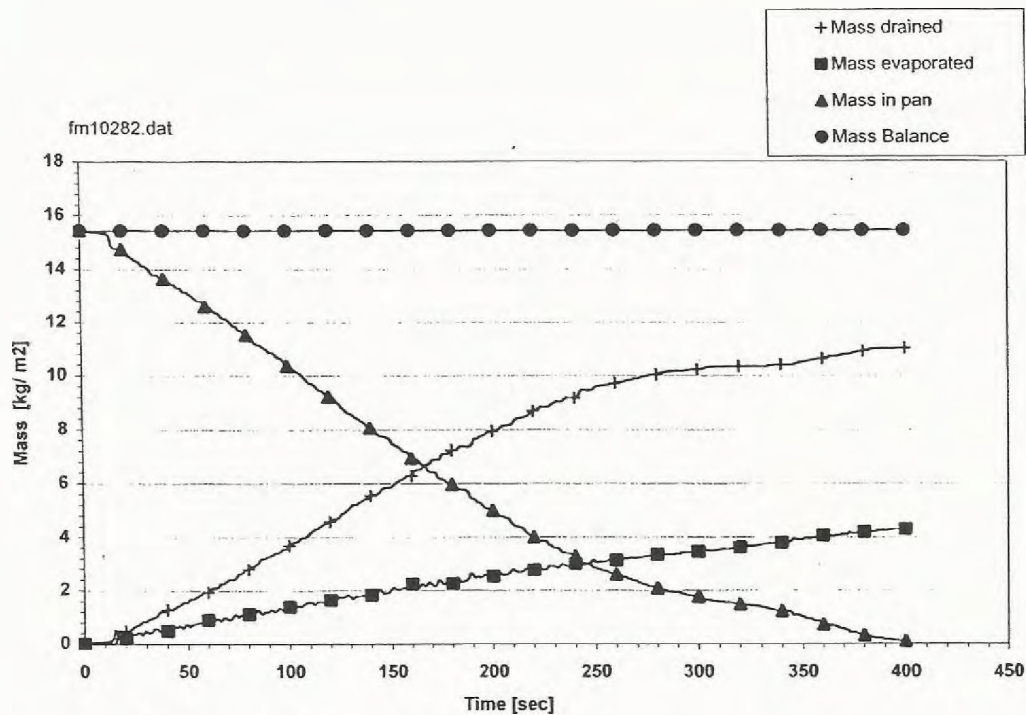


Fig. C193- Mass data in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 4.88, irradiance= 50kW/m², initial foam height= 75mm.

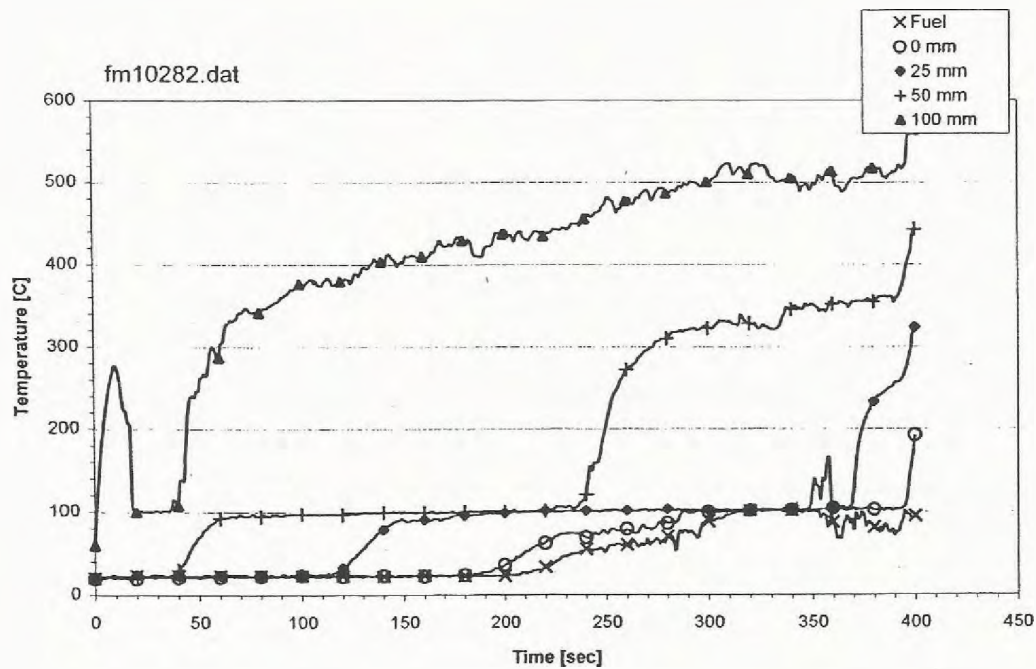


Fig. C194- Foam temperature in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 4.88, irradiance= 50kW/m², initial foam height= 75mm.

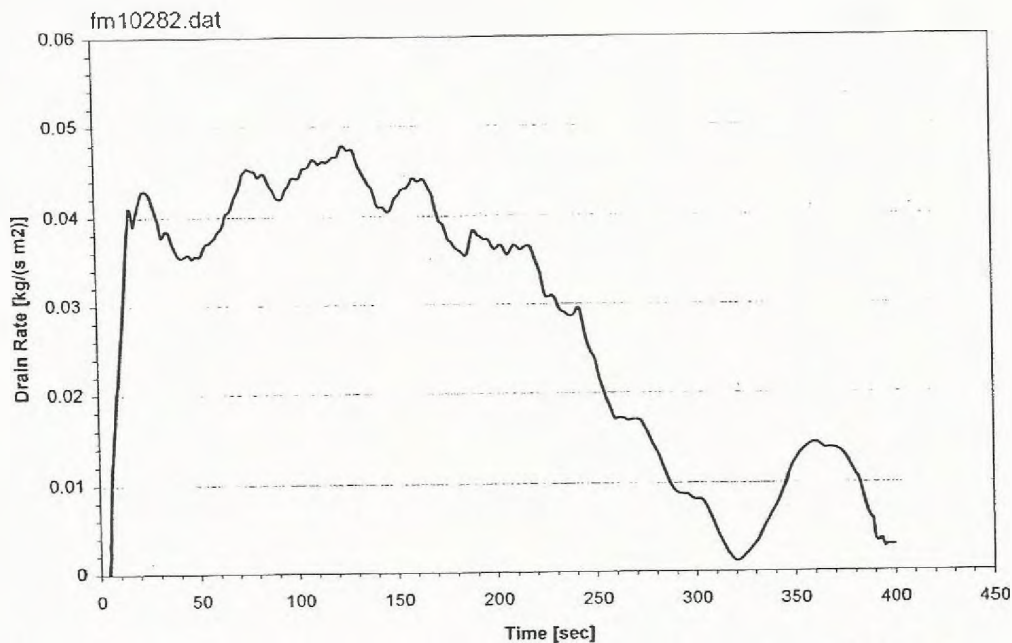


Fig. C195- Drain rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 4.88, irradiance= 50kW/m2, initial foam height= 75mm.

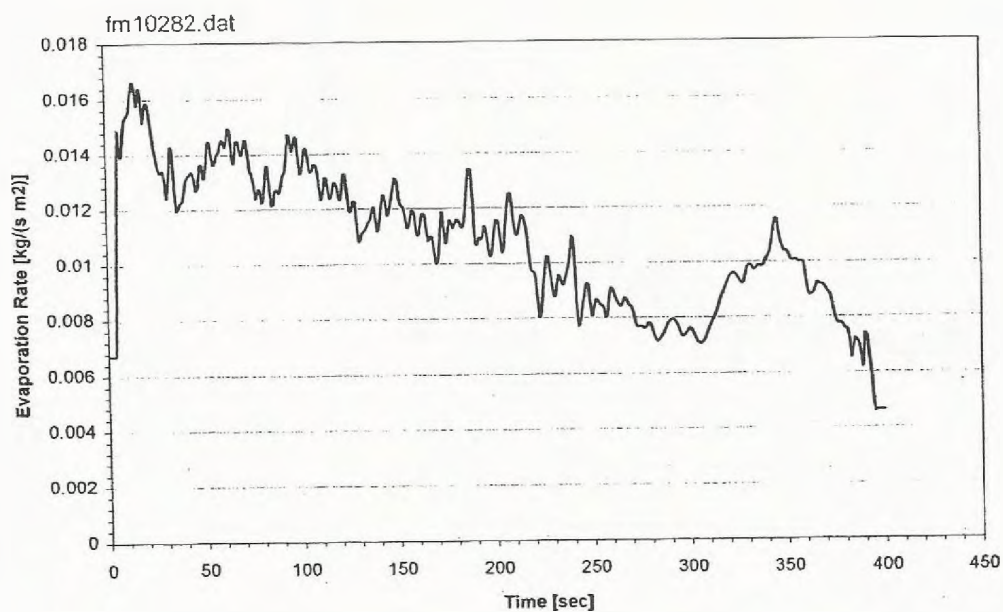


Fig. C196- Evaporation rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 4.88, irradiance= 50kW/m2, initial foam height= 75mm.

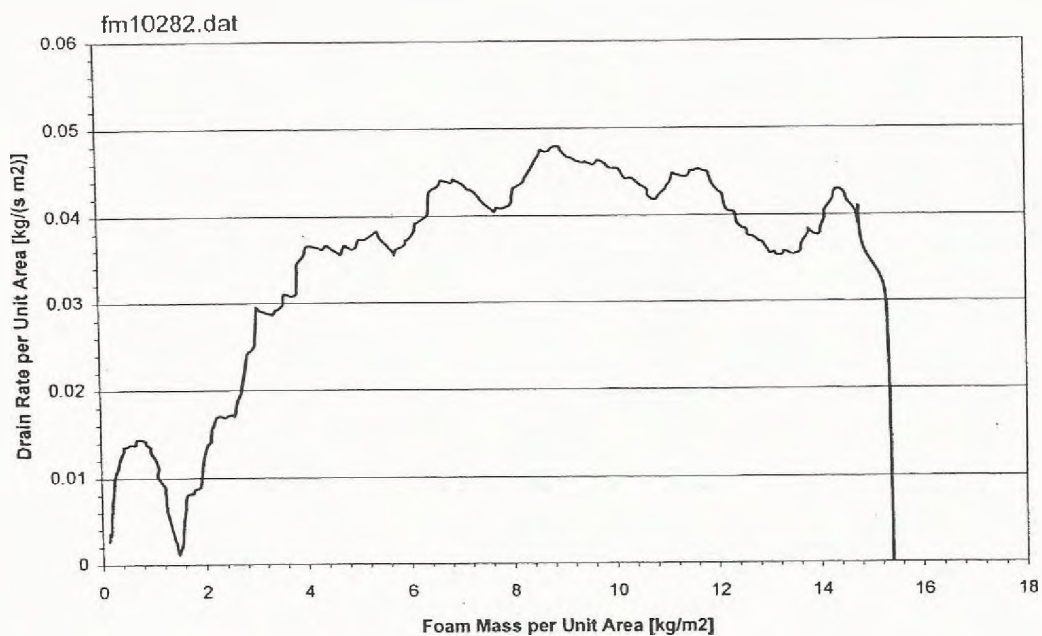


Fig. C197- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 4.88, irradiance= 50kW/m², initial foam height= 75mm.

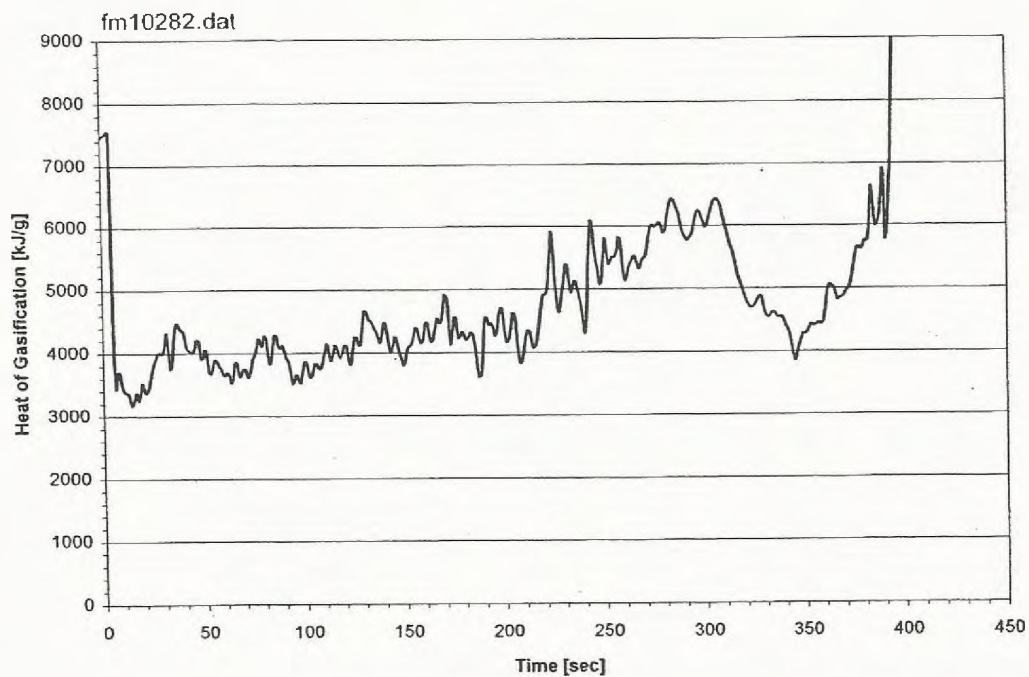


Fig. C198- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 4.88, irradiance= 50kW/m², initial foam height= 75mm.

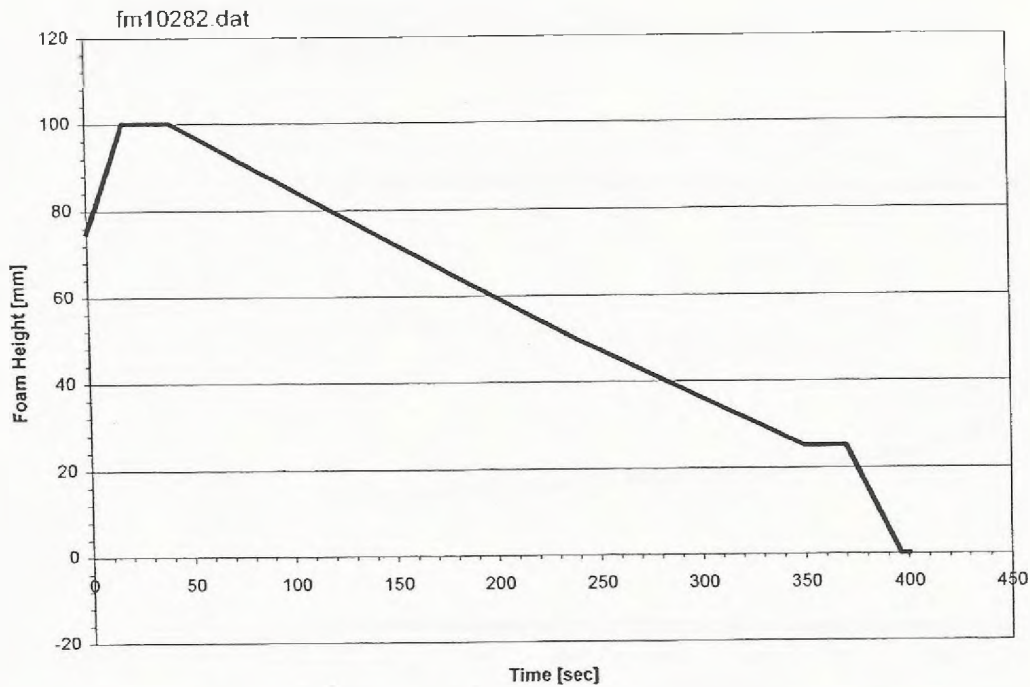


Fig. C199- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 4.88, irradiance= 50kW/m², initial foam height= 75mm.

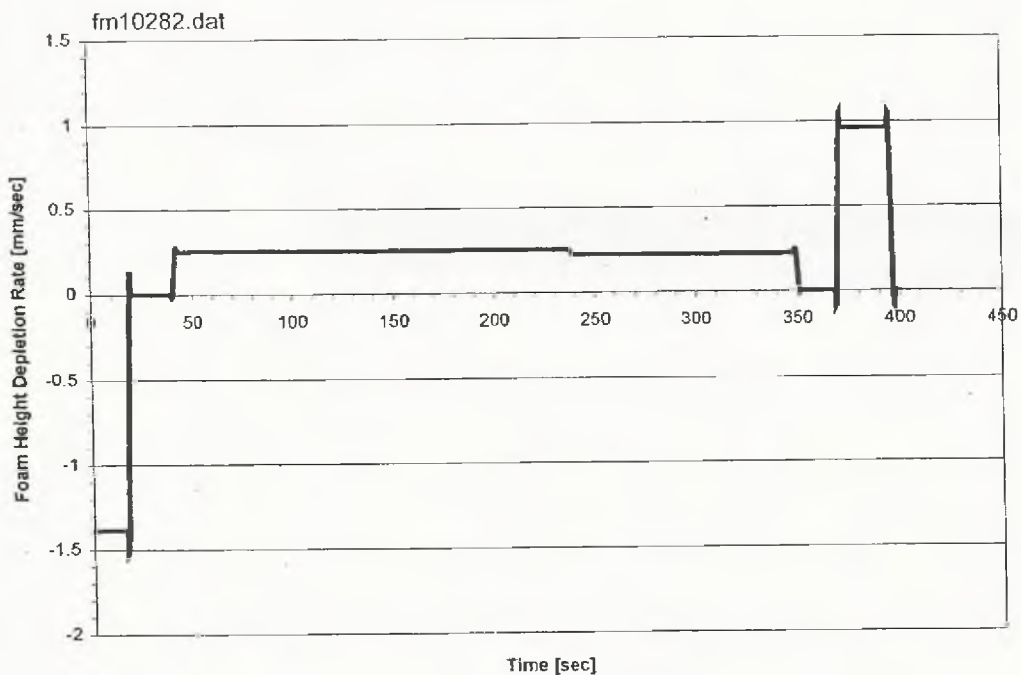


Fig. C200- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 4.88, irradiance= 50kW/m², initial foam height= 75mm.

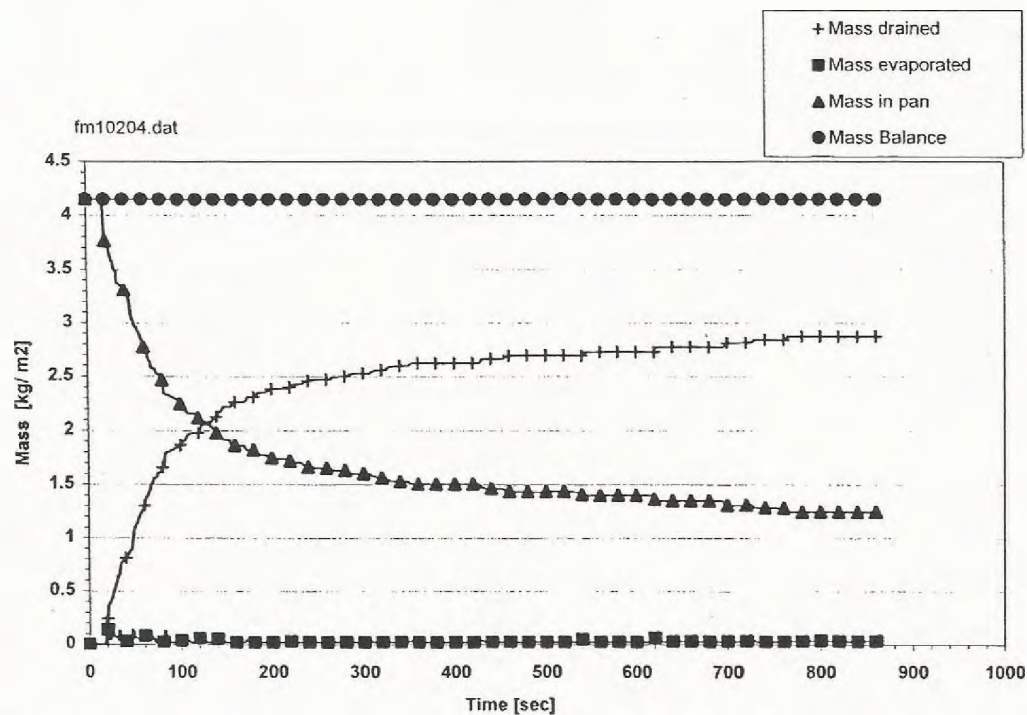


Fig. C201- Mass data in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 6.06, irradiance= 0kW/m², initial foam height= 25mm.

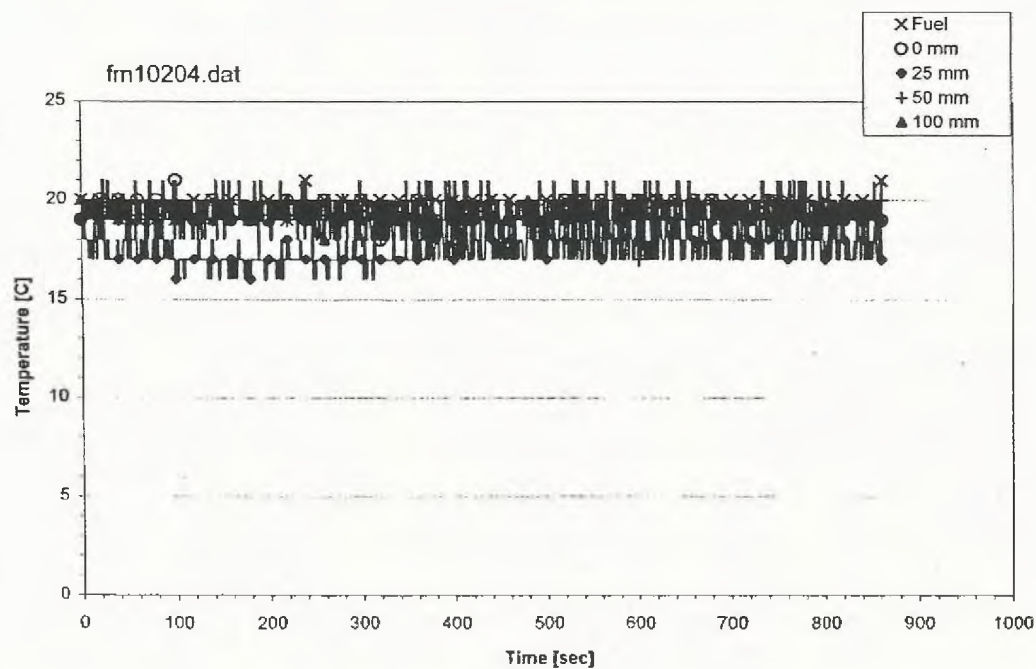


Fig. C202- Foam temperature in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 6.06, irradiance= 0kW/m², initial foam height= 25mm.

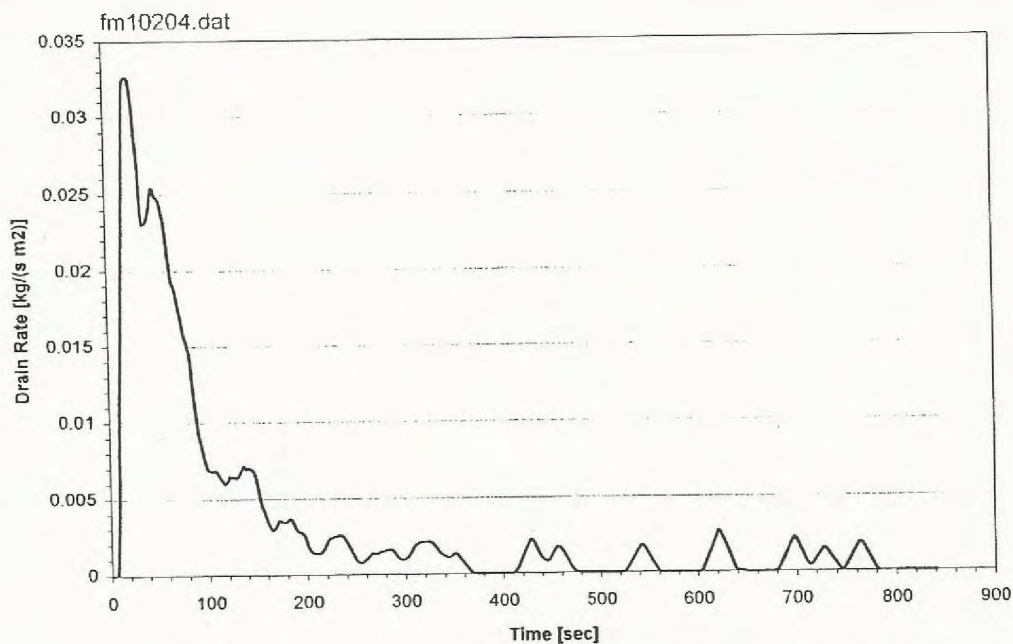


Fig. C203- Drain rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 6.06, irradiance= 0kW/m², initial foam height= 25mm.

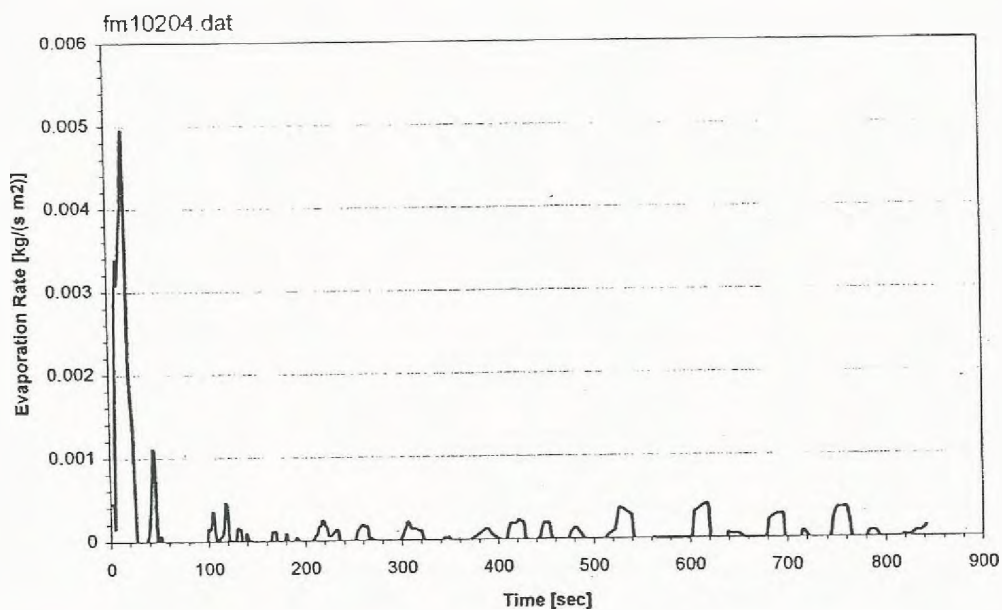


Fig. C204- Evaporation rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 6.06, irradiance= 0kW/m², initial foam height= 25mm.

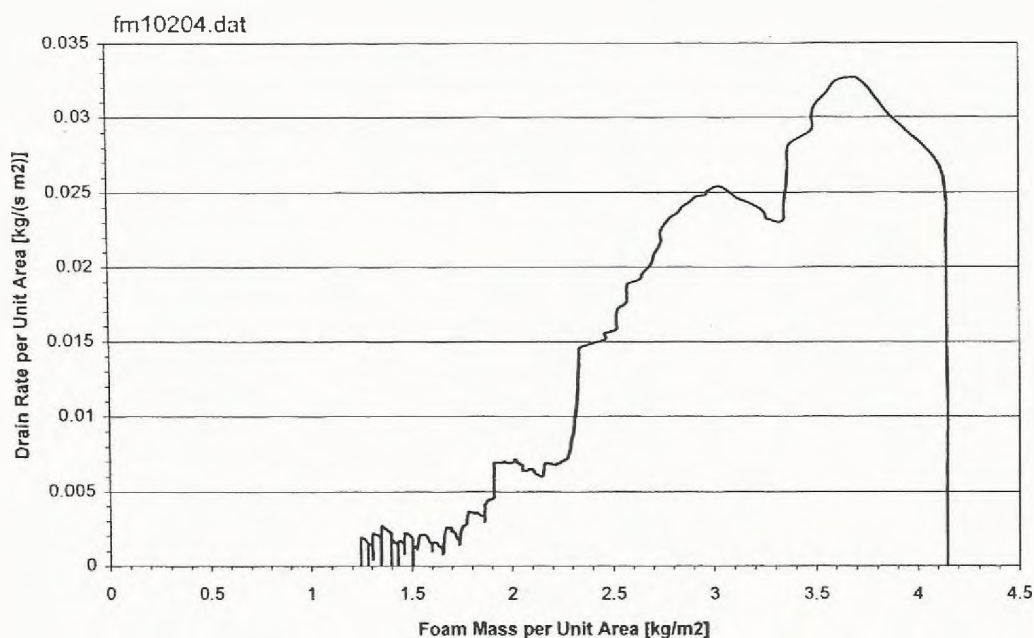


Fig. C205- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 6.06, irradiance= 0kW/m2, initial foam height= 25mm.

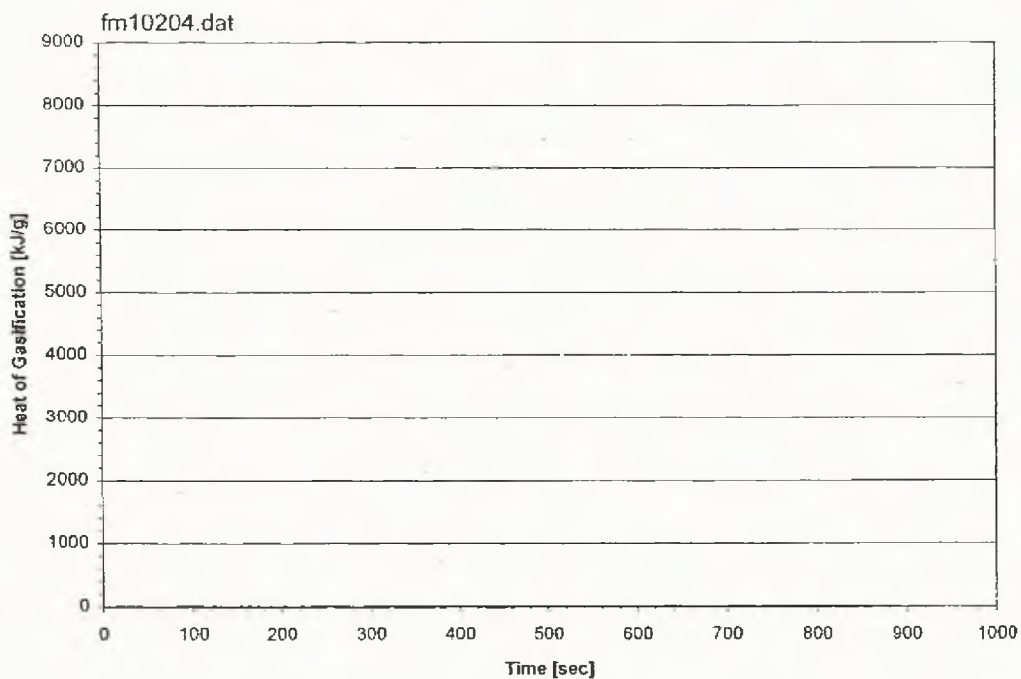


Fig. C206- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 6.06, irradiance= 0kW/m2, initial foam height= 25mm.

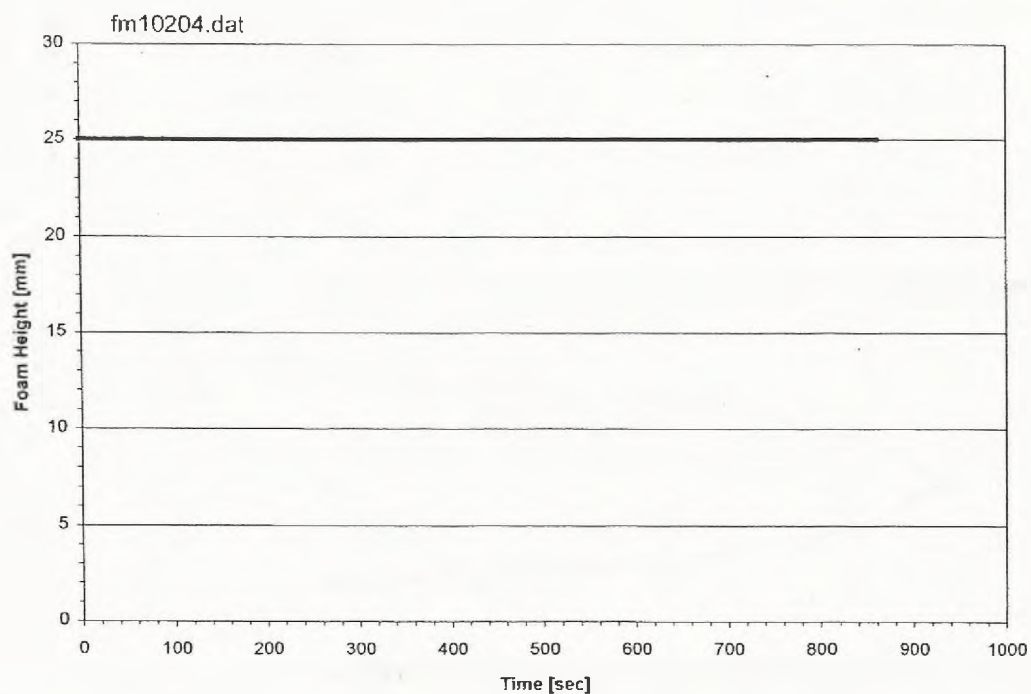


Fig. C207- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 6.06, irradiance= 0kW/m2, initial foam height= 25mm.

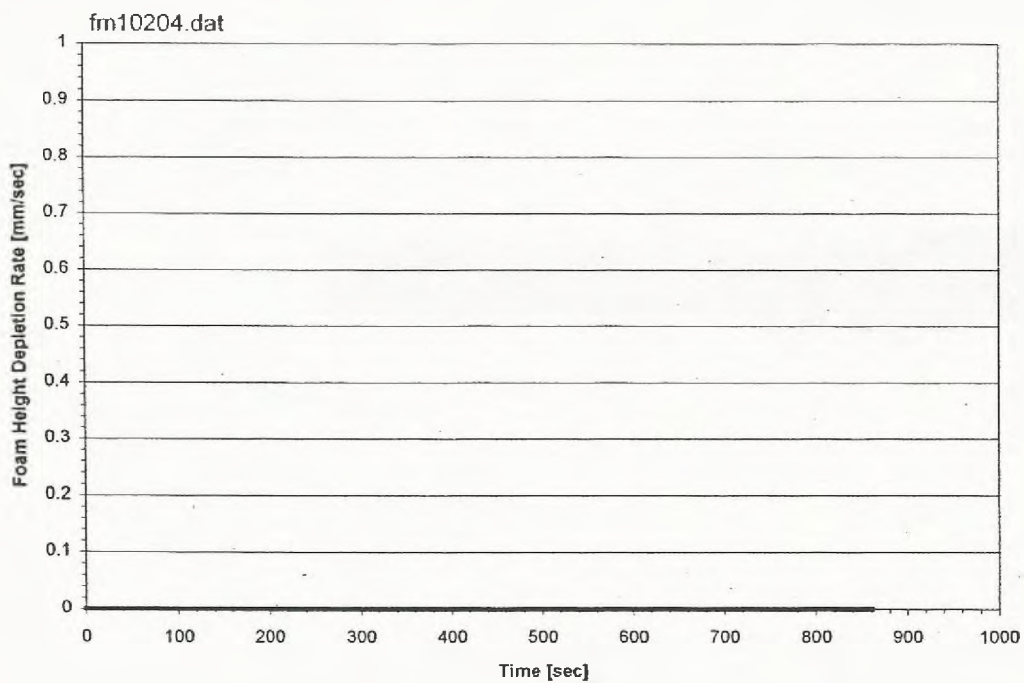


Fig. C208- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 6.06, irradiance= 0kW/m2, initial foam height= 25mm.

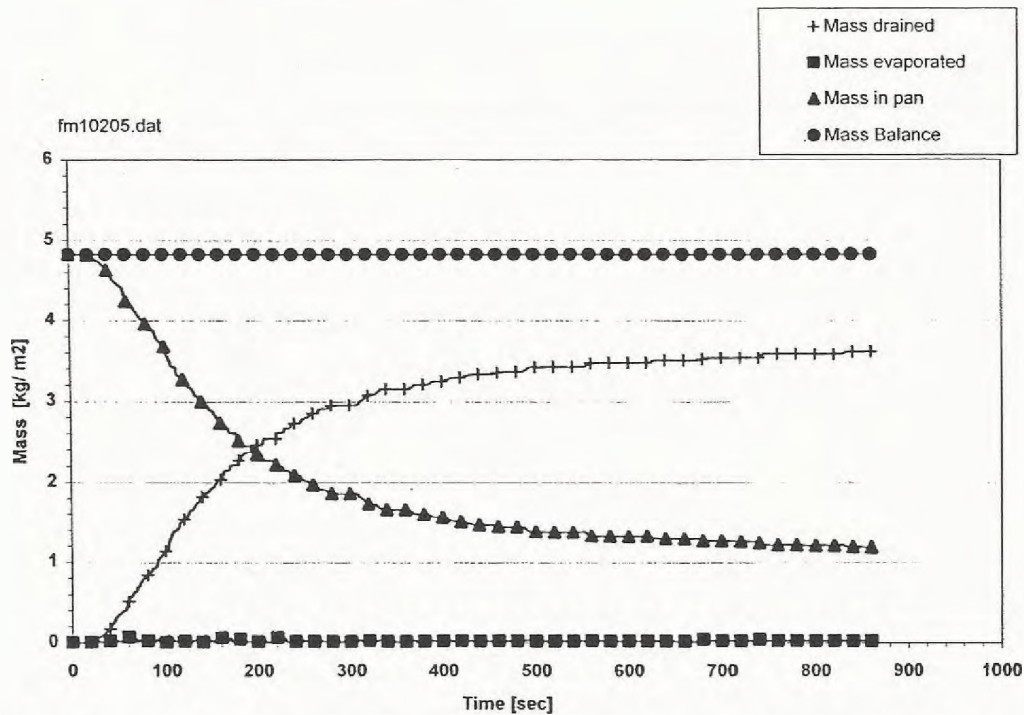


Fig. C209- Mass data in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 10.4, irradiance= 0kW/m², initial foam height= 50mm.

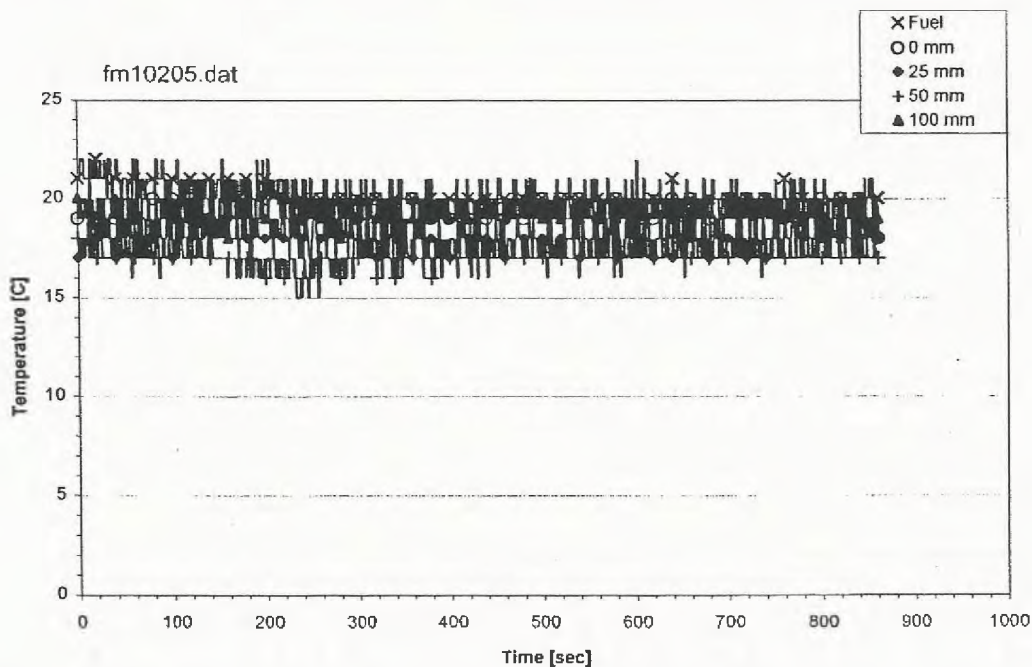


Fig. C210- Foam temperature in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 10.4, irradiance= 0kW/m², initial foam height= 50mm.

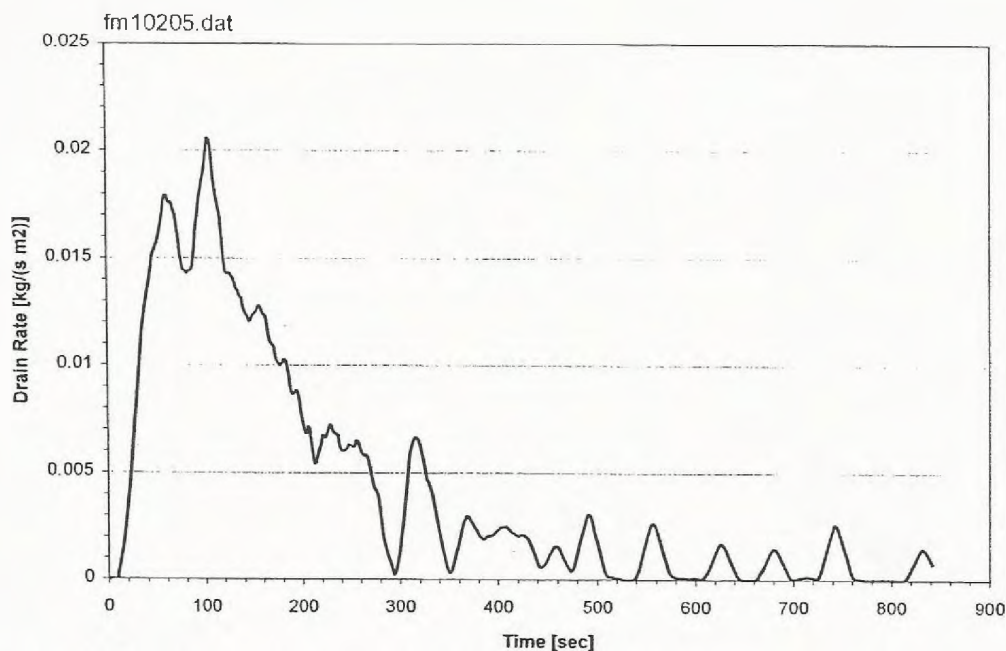


Fig. C211- Drain rate in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 10.4, irradiance= 0kW/m², initial foam height= 50mm.

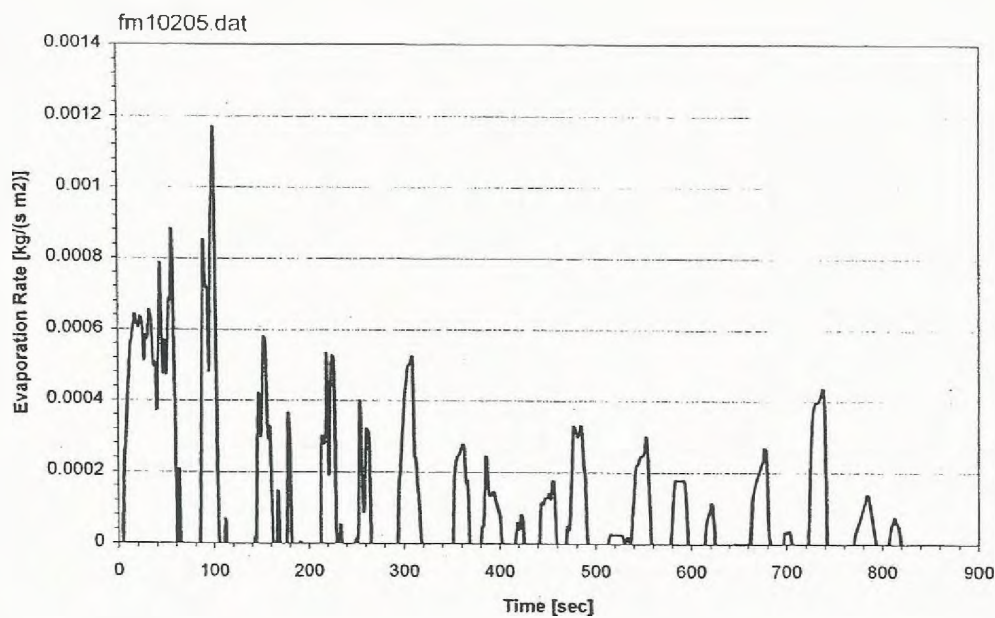


Fig. C212- Evaporation rate in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 10.4, irradiance= 0kW/m², initial foam height= 50mm.

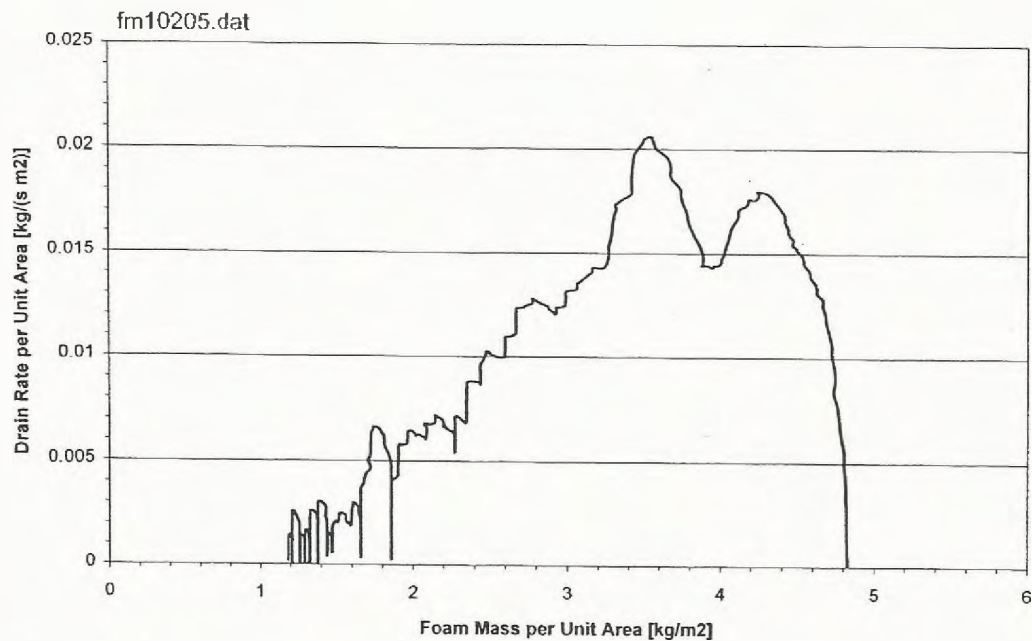


Fig. C213- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 10.4, irradiance= 0kW/m², initial foam height= 50mm.

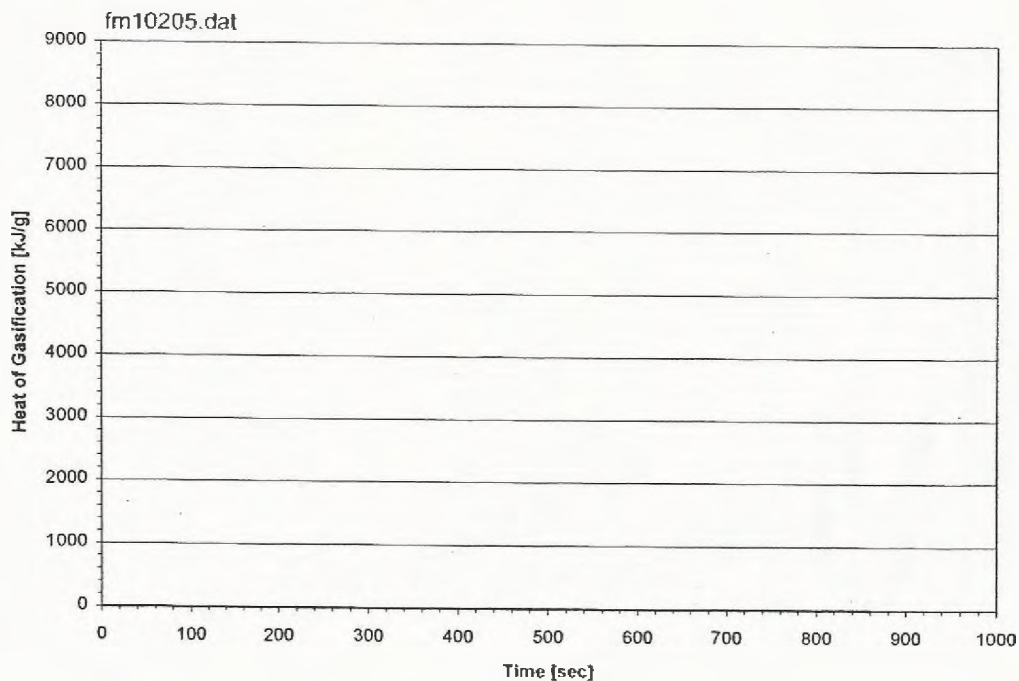


Fig. C214- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 10.4, irradiance= 0kW/m², initial foam height= 50mm.

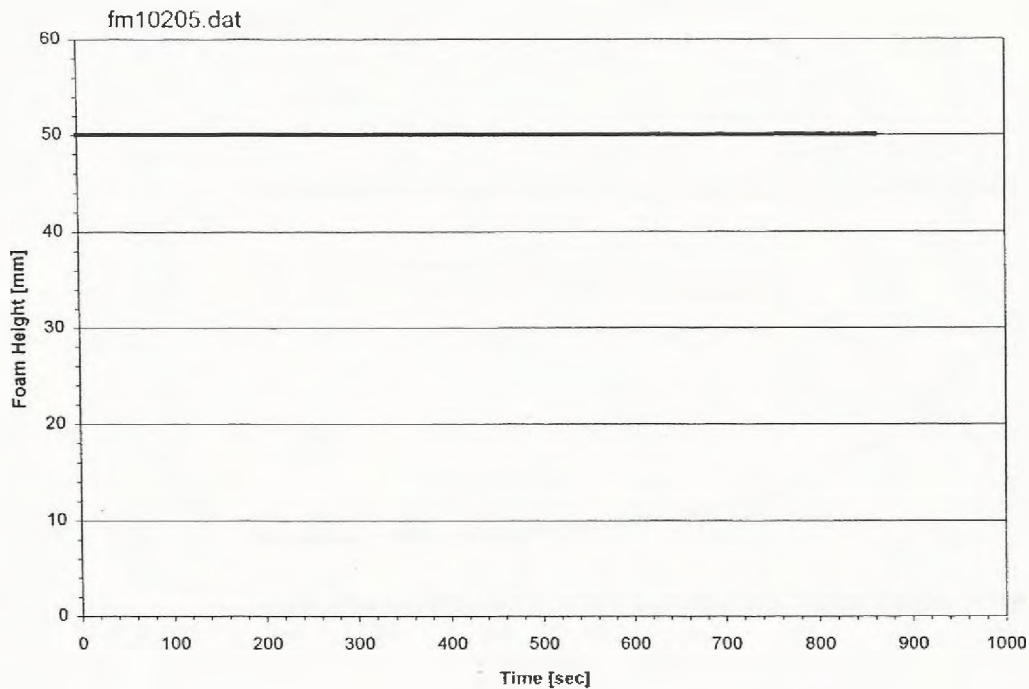


Fig. C215- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 10.4, irradiance= 0kW/m2, initial foam height= 50mm.

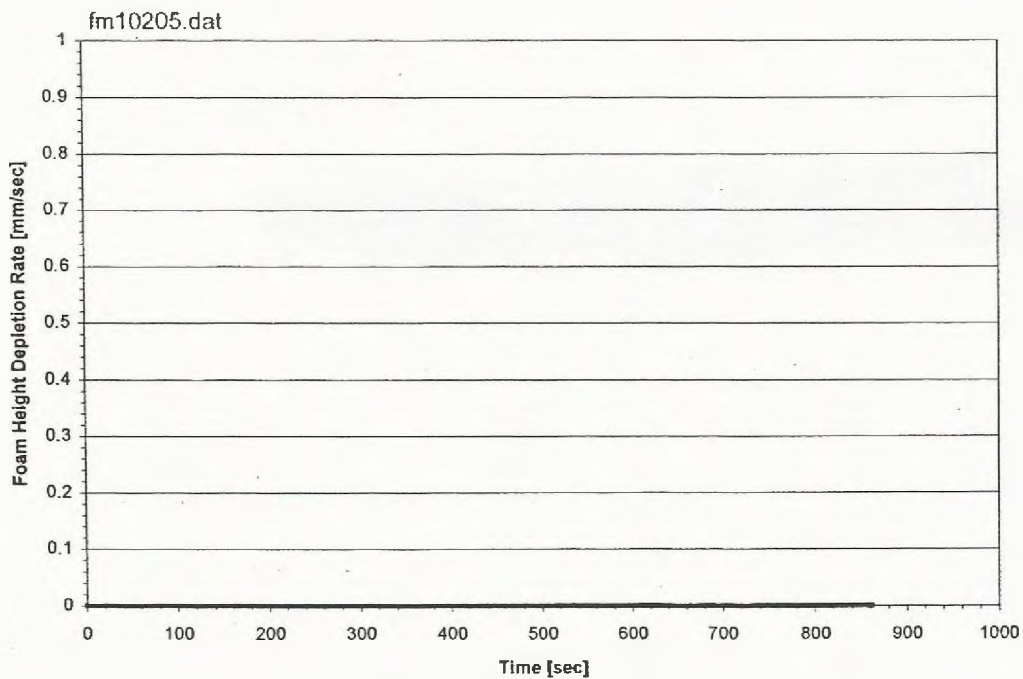


Fig. C216- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 10.4, irradiance= 0kW/m2, initial foam height= 50mm.

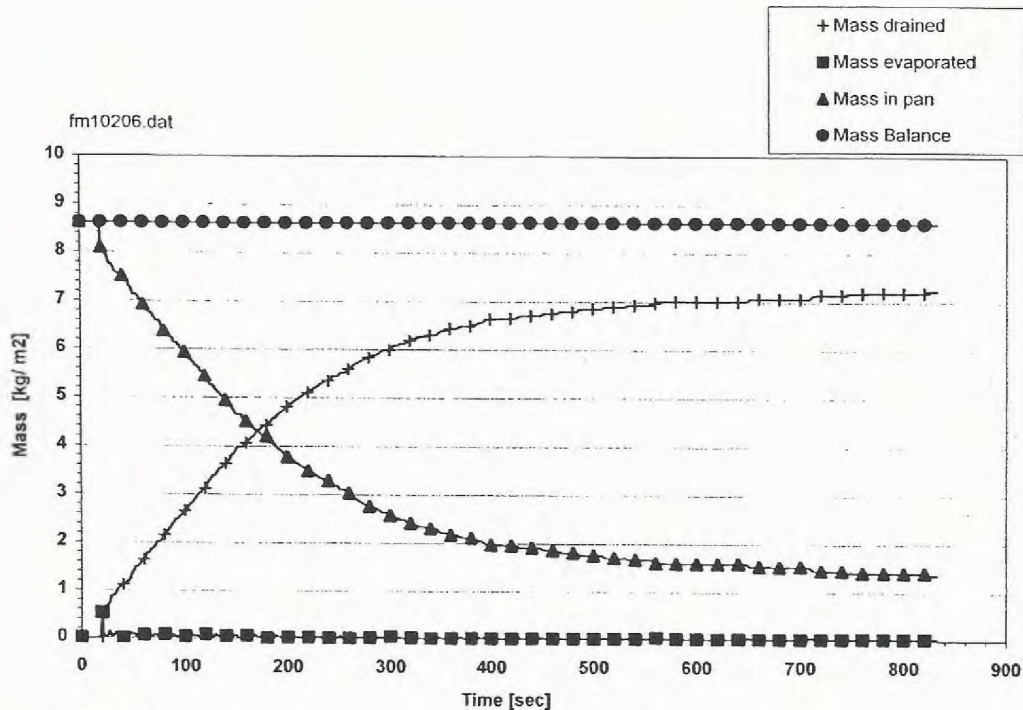


Fig. C217- Mass data in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 8.73, irradiance= 0kW/m², initial foam height= 75mm.

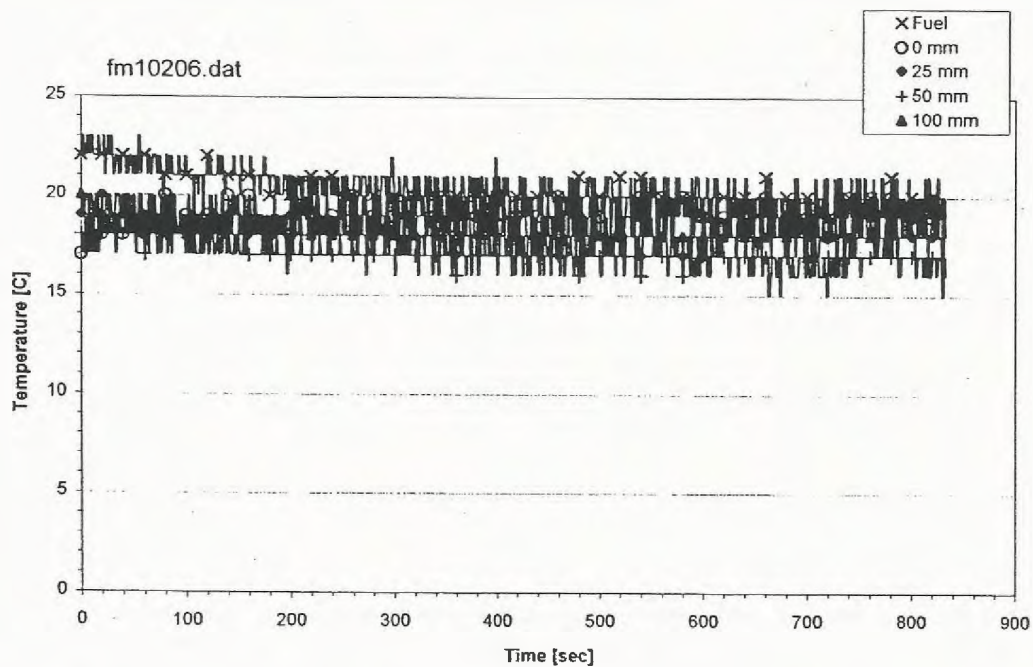


Fig. C218- Foam temperature in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 8.73, irradiance= 0kW/m², initial foam height= 75mm.

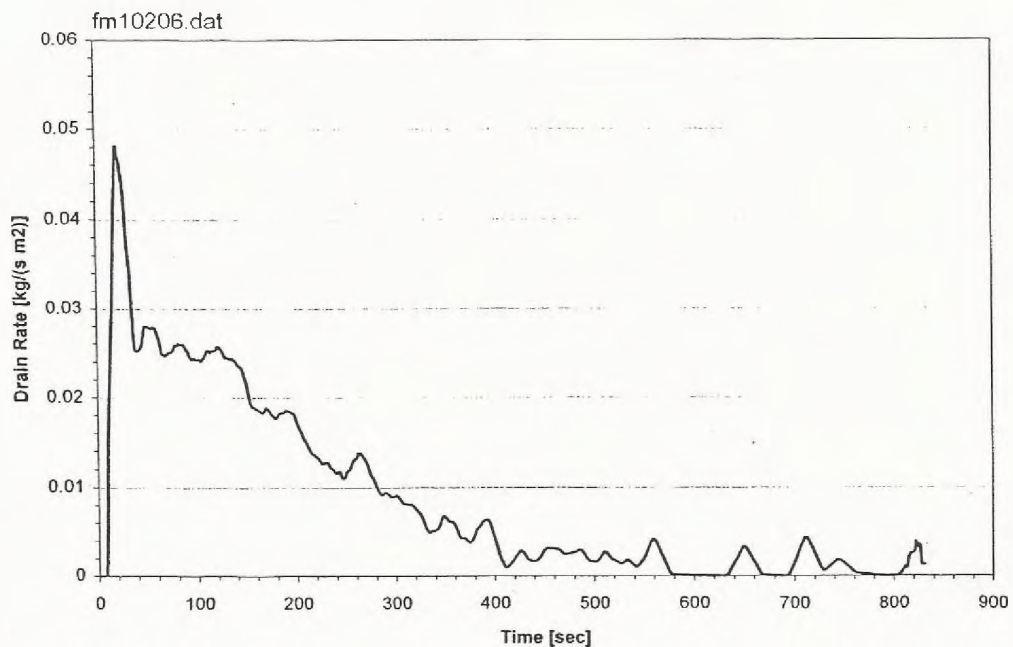


Fig. C219- Drain rate in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 8.73, irradiance= 0kW/m², initial foam height= 75mm.

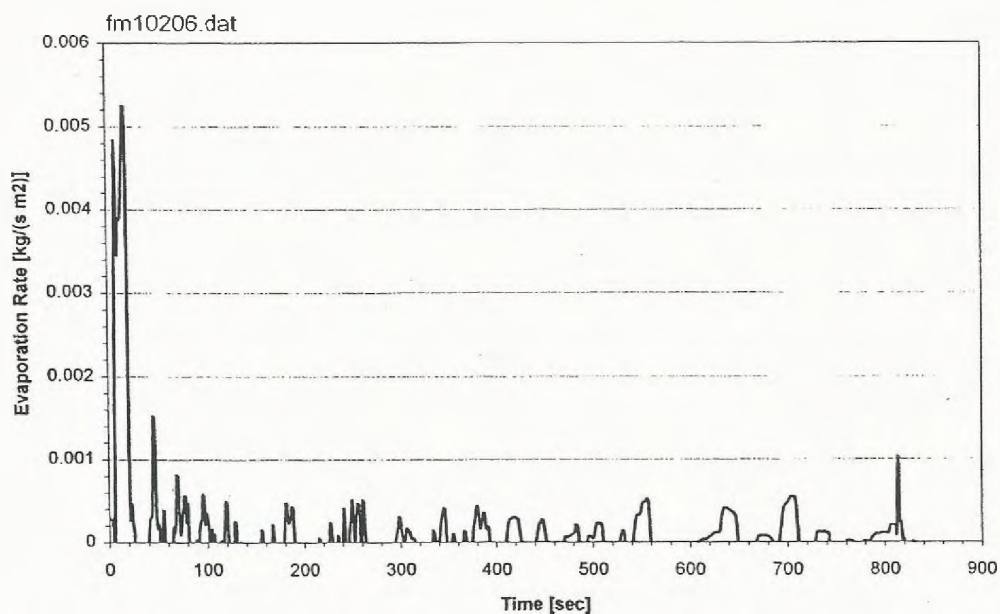


Fig. C220- Evaporation rate in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 8.73, irradiance= 0kW/m², initial foam height= 75mm.

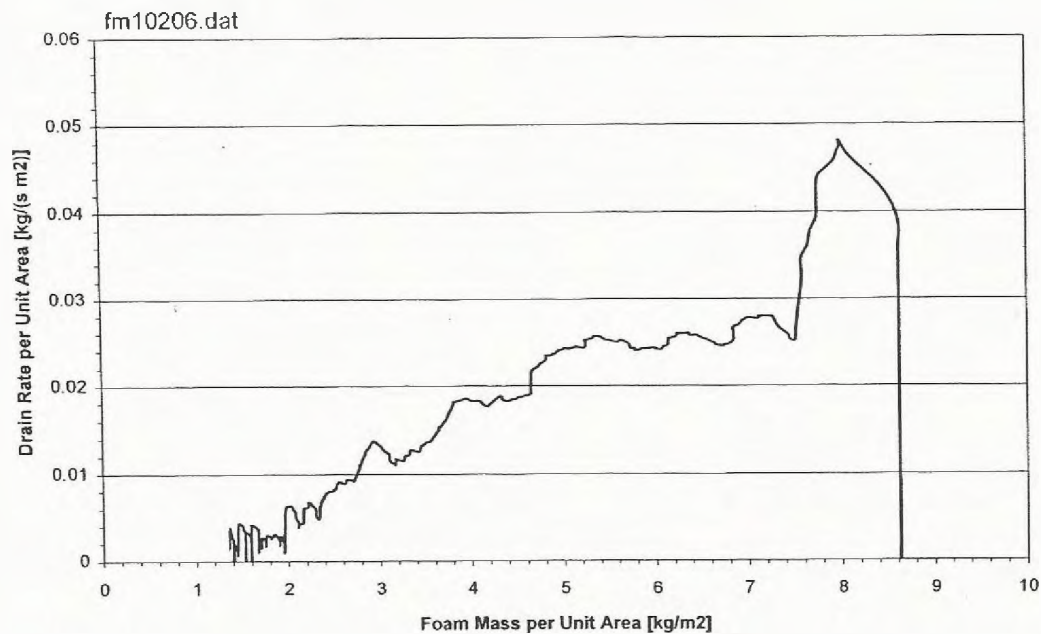


Fig. C221- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 8.73, irradiance= 0kW/m², initial foam height= 75mm.

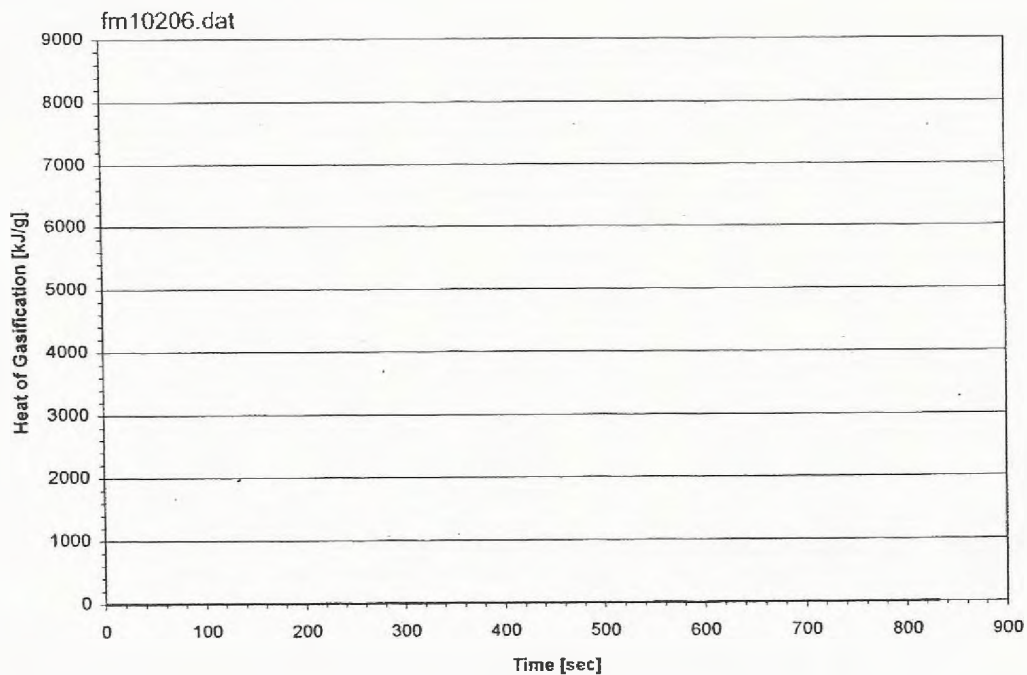


Fig. C222- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 8.73, irradiance= 0kW/m², initial foam height= 75mm.

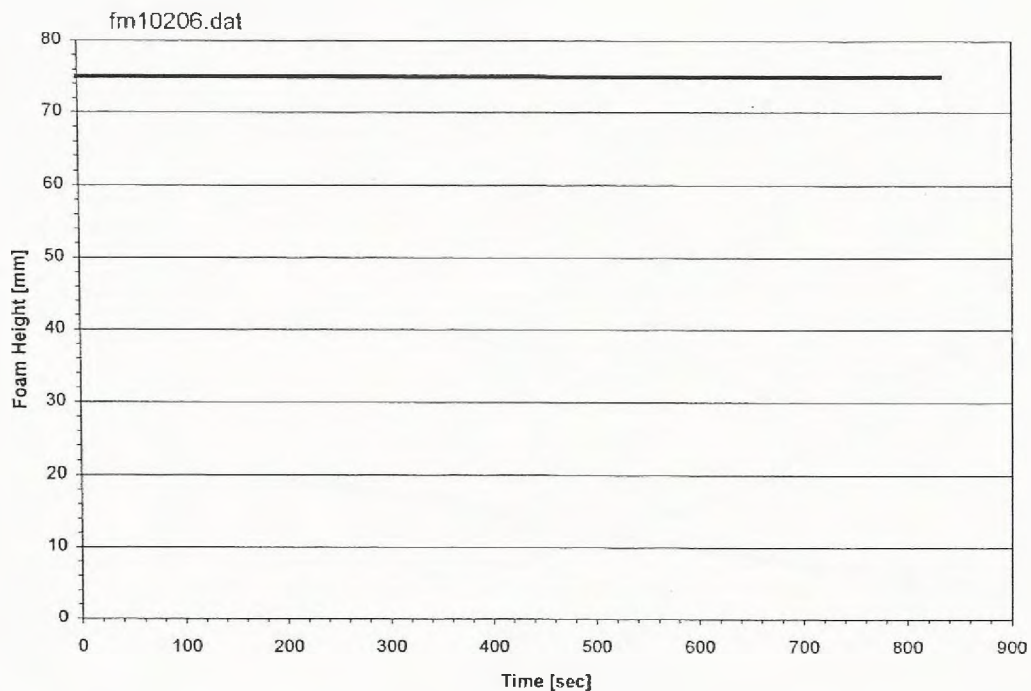


Fig. C223- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 8.73, irradiance= 0kW/m2, initial foam height= 75mm.

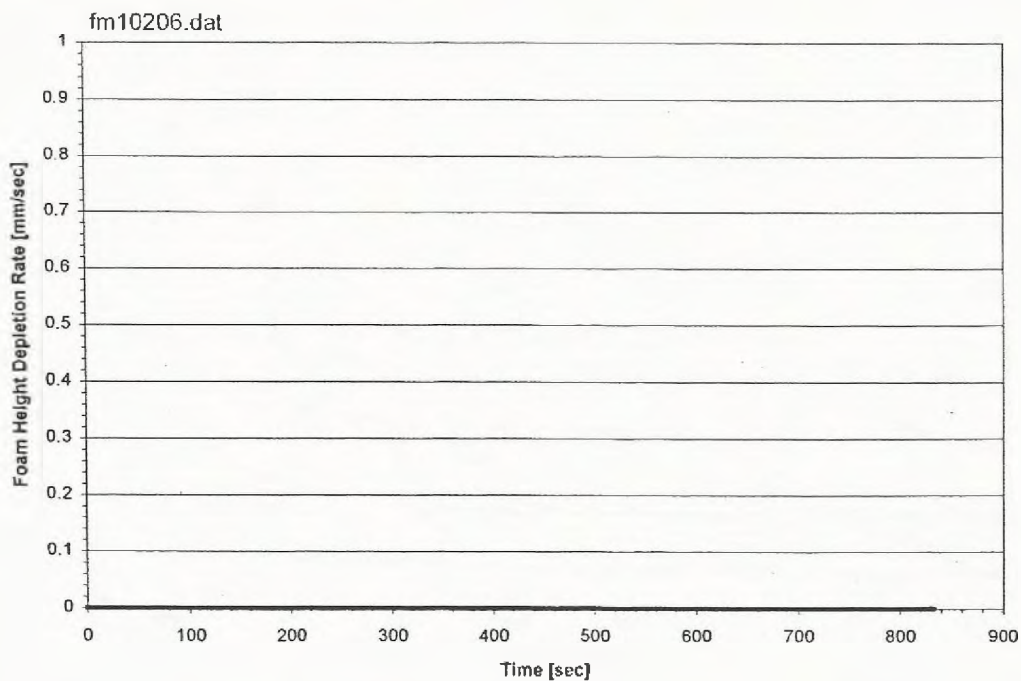


Fig. C224- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 8.73, irradiance= 0kW/m2, initial foam height= 75mm.

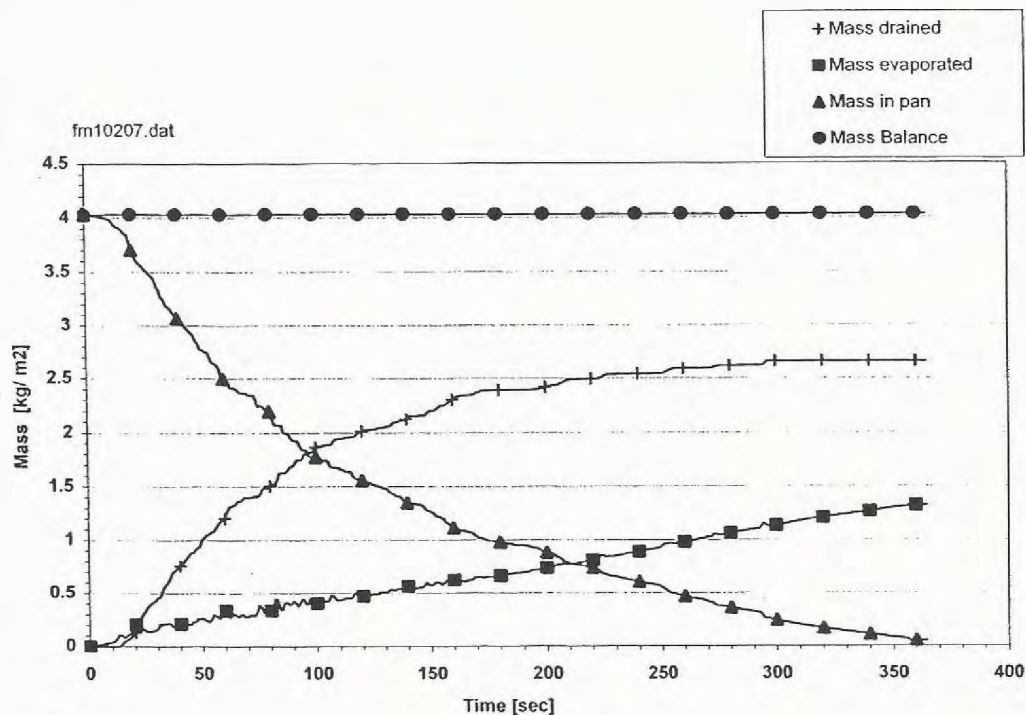


Fig. C225- Mass data in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 6.23, irradiance= 20kW/m², initial foam height= 25mm.

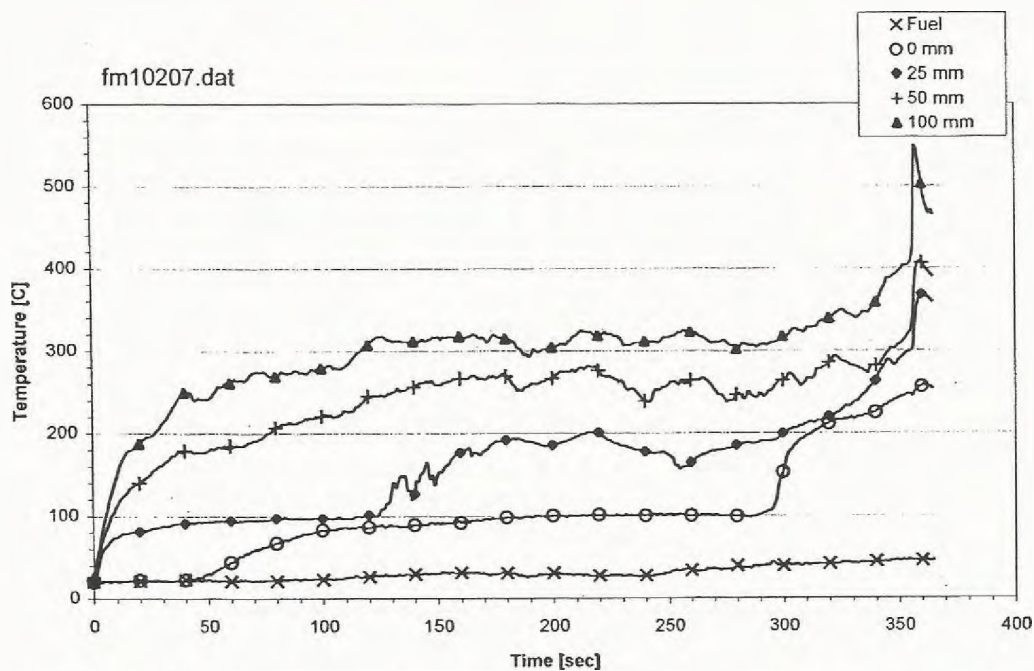


Fig. C226- Foam temperature in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 6.23, irradiance= 20kW/m², initial foam height= 25mm.

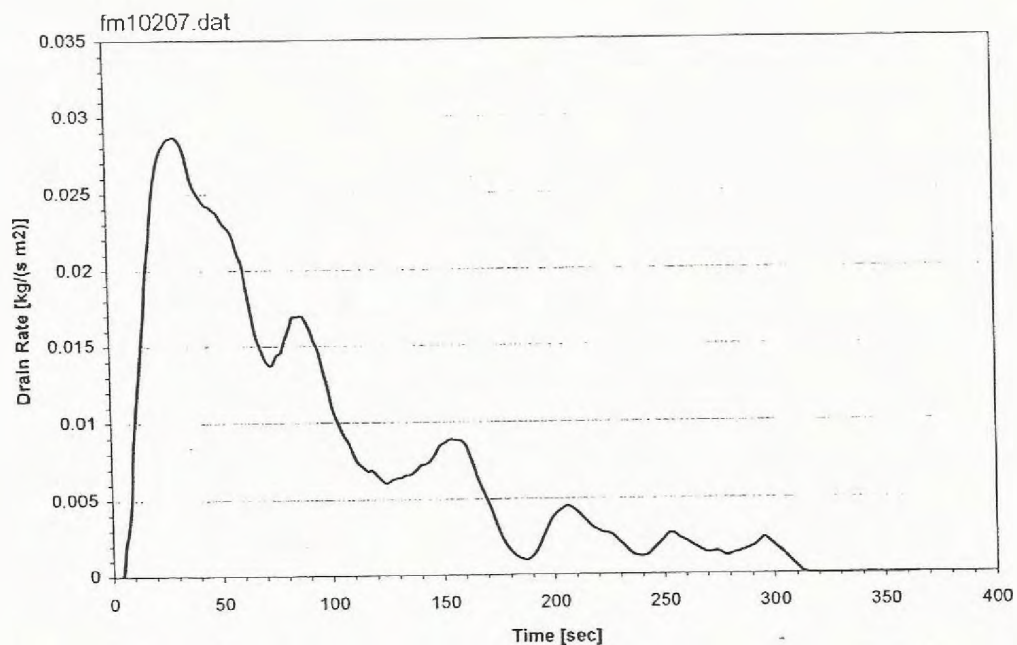


Fig. C227- Drain rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 6.23, irradiance= 20kW/m2, initial foam height= 25mm.

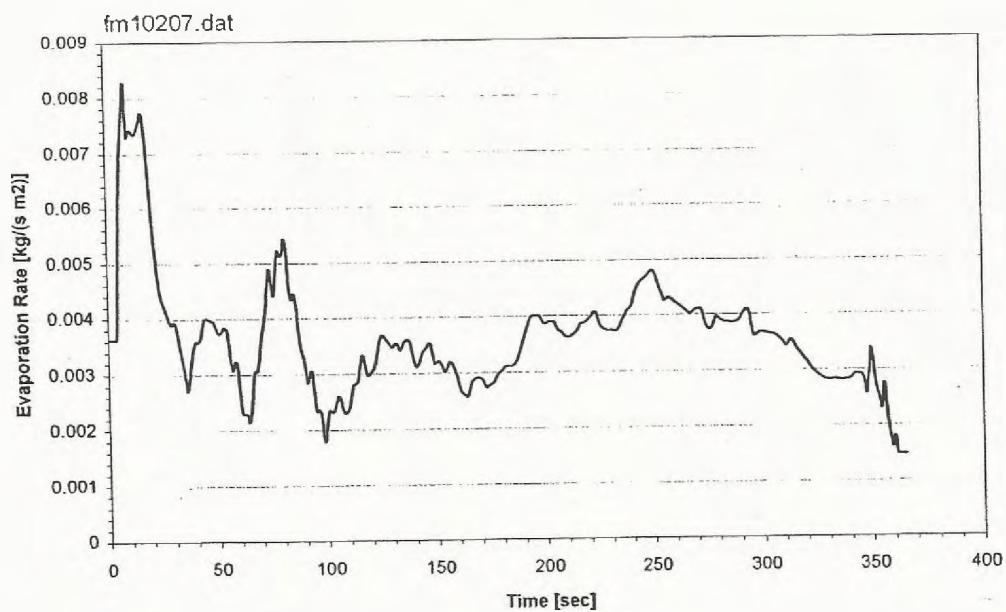


Fig. C228- Evaporation rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 6.23, irradiance= 20kW/m2, initial foam height= 25mm.

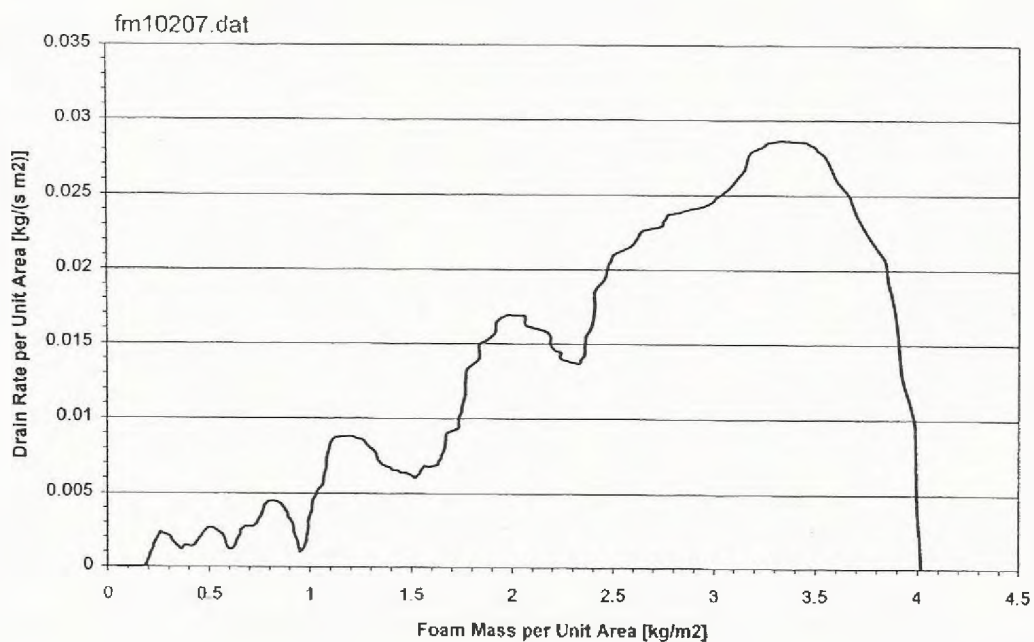


Fig. C229- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 6.23, irradiance= 20kW/m², initial foam height= 25mm.



Fig. C230- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 6.23, irradiance= 20kW/m², initial foam height= 25mm.

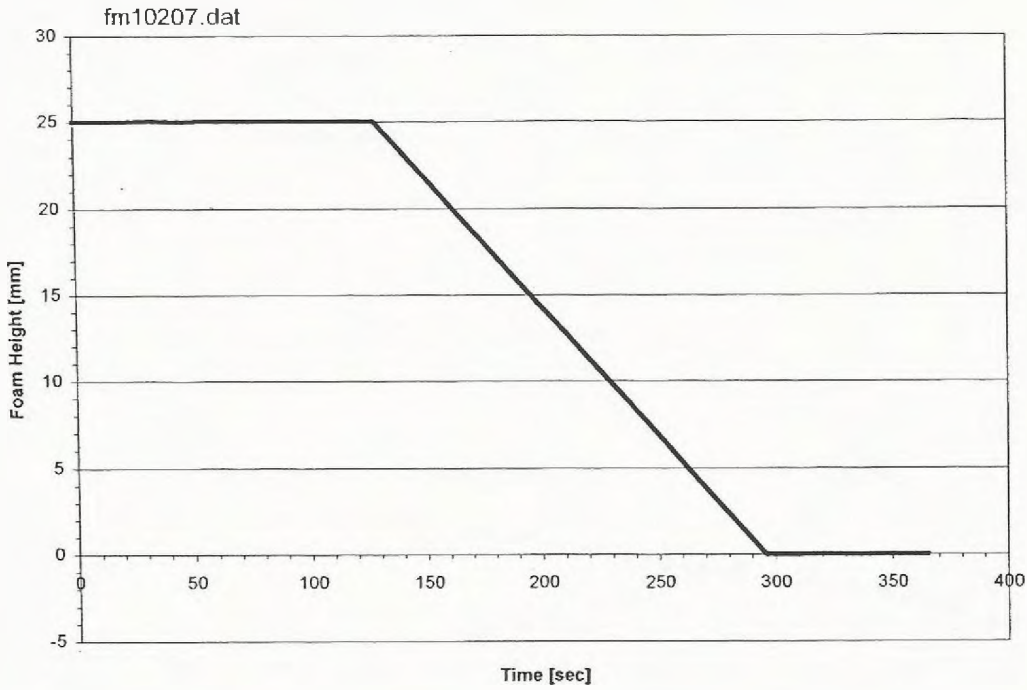


Fig. C231- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 6.23, irradiance= 20kW/m², initial foam height= 25mm.

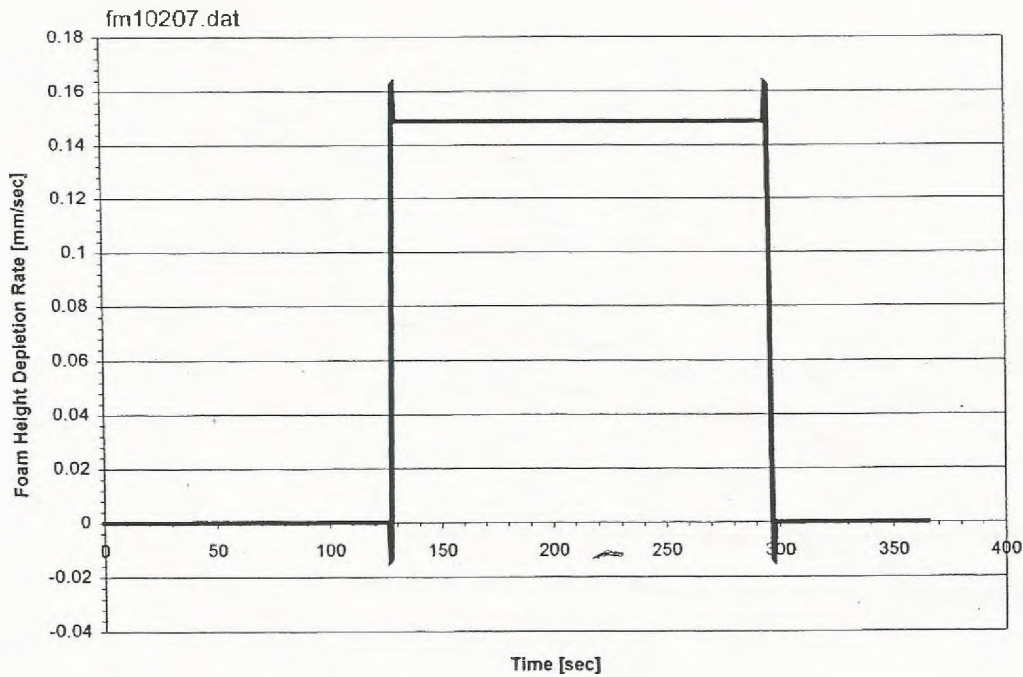


Fig. C232- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 6.23, irradiance= 20kW/m², initial foam height= 25mm.

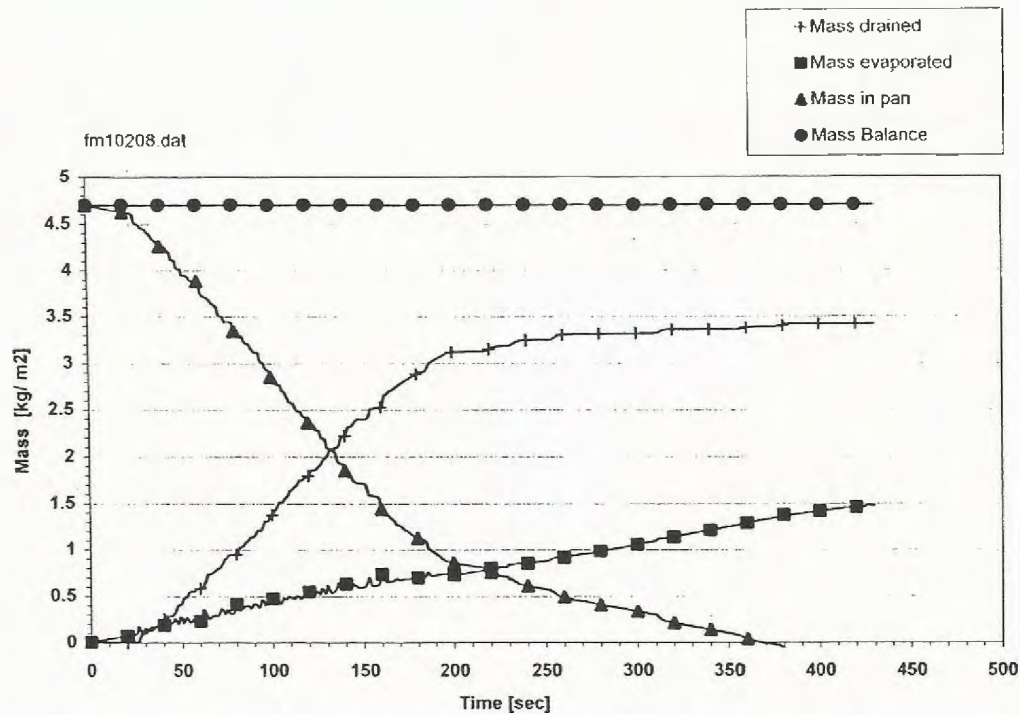


Fig. C233- Mass data in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 10.68, irradiance= 20kW/m², initial foam height= 50mm.

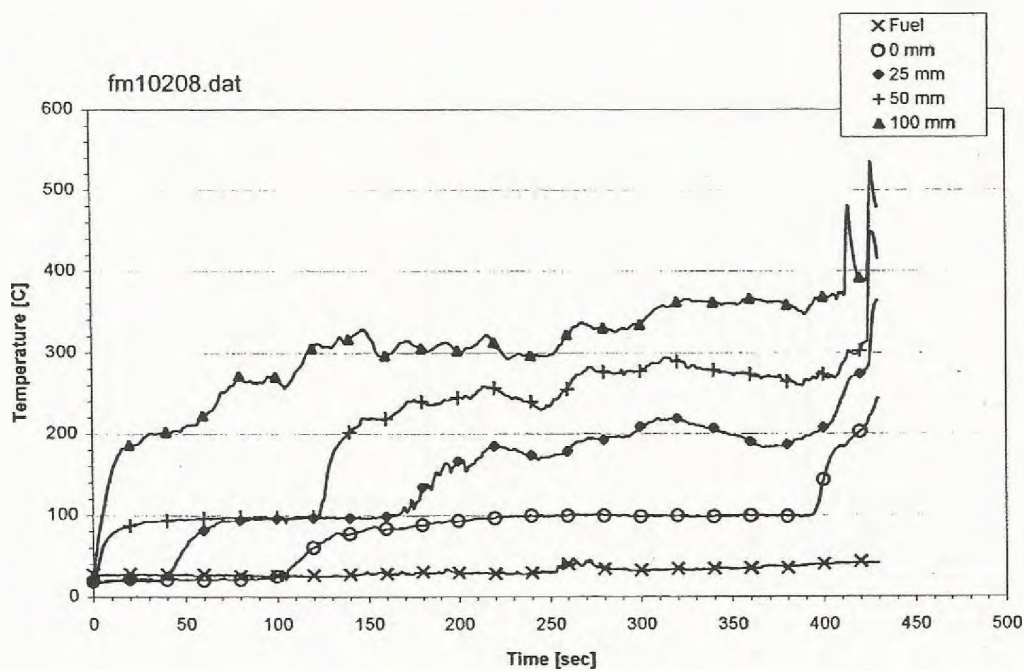


Fig. C234- Foam temperature in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 10.68, irradiance= 20kW/m², initial foam height= 50mm.

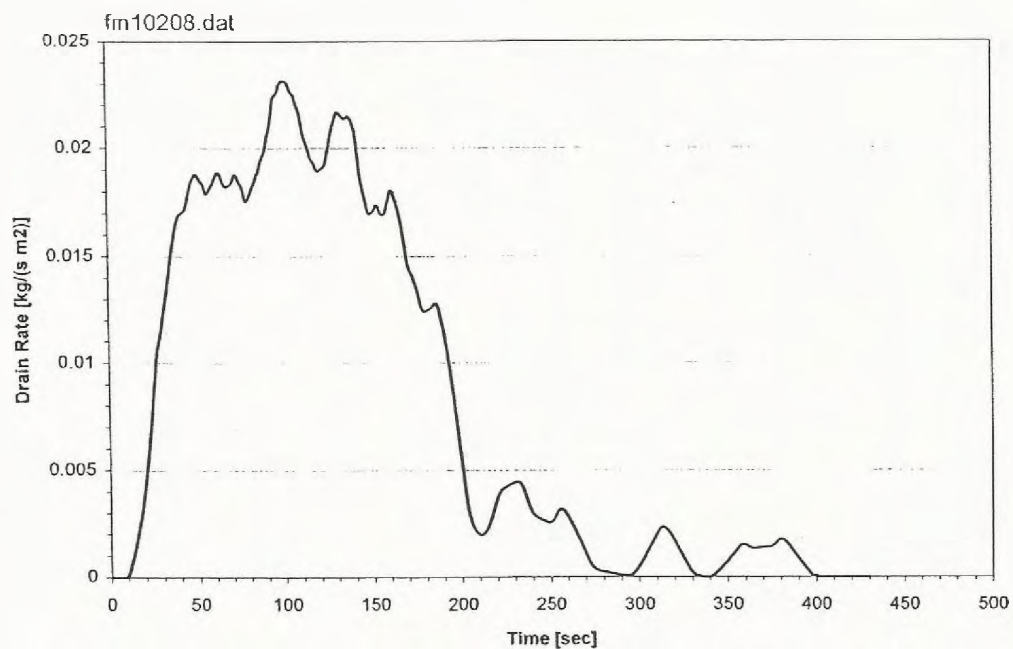


Fig. C235- Drain rate in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 10.68, irradiance= 20kW/m², initial foam height= 50mm.

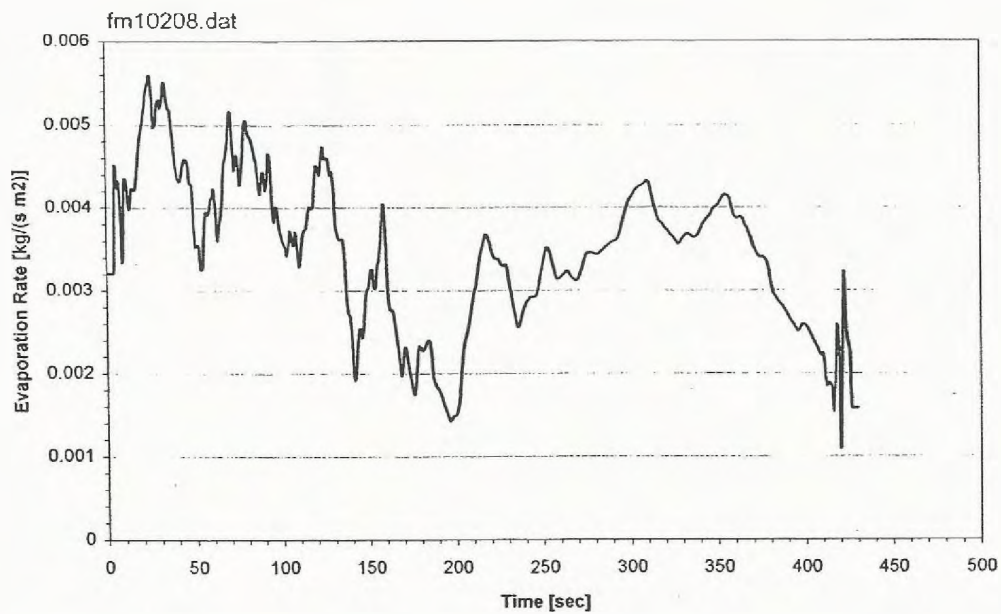


Fig. C236- Evaporation rate in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 10.68, irradiance= 20kW/m², initial foam height= 50mm.

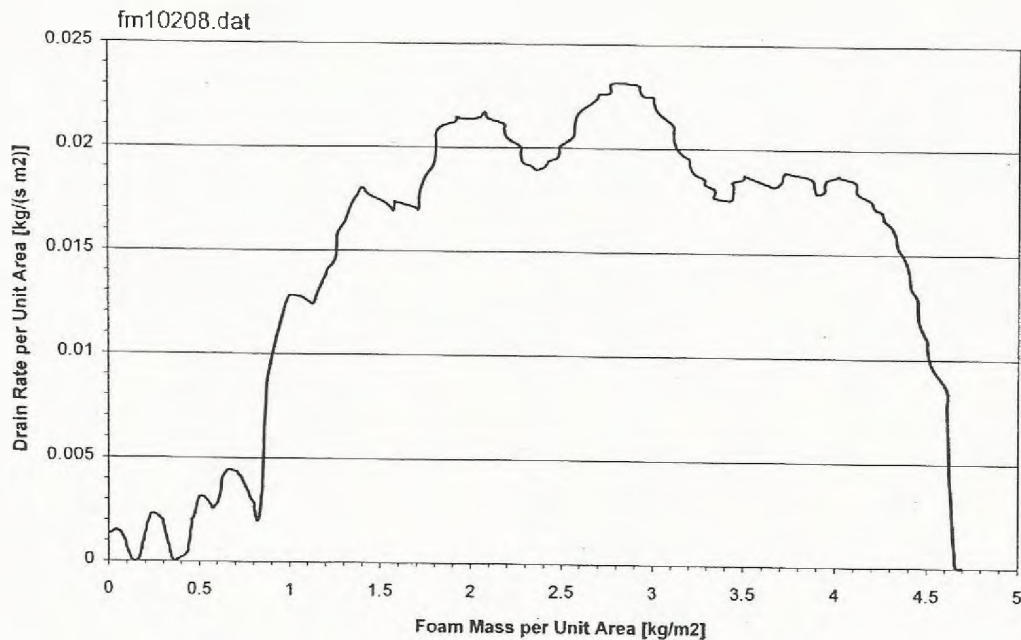


Fig. C237- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 10.68, irradiance= 20kW/m², initial foam height= 50mm.

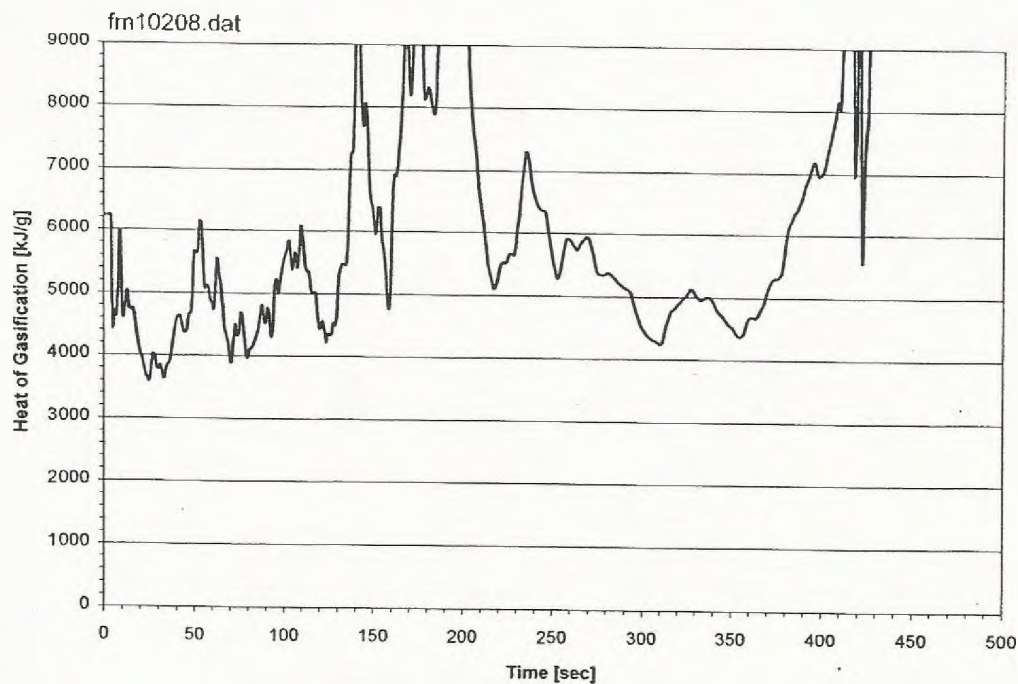


Fig. C238- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 10.68, irradiance= 20kW/m², initial foam height= 50mm.

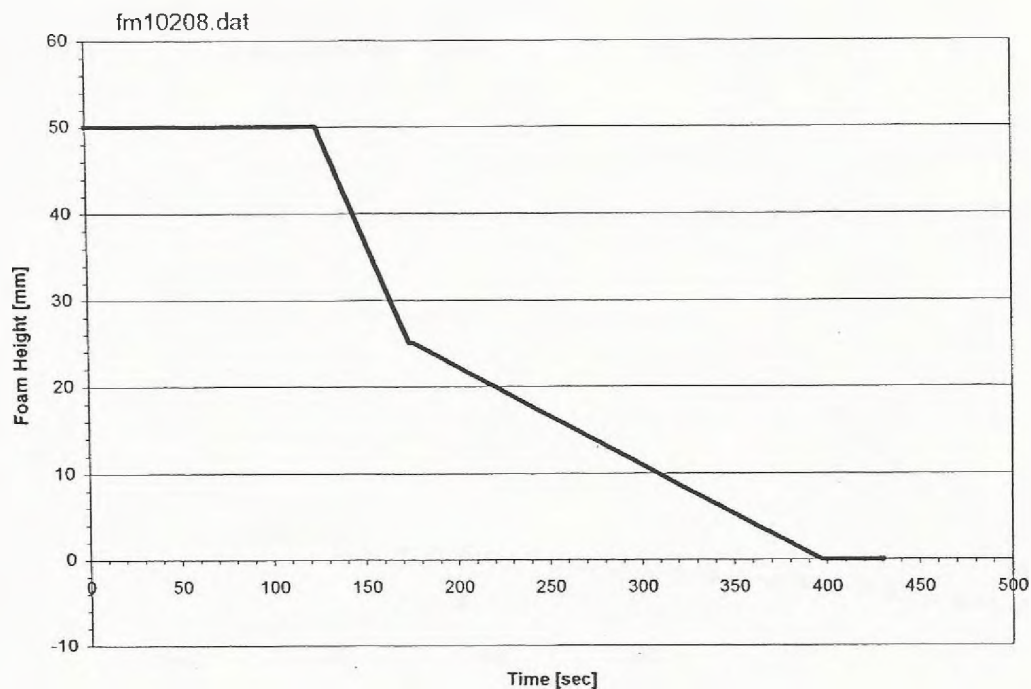


Fig. C239- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 10.68, irradiance= 20kW/m², initial foam height= 50mm.

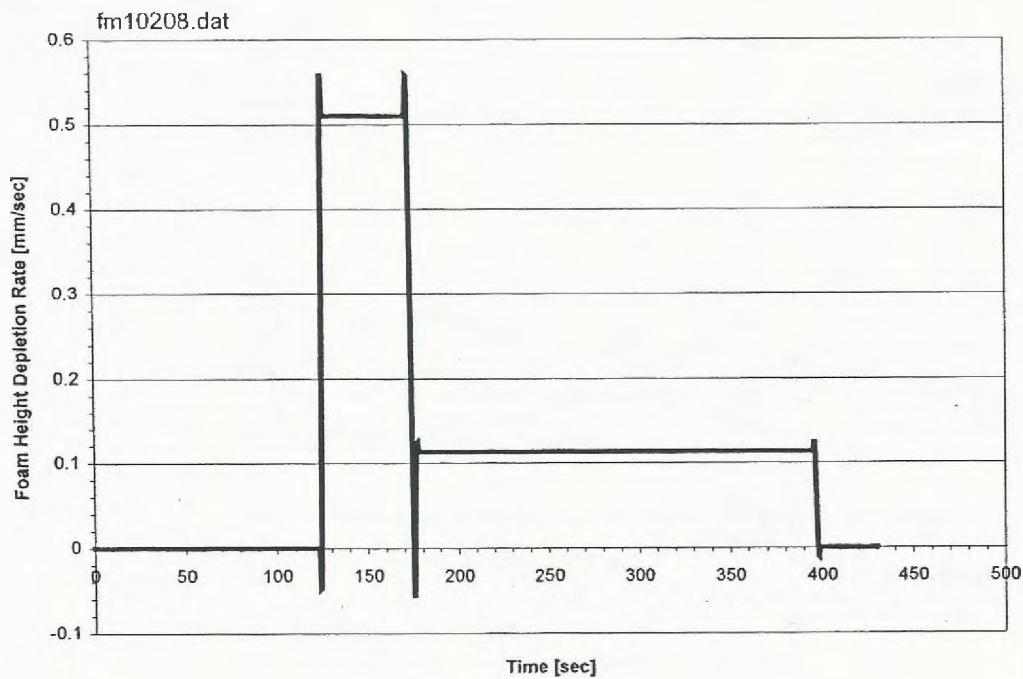


Fig. C240- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 10.68, irradiance= 20kW/m², initial foam height= 50mm.

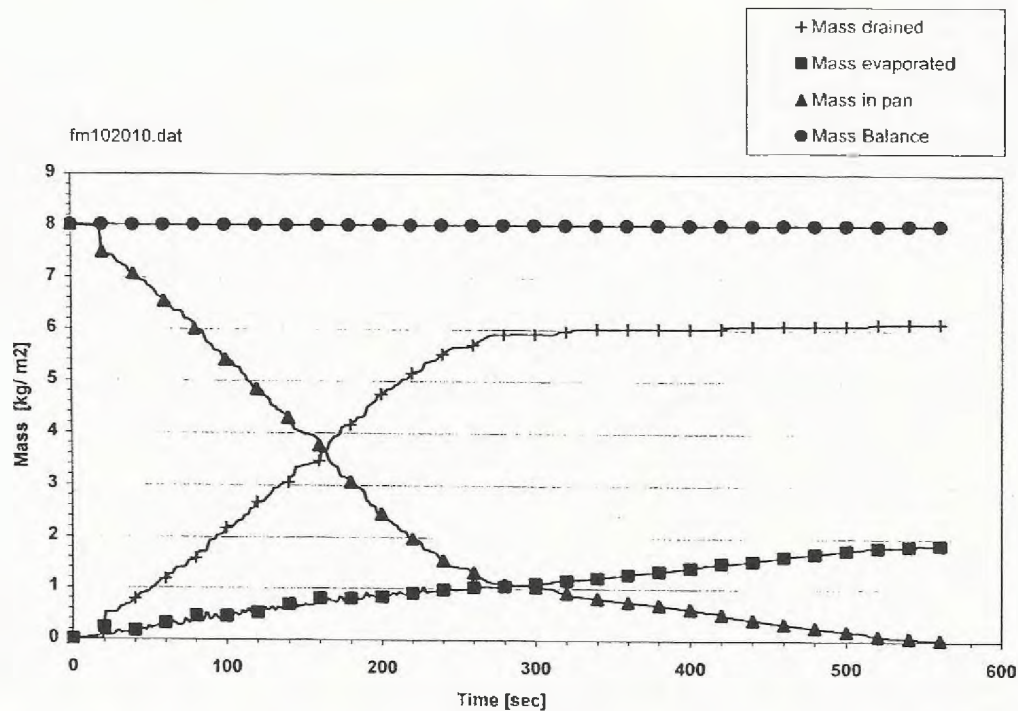


Fig. C241- Mass data in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 9.39, irradiance= 20kW/m², initial foam height= 75mm.

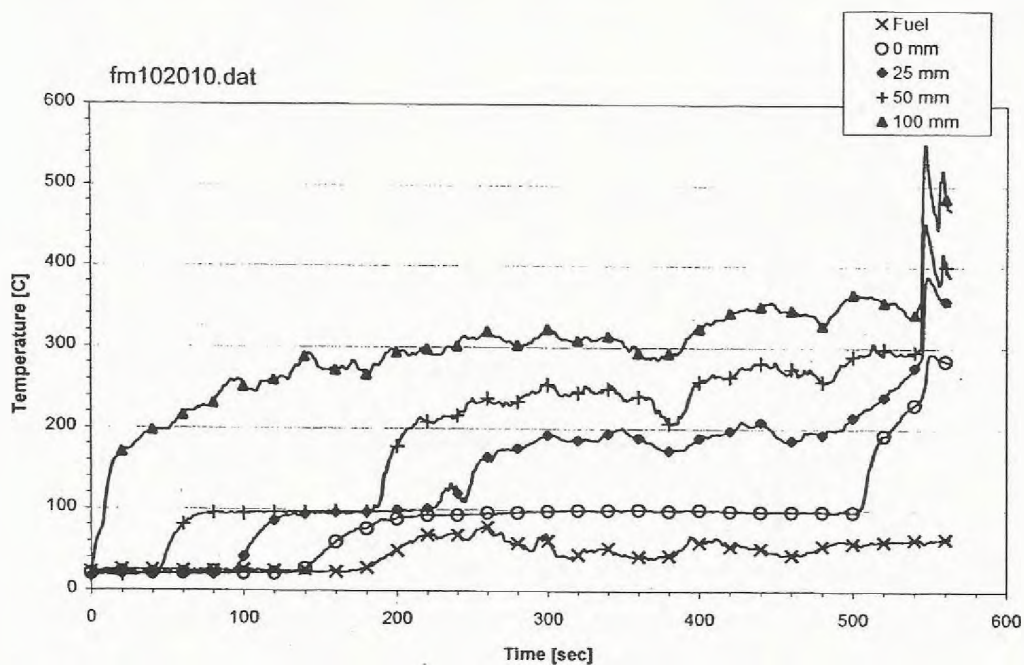


Fig. C242- Foam temperature in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 9.39, irradiance= 20kW/m², initial foam height= 75mm.

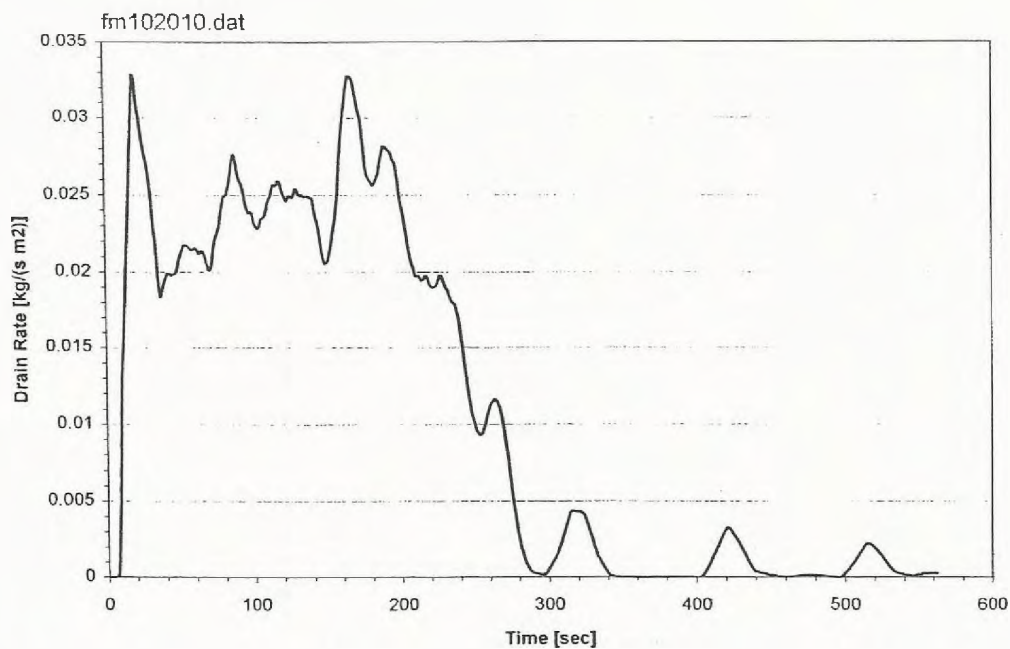


Fig. C243- Drain rate in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 9.39, irradiance= 20kW/m², initial foam height= 75mm.

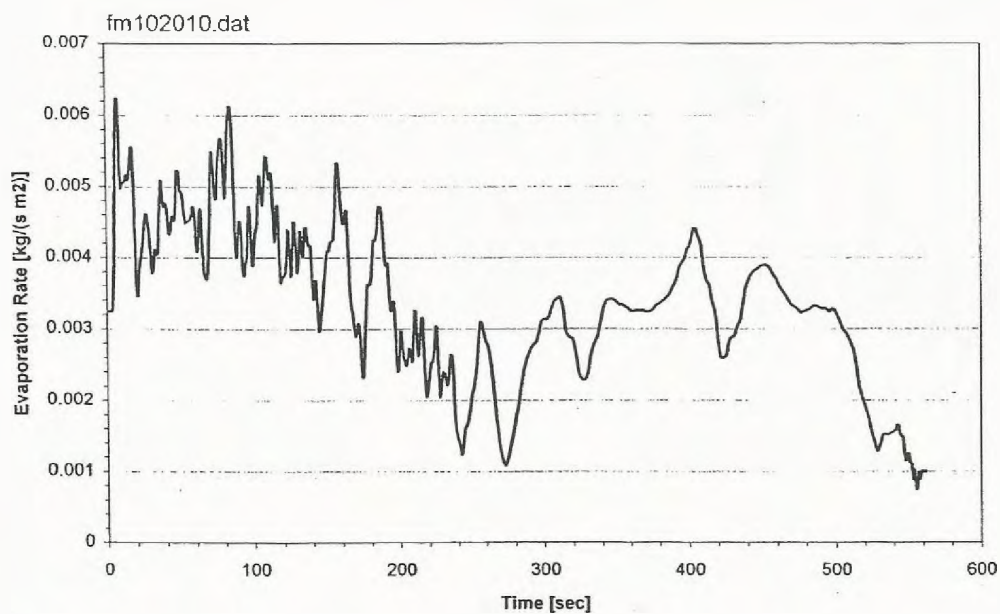


Fig. C244- Evaporation rate in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 9.39, irradiance= 20kW/m², initial foam height= 75mm.

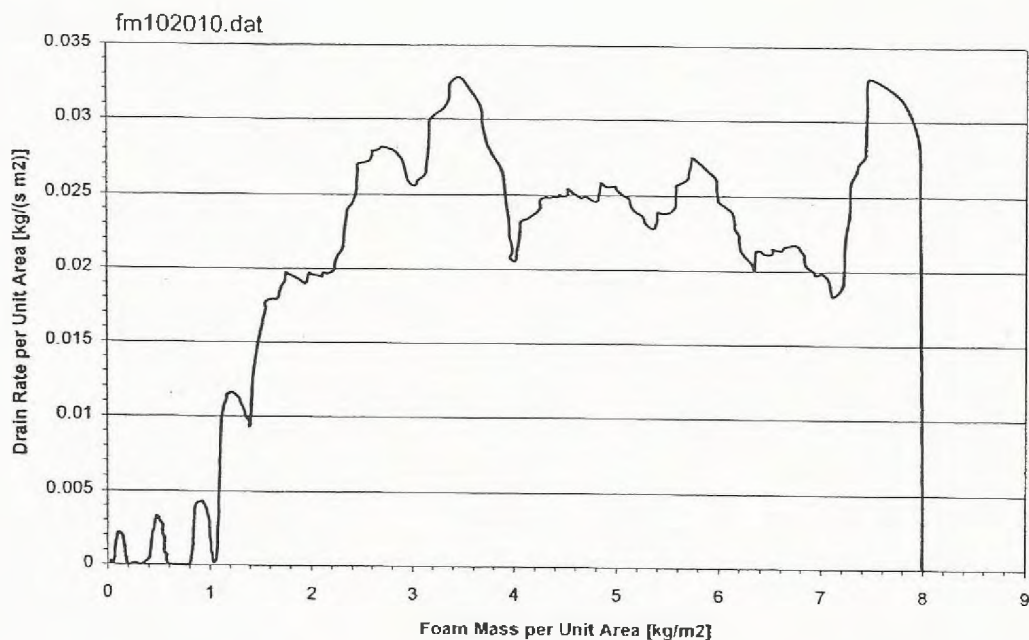


Fig. C245- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 9.39, irradiance= 20kW/m², initial foam height= 75mm.

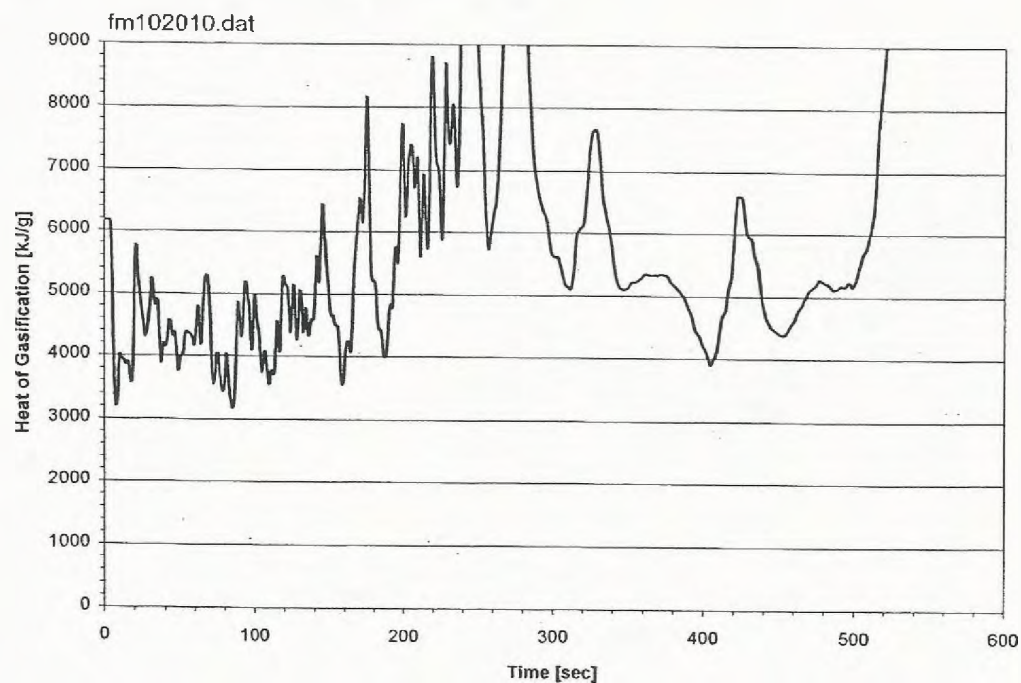


Fig. C246- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 9.39, irradiance= 20kW/m², initial foam height= 75mm.

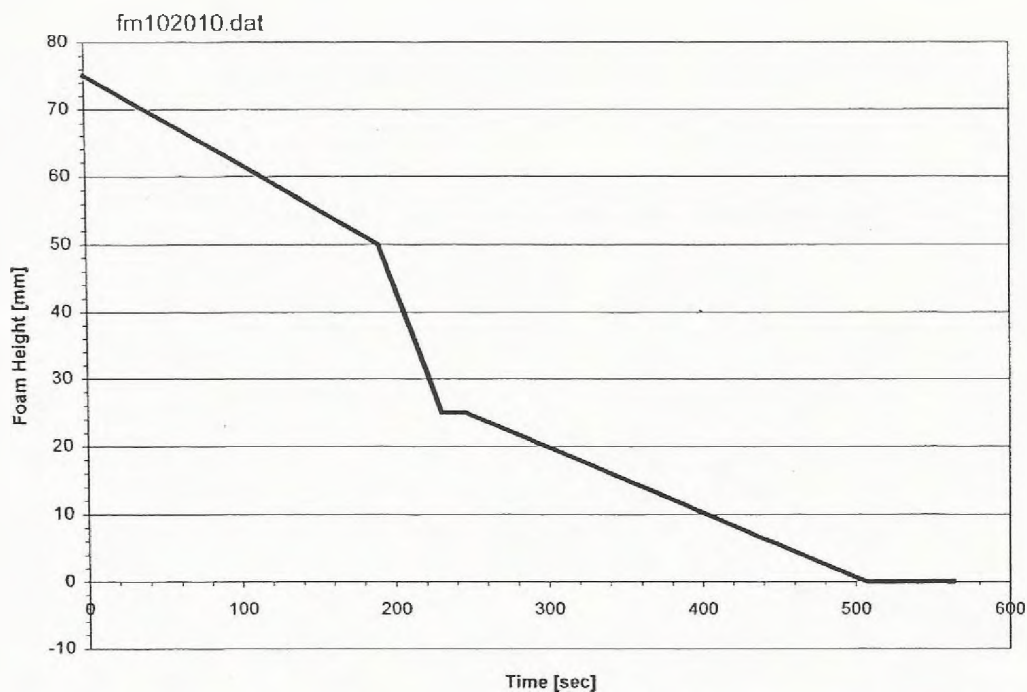


Fig. C247- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 9.39, irradiance= 20kW/m², initial foam height= 75mm.

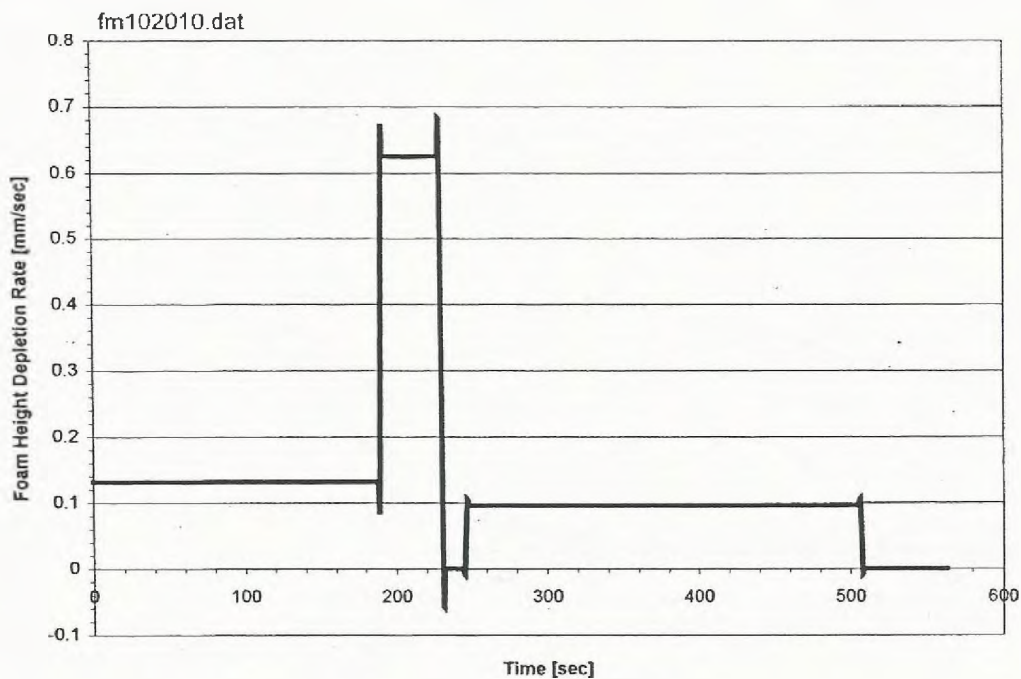


Fig. C248- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 9.39, irradiance= 20kW/m², initial foam height= 75mm.

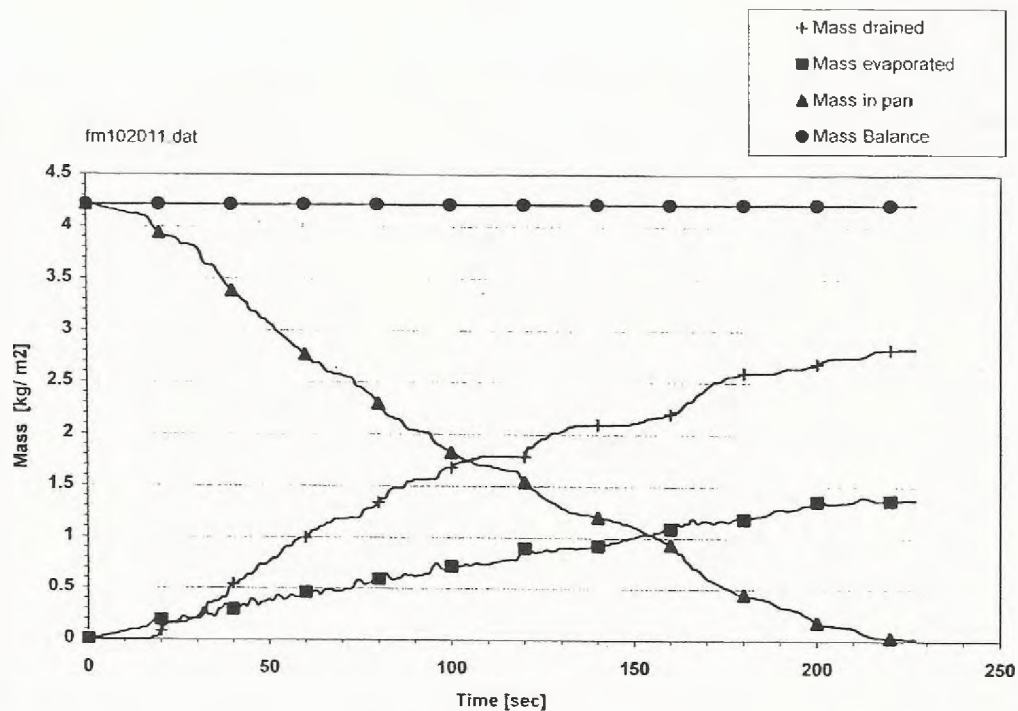


Fig. C249- Mass data in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.96, irradiance= 35kW/m², initial foam height= 25mm.

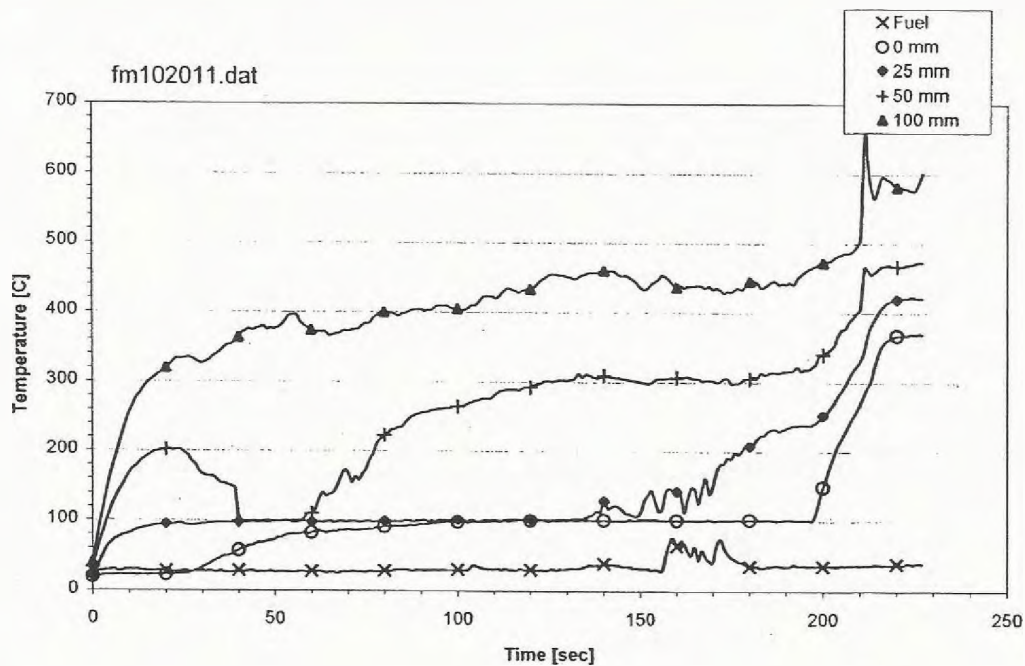


Fig. C250- Foam temperature in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.96, irradiance= 35kW/m², initial foam height= 25mm.

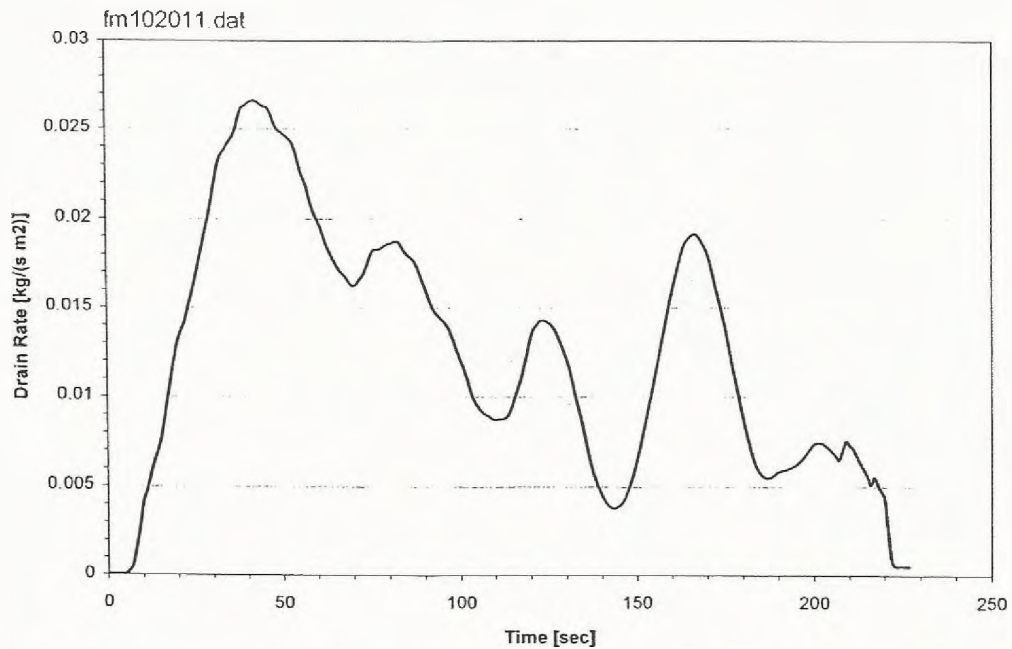


Fig. C251- Drain rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.96, irradiance= 35kW/m2, initial foam height= 25mm.

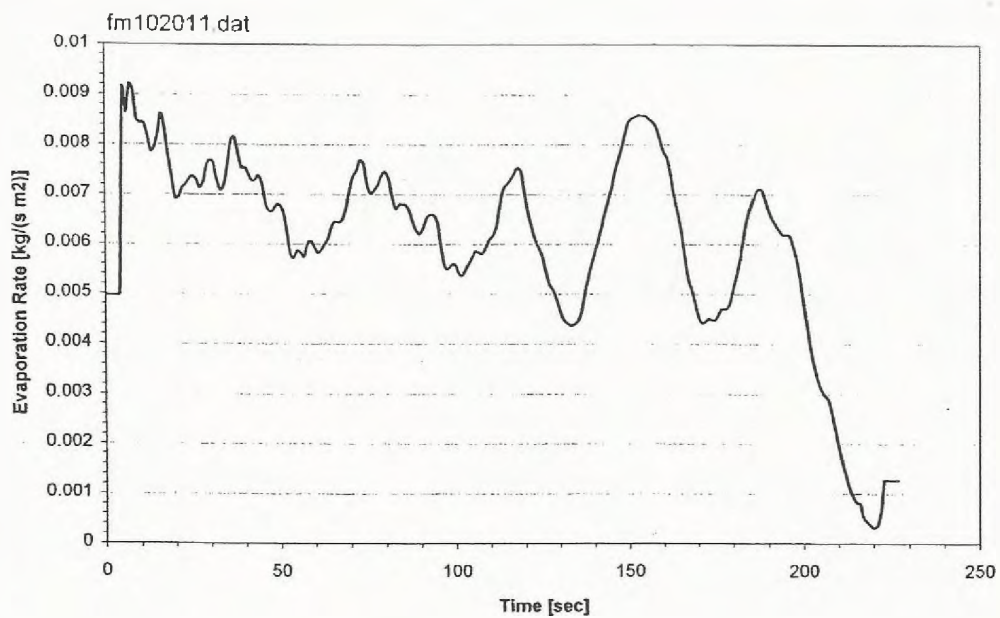


Fig. C252- Evaporation rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.96, irradiance= 35kW/m2, initial foam height= 25mm.

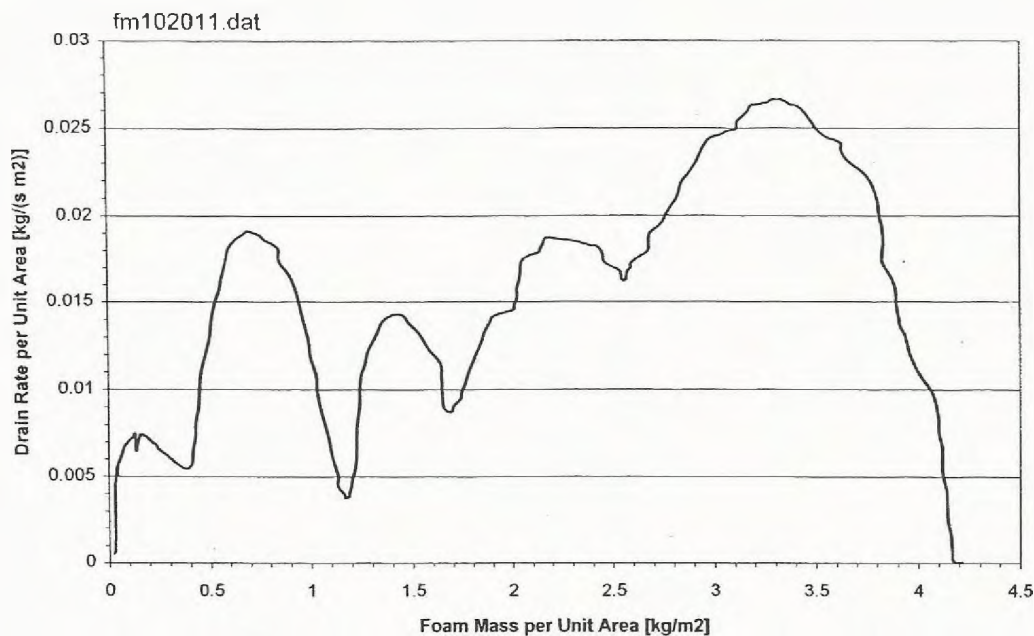


Fig. C253- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.96, irradiance= 35kW/m², initial foam height= 25mm.

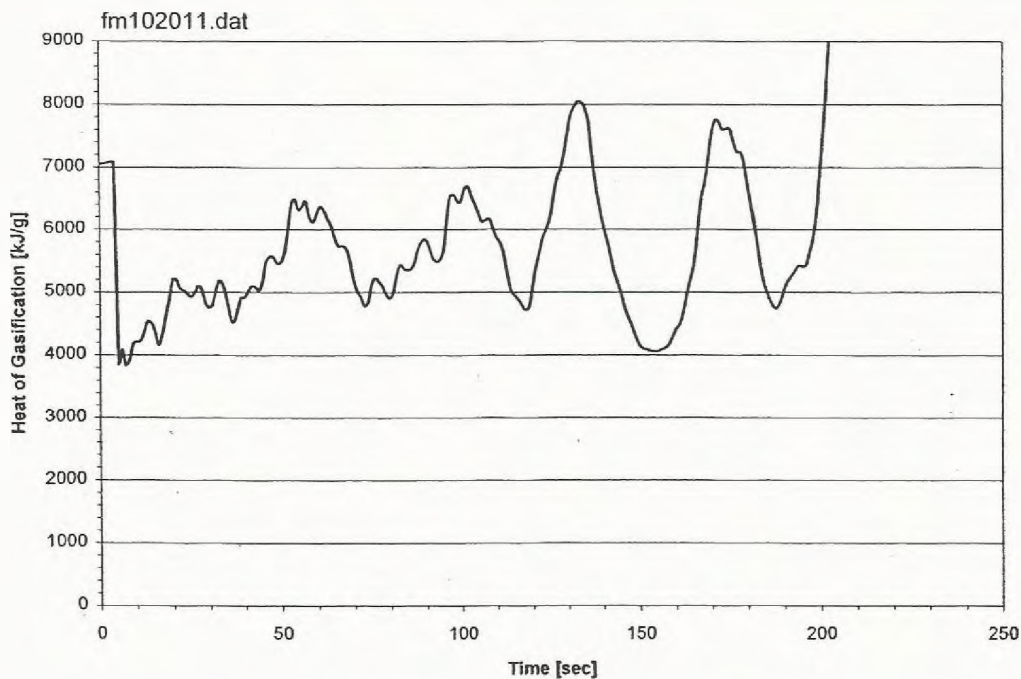


Fig. C254- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.96, irradiance= 35kW/m², initial foam height= 25mm.

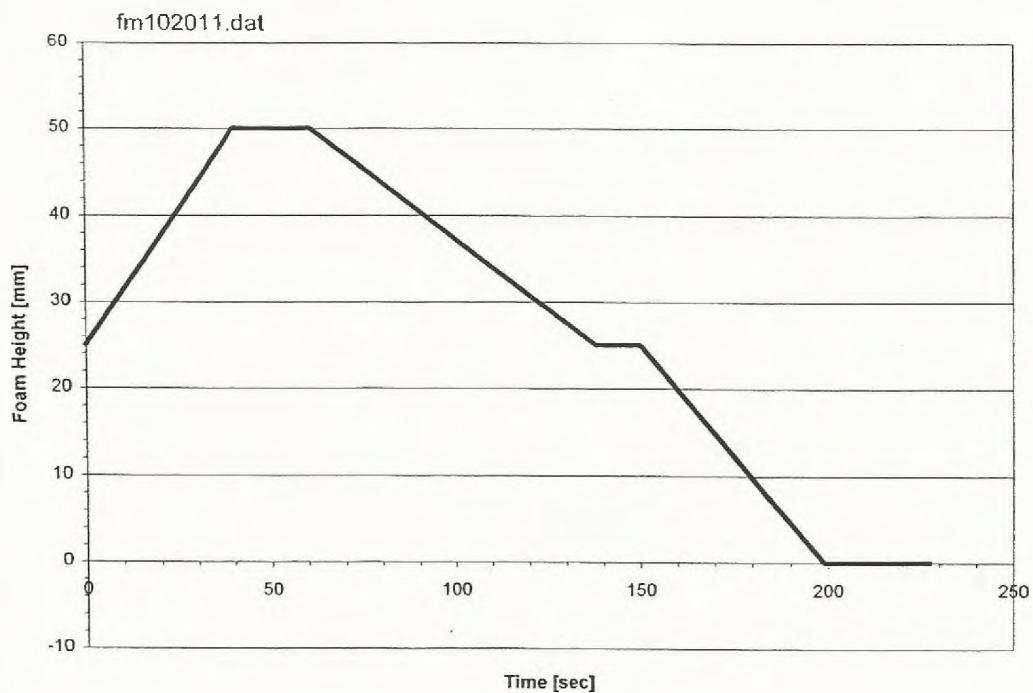


Fig. C255- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.96, irradiance= 35kW/m², initial foam height= 25mm.

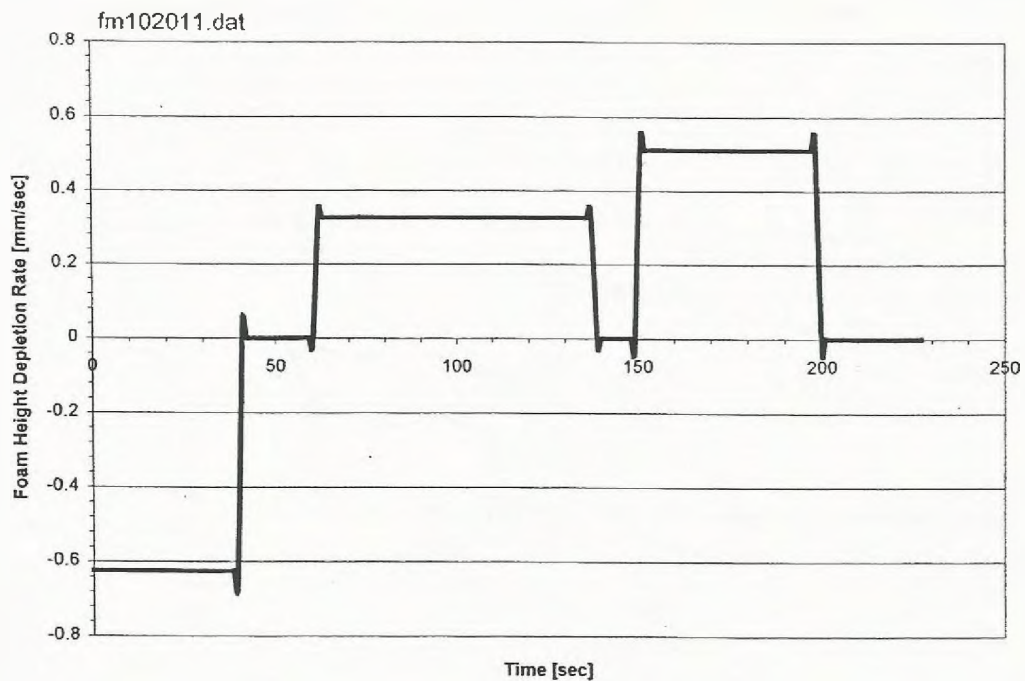


Fig. C256- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 5.96, irradiance= 35kW/m², initial foam height= 25mm.

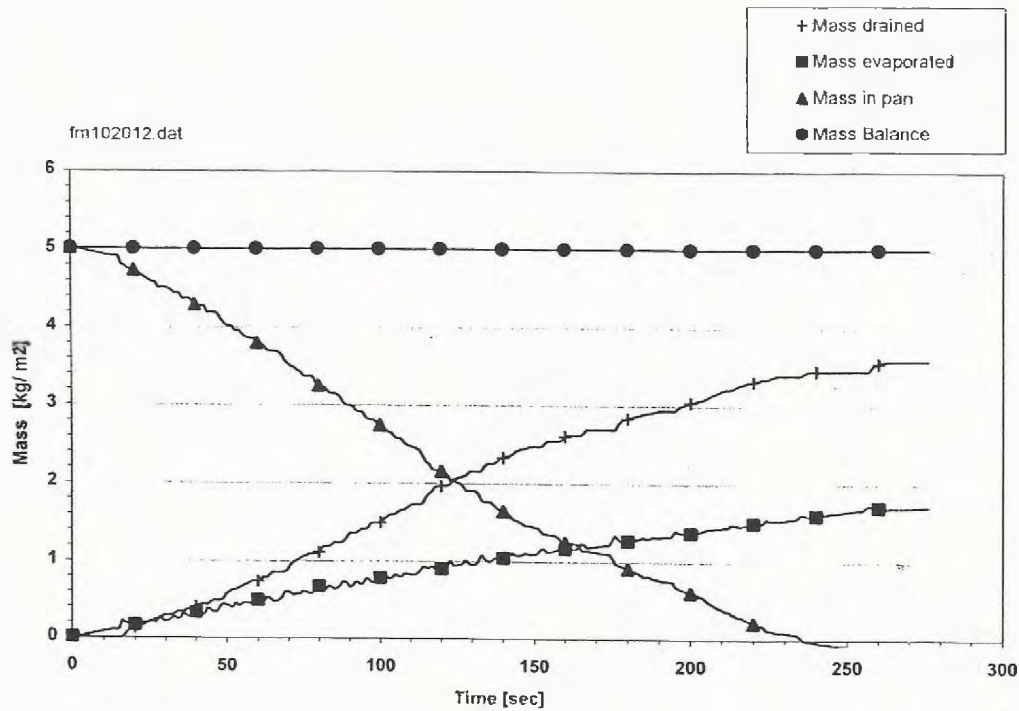


Fig. C257- Mass data in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 10.01, irradiance= 35kW/m², initial foam height= 50mm.

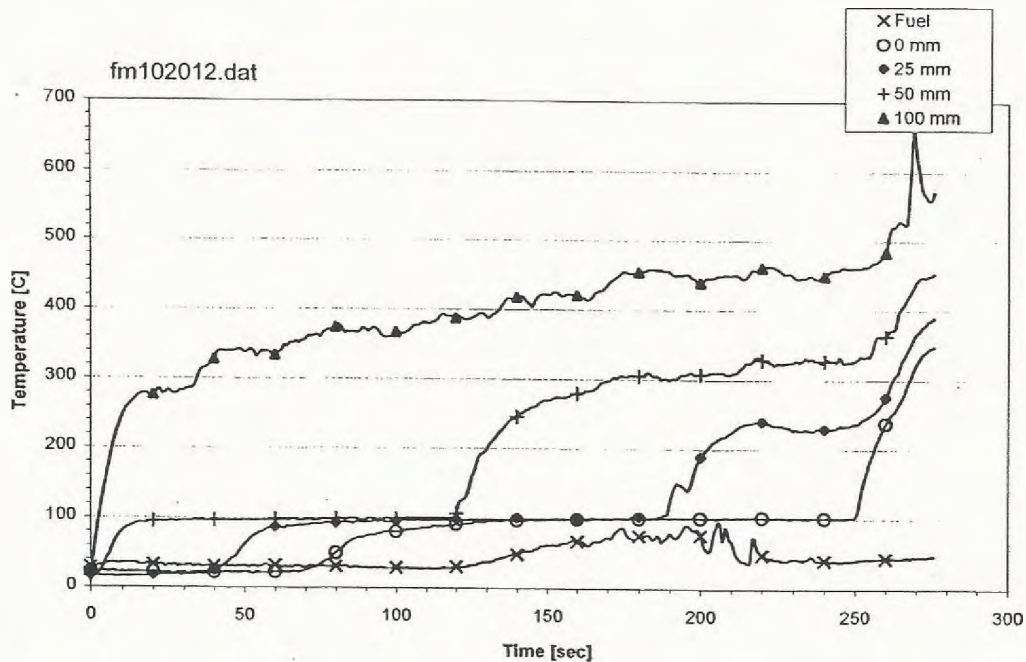


Fig. C258- Foam temperature in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 10.01, irradiance= 35kW/m², initial foam height= 50mm.

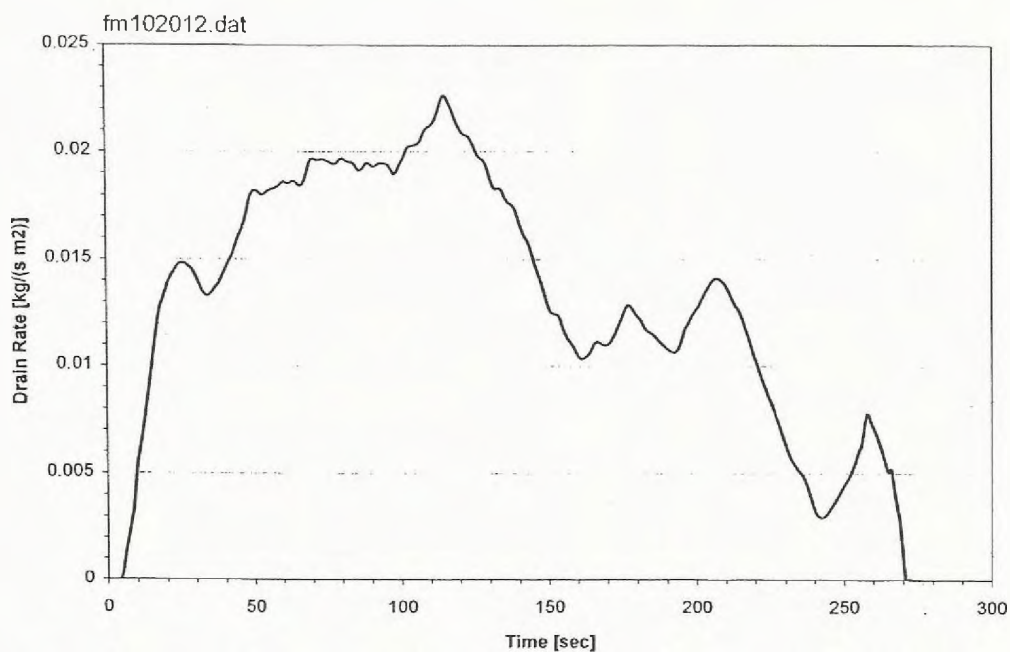


Fig. C259- Drain rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 10.01, irradiance= 35kW/m², initial foam height= 50mm.

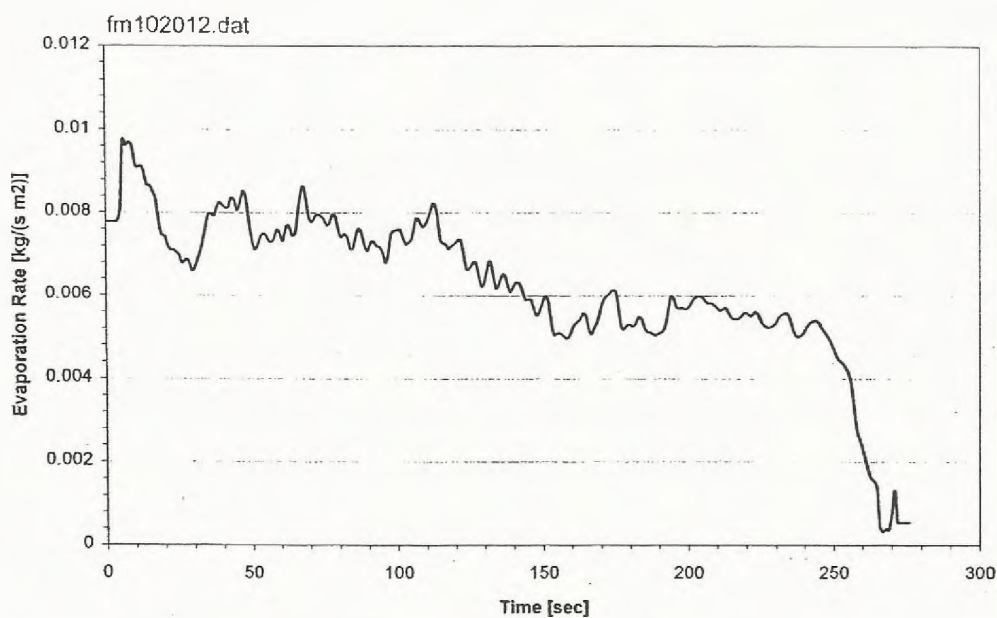


Fig. C260- Evaporation rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 10.01, irradiance= 35kW/m², initial foam height= 50mm.

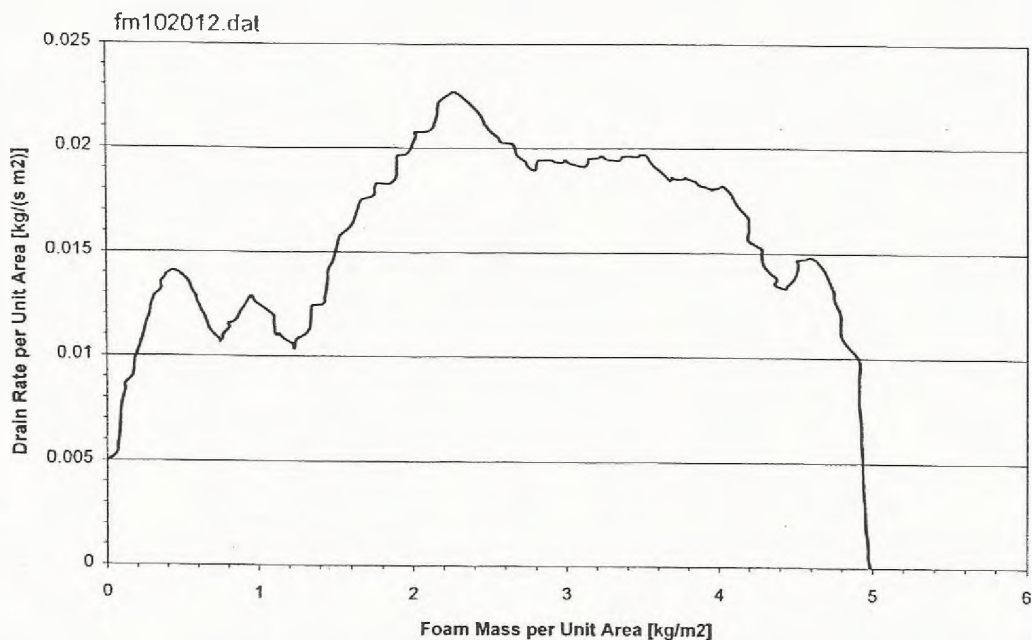


Fig. C261- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 10.01, irradiance= 35kW/m², initial foam height= 50mm.

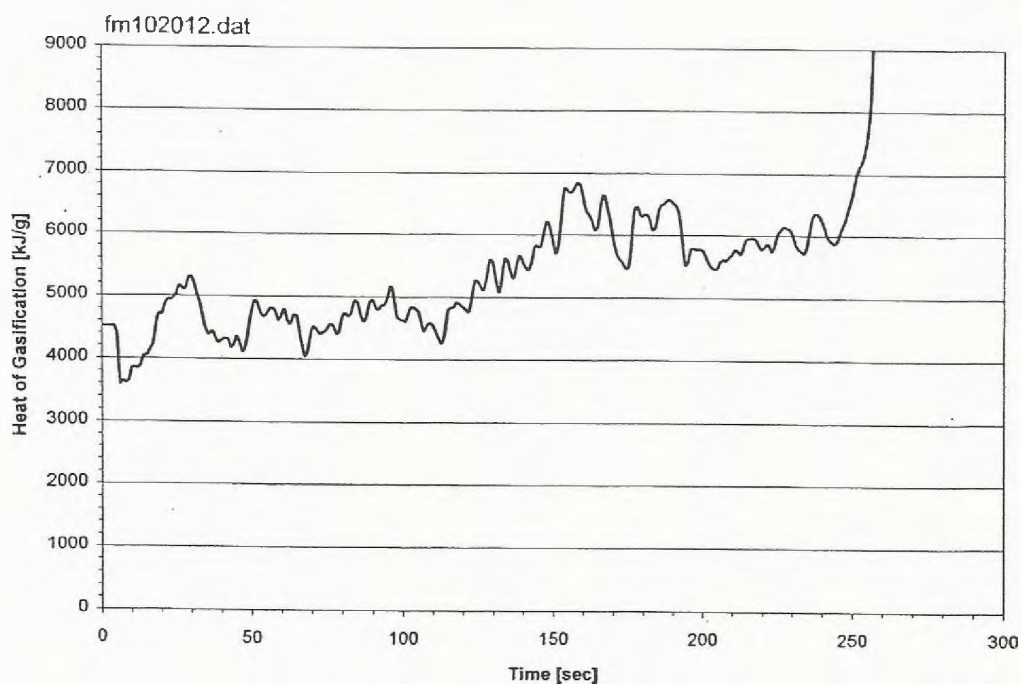


Fig. C262- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 10.01, irradiance= 35kW/m², initial foam height= 50mm.

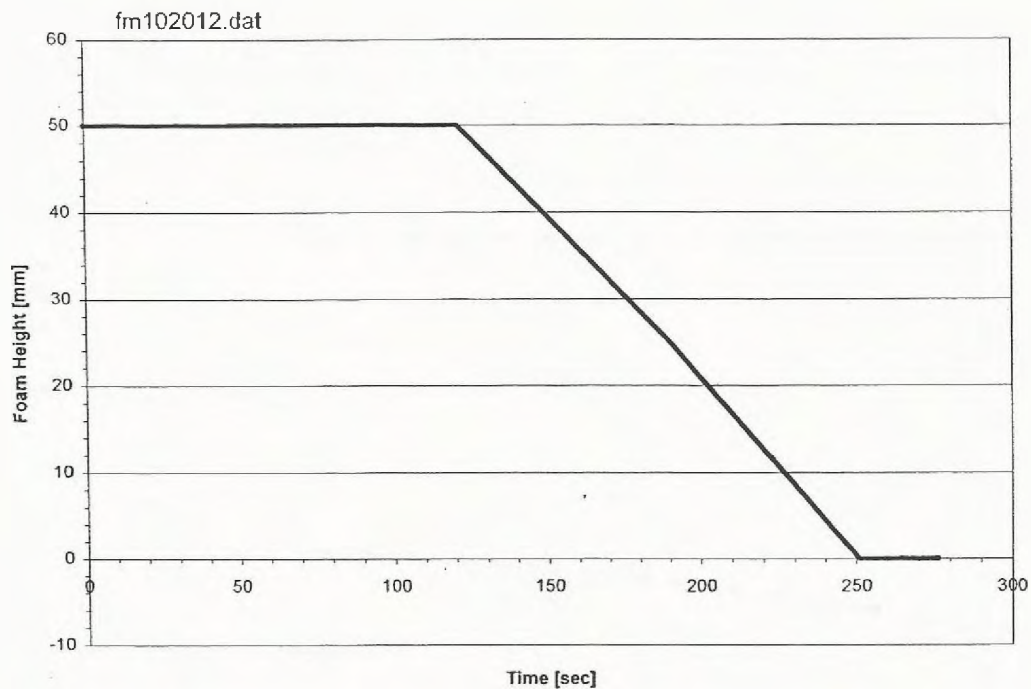


Fig. C263- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 10.01, irradiance= 35kW/m², initial foam height= 50mm.

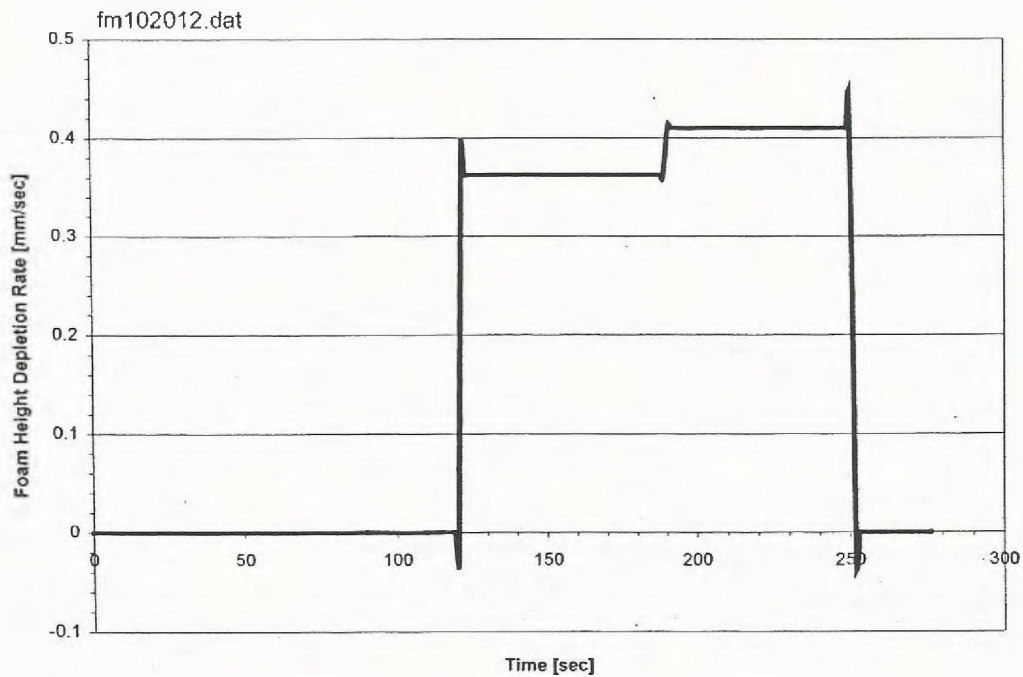


Fig. C264- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 10.01, irradiance= 35kW/m², initial foam height= 50mm.

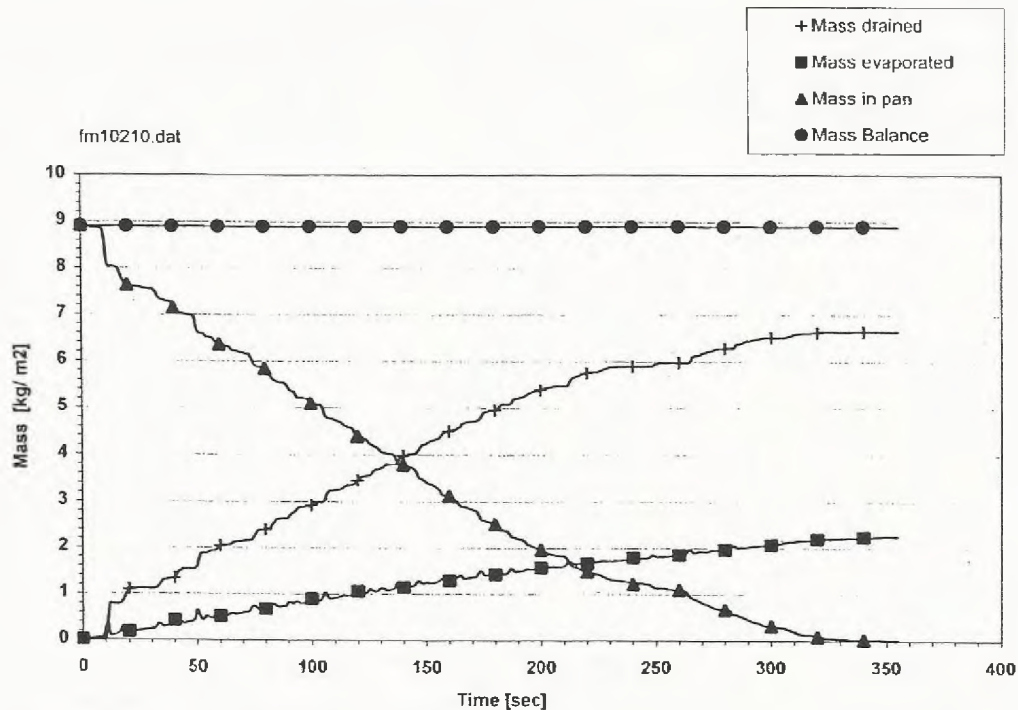


Fig. C265- Mass data in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 8.46, irradiance= 35kW/m², initial foam height= 75mm.

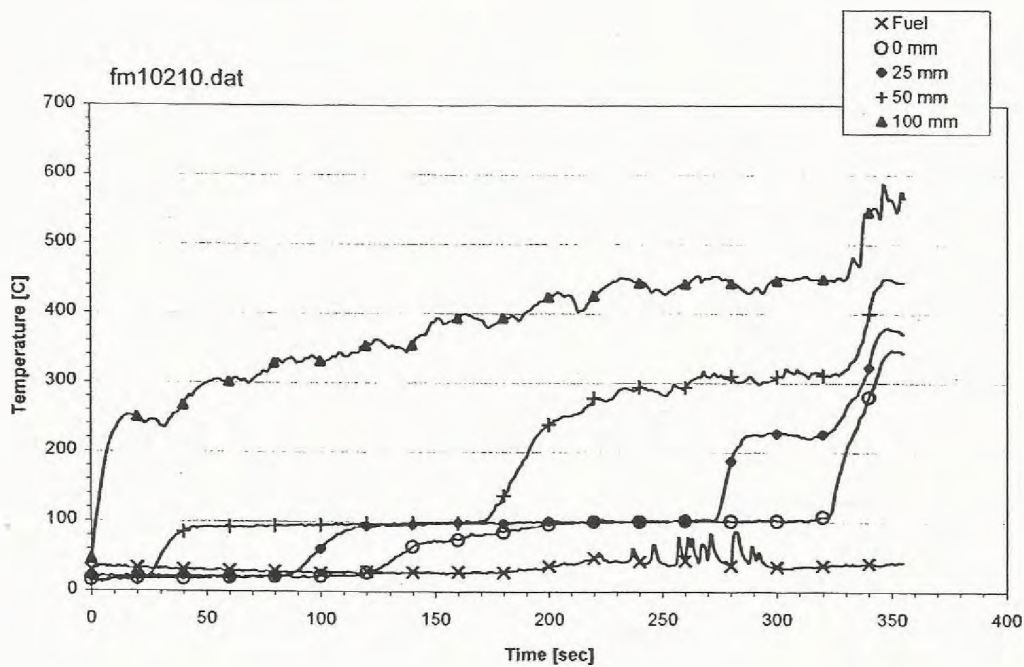


Fig. C266- Foam temperature in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 8.46, irradiance= 35kW/m², initial foam height= 75mm.

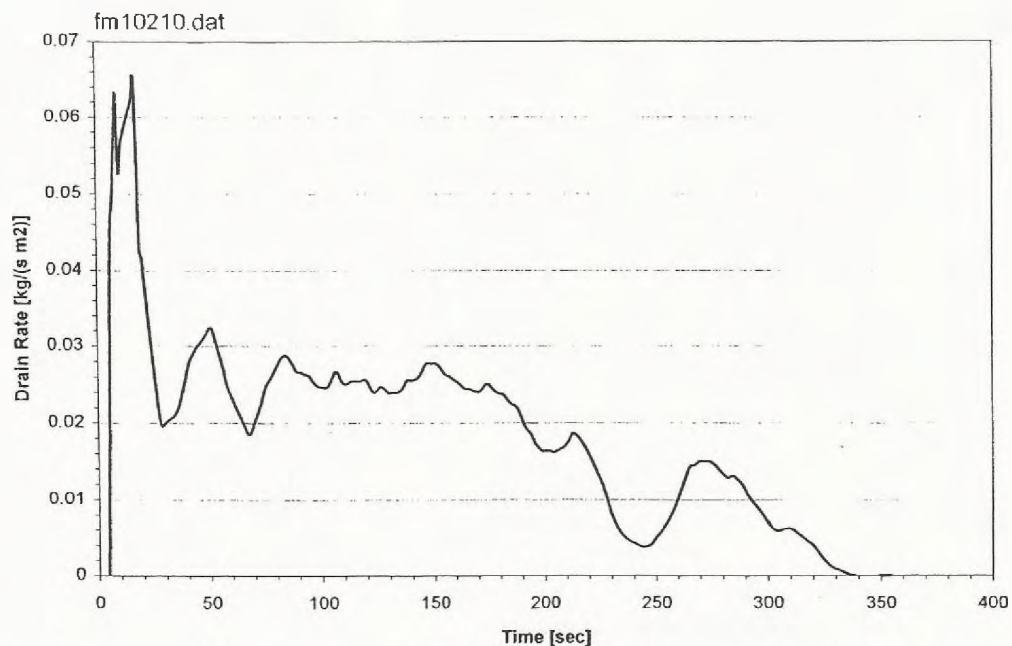


Fig. C267- Drain rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 8.46, irradiance= 35kW/m², initial foam height= 75mm.

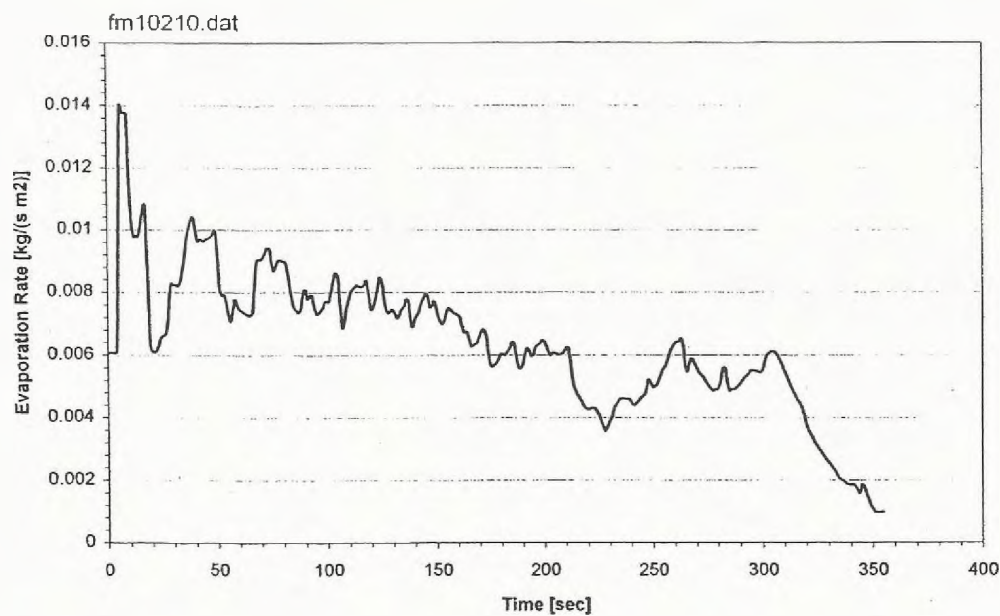


Fig. C268- Evaporation rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 8.46, irradiance= 35kW/m², initial foam height= 75mm.

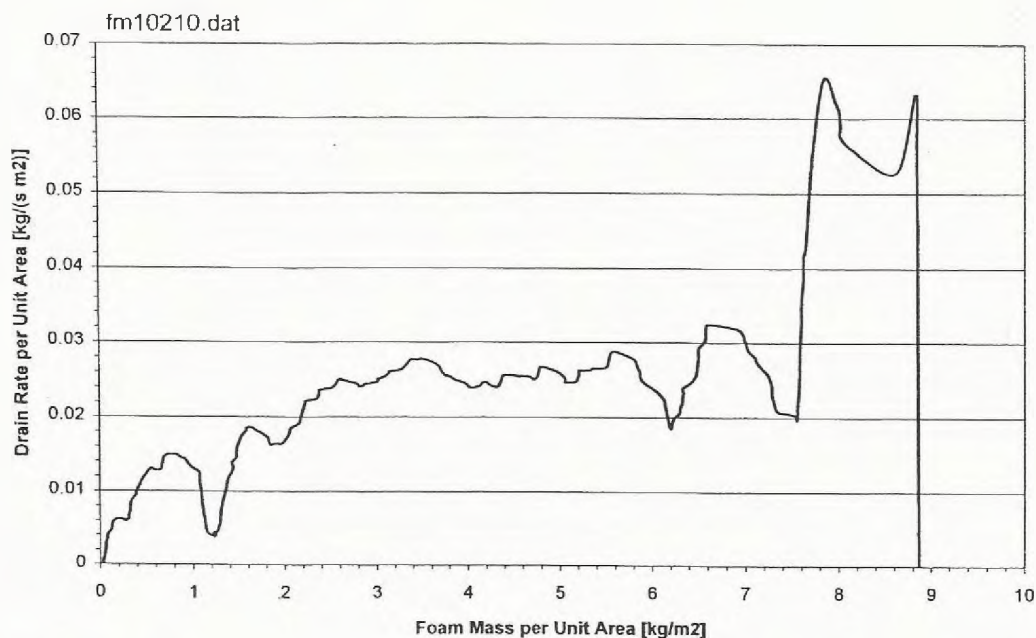


Fig. C269- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 8.46, irradiance= 35kW/m², initial foam height= 75mm.

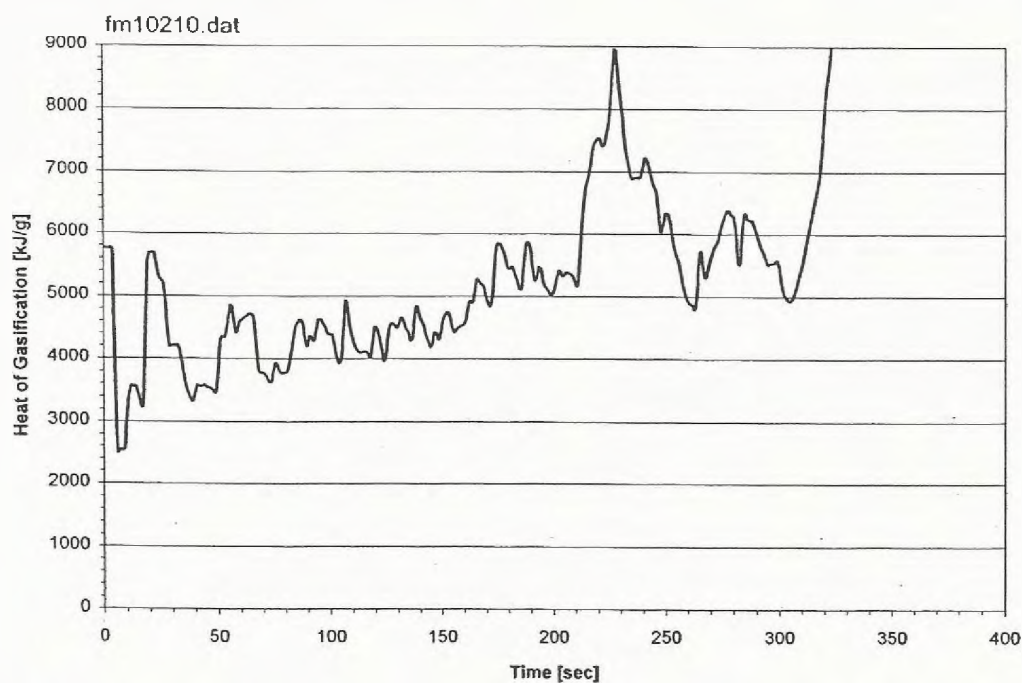


Fig. C270- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 8.46, irradiance= 35kW/m², initial foam height= 75mm.

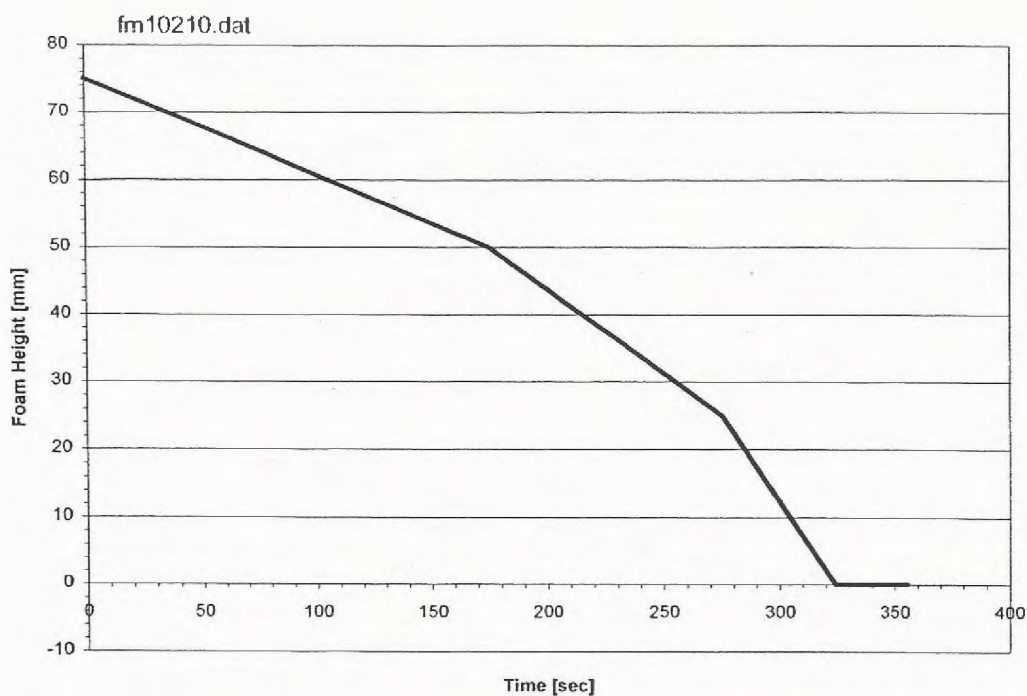


Fig. C271- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 8.46, irradiance= 35kW/m2, initial foam height= 75mm.



Fig. C272- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 8.46, irradiance= 35kW/m2, initial foam height= 75mm.

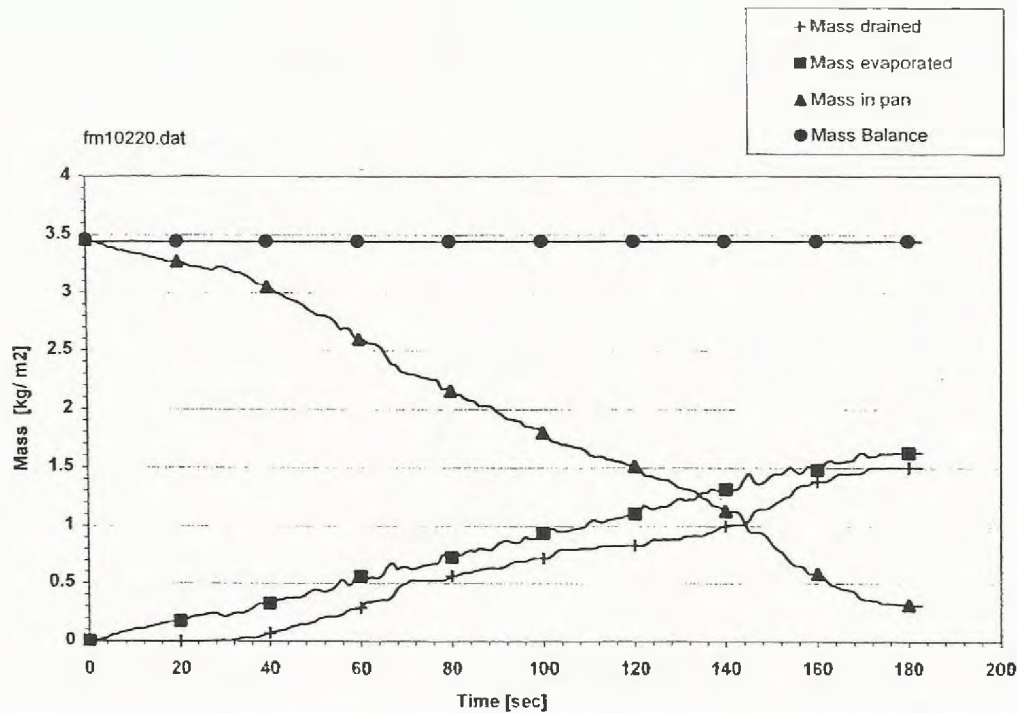


Fig. C273- Mass data in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 7.26, irradiance= 50kW/m², initial foam height= 25mm.

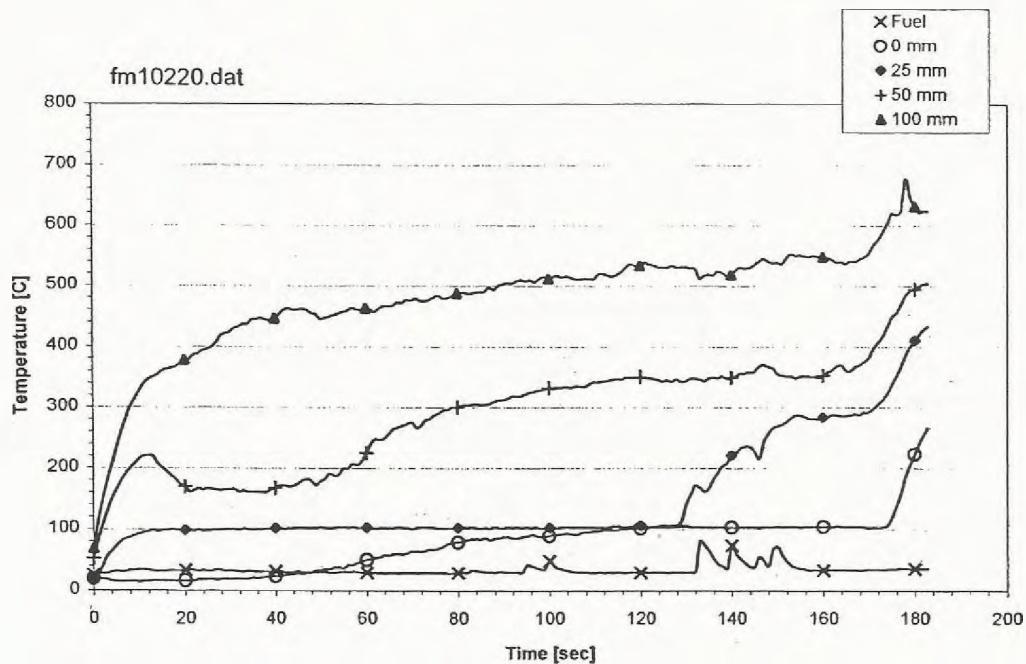


Fig. C274- Foam temperature in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 7.26, irradiance= 50kW/m², initial foam height= 25mm.

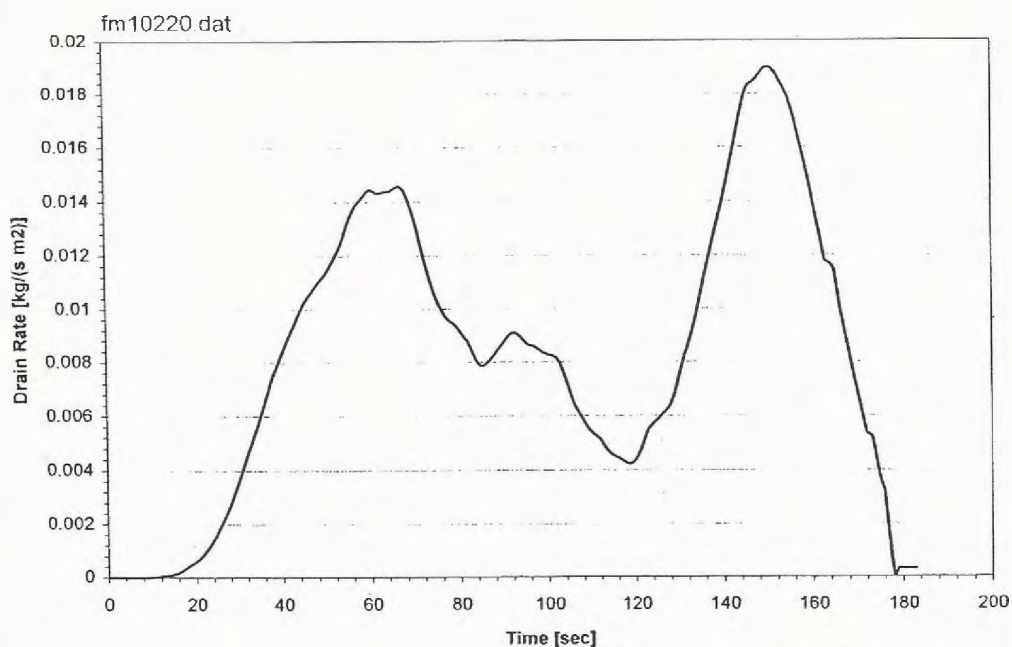


Fig. C275- Drain rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 7.26, irradiance= 50kW/m2, initial foam height= 25mm.

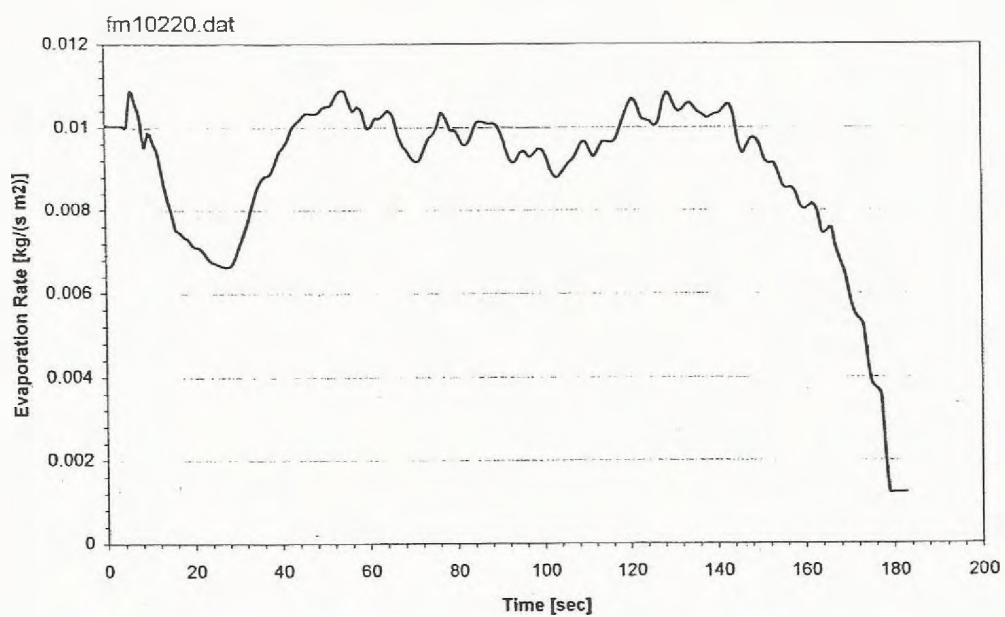


Fig. C276- Evaporation rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 7.26, irradiance= 50kW/m2, initial foam height= 25mm.

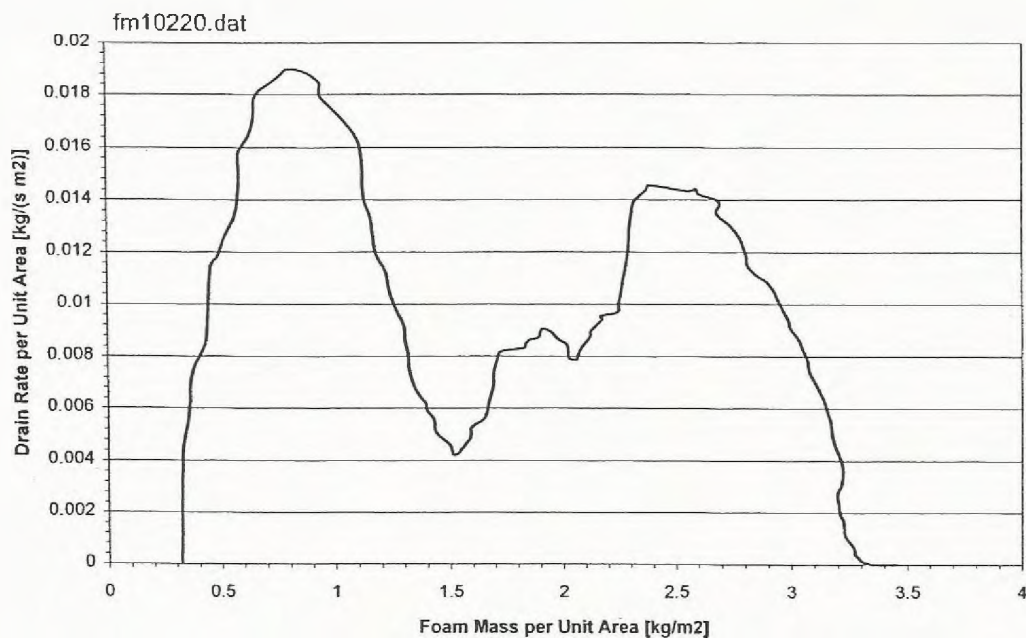


Fig. C277- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 7.26, irradiance= 50kW/m², initial foam height= 25mm.

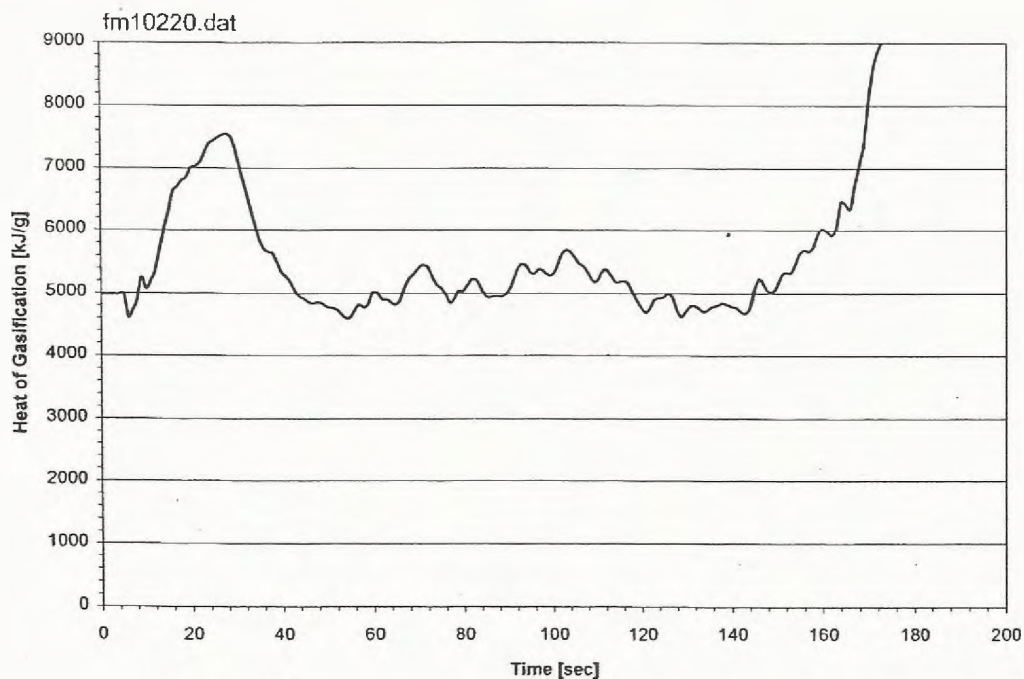


Fig. C278- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 7.26, irradiance= 50kW/m², initial foam height= 25mm.

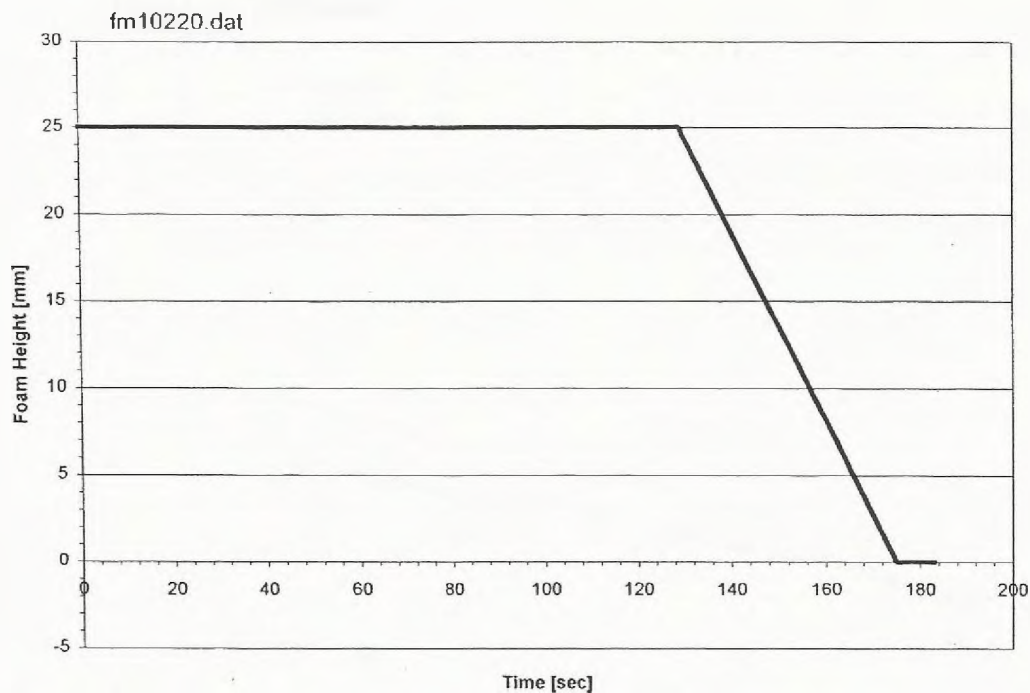


Fig. C279- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 7.26, irradiance= 50kW/m2, initial foam height= 25mm.

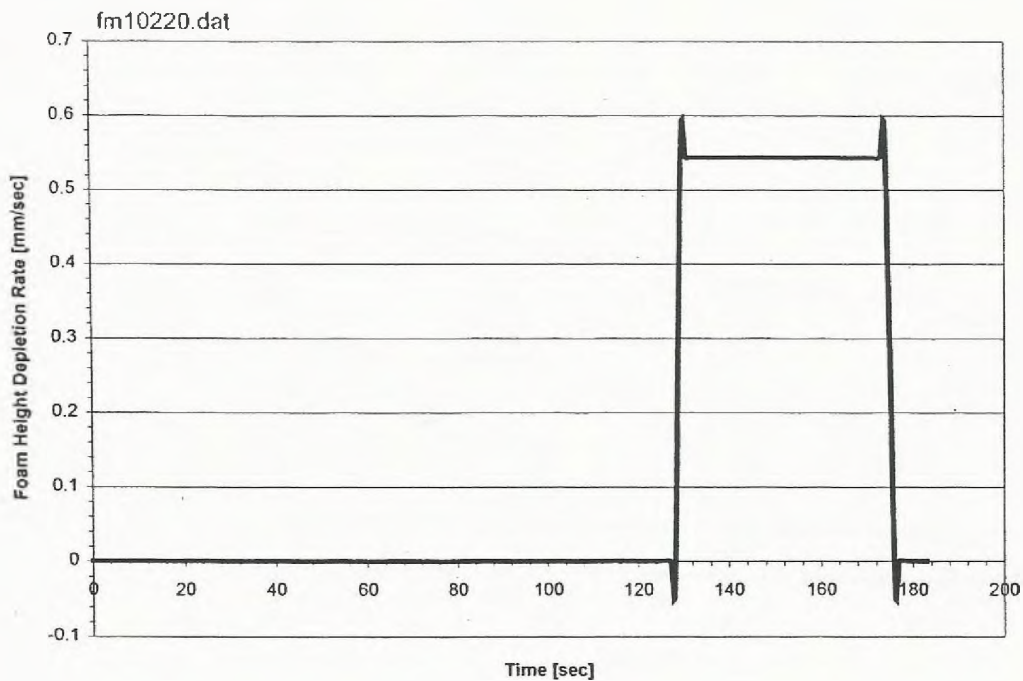


Fig. C280- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 7.26, irradiance= 50kW/m2, initial foam height= 25mm.

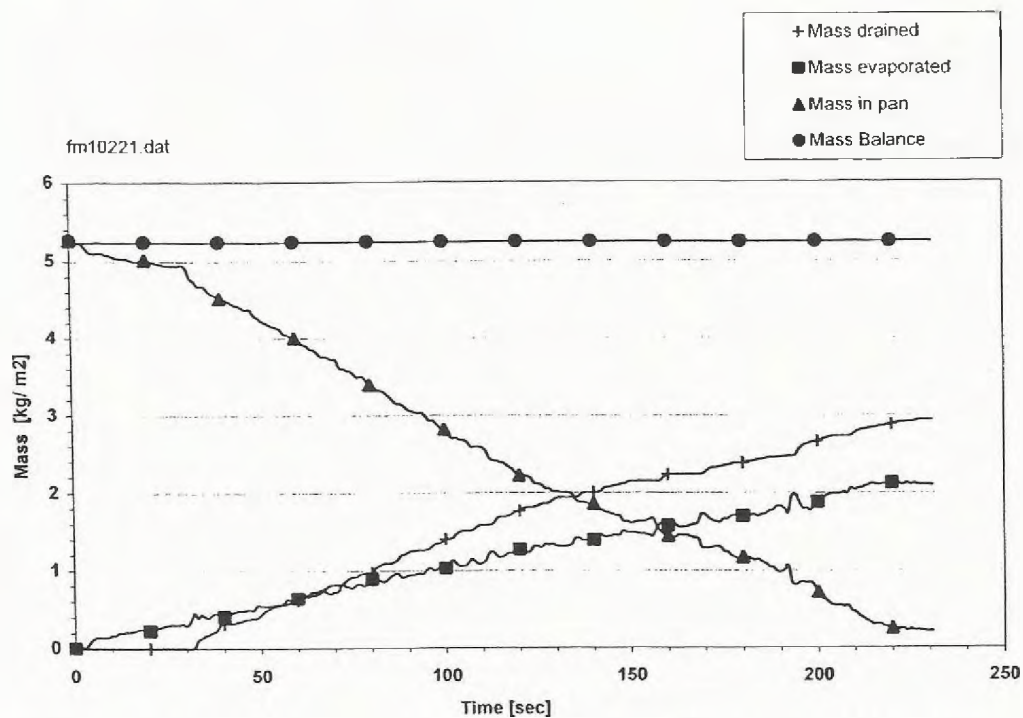


Fig. C281- Mass data in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 9.56, irradiance= 50kW/m², initial foam height= 50mm.

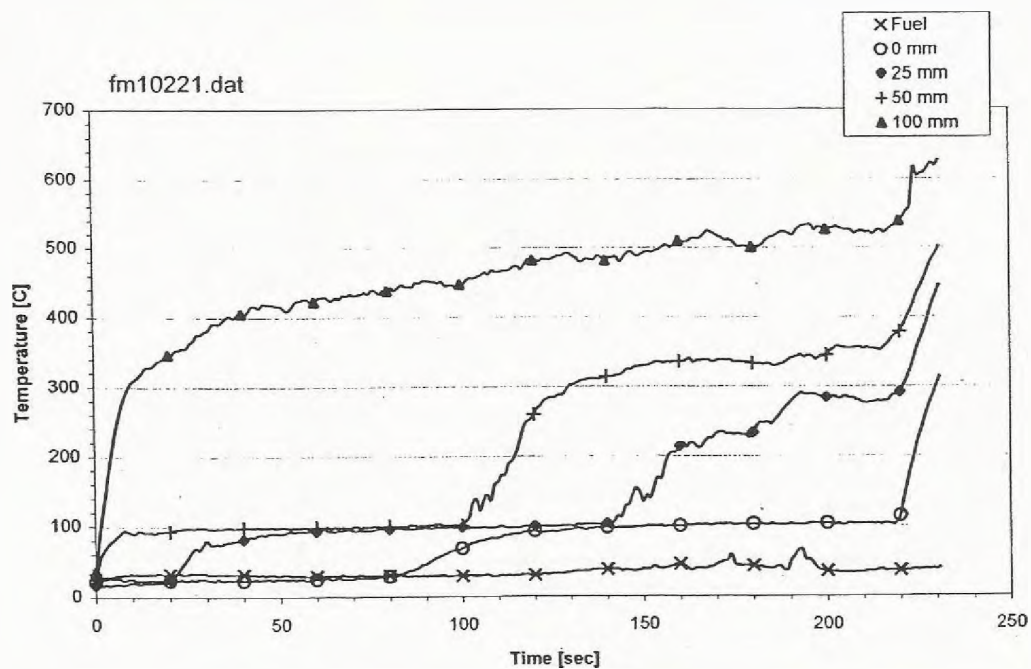


Fig. C282- Foam temperature in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 9.56, irradiance= 50kW/m², initial foam height= 50mm.



Fig. C283- Drain rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 9.56, irradiance= 50kW/m², initial foam height= 50mm.

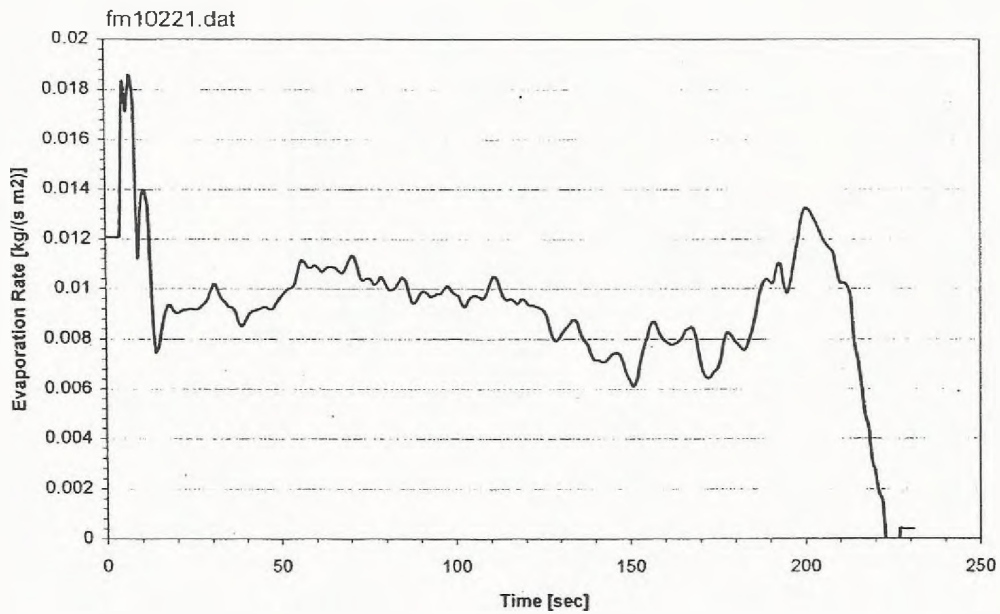


Fig. C284- Evaporation rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 9.56, irradiance= 50kW/m², initial foam height= 50mm.

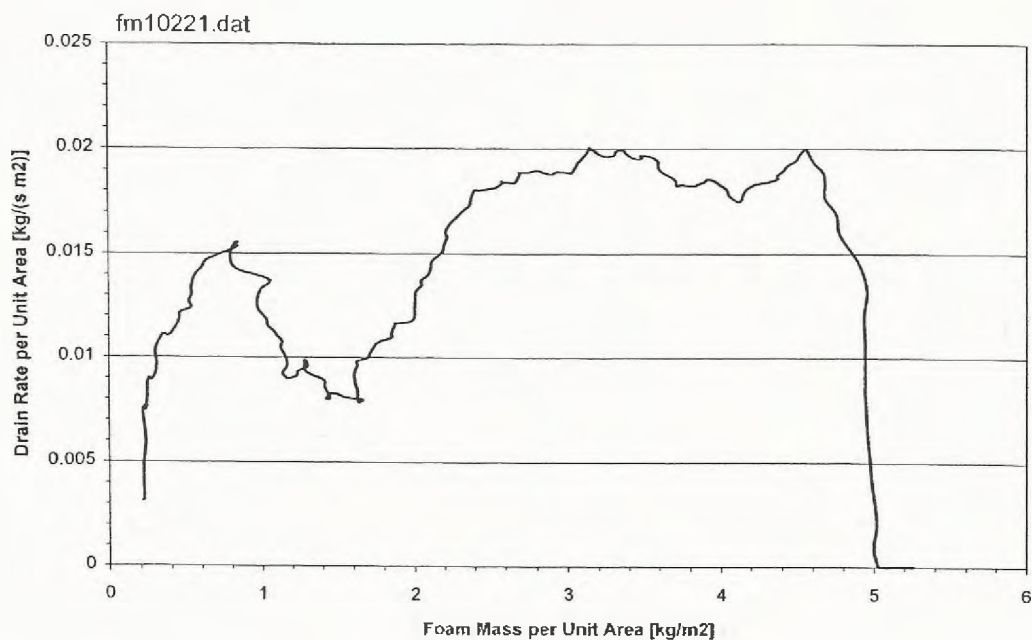


Fig. C285- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 9.56, irradiance= 50kW/m², initial foam height= 50mm.

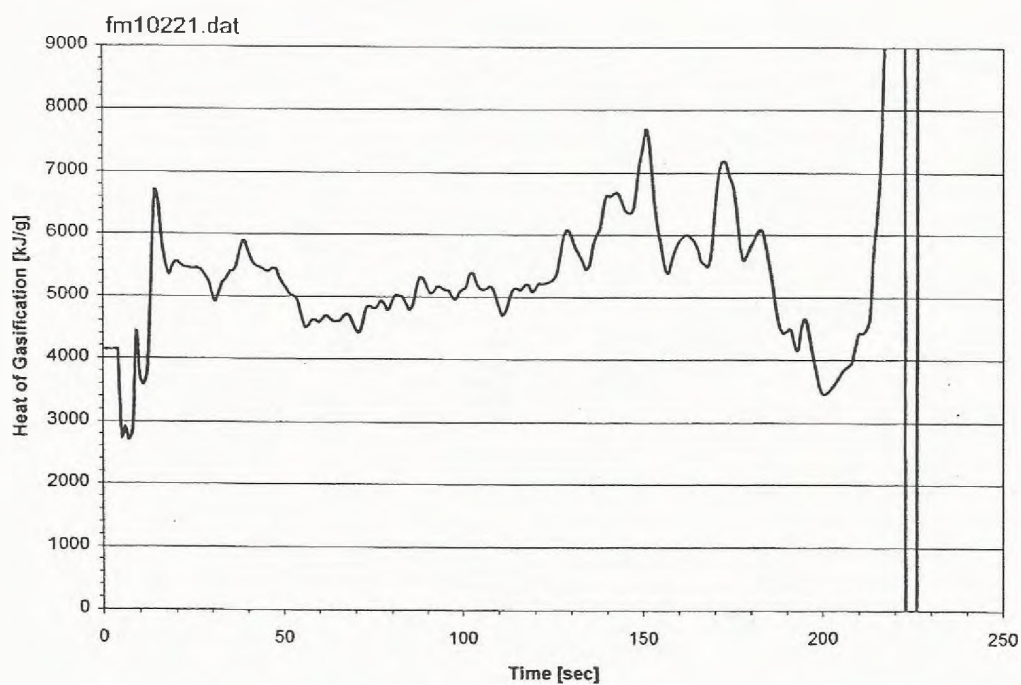


Fig. C286- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 9.56, irradiance= 50kW/m², initial foam height= 50mm.

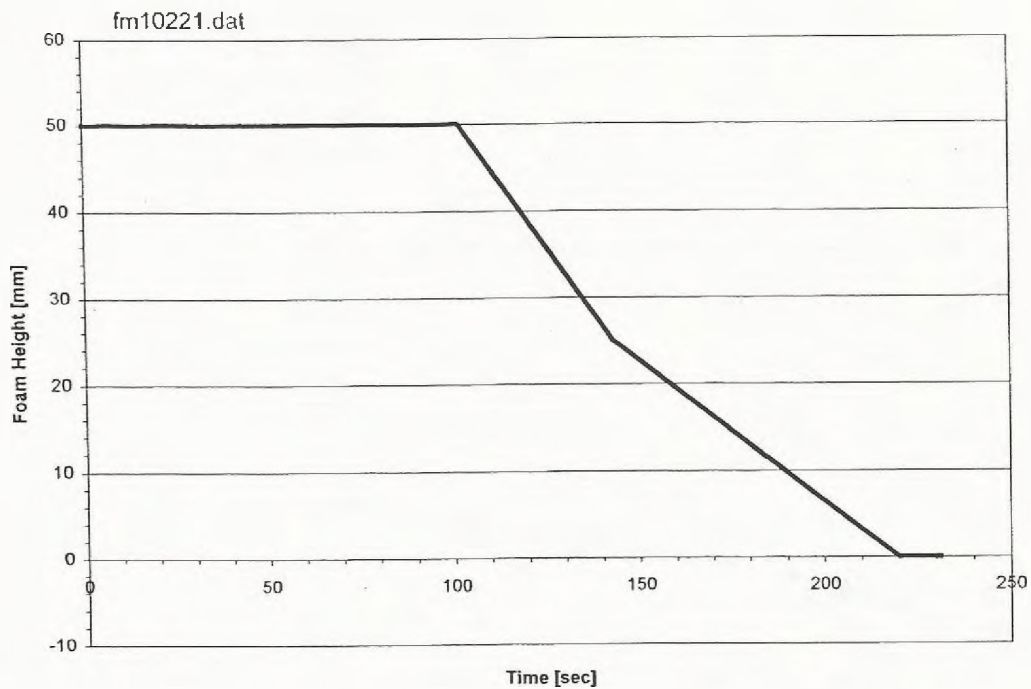


Fig. C287- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 9.56, irradiance= 50kW/m², initial foam height= 50mm.

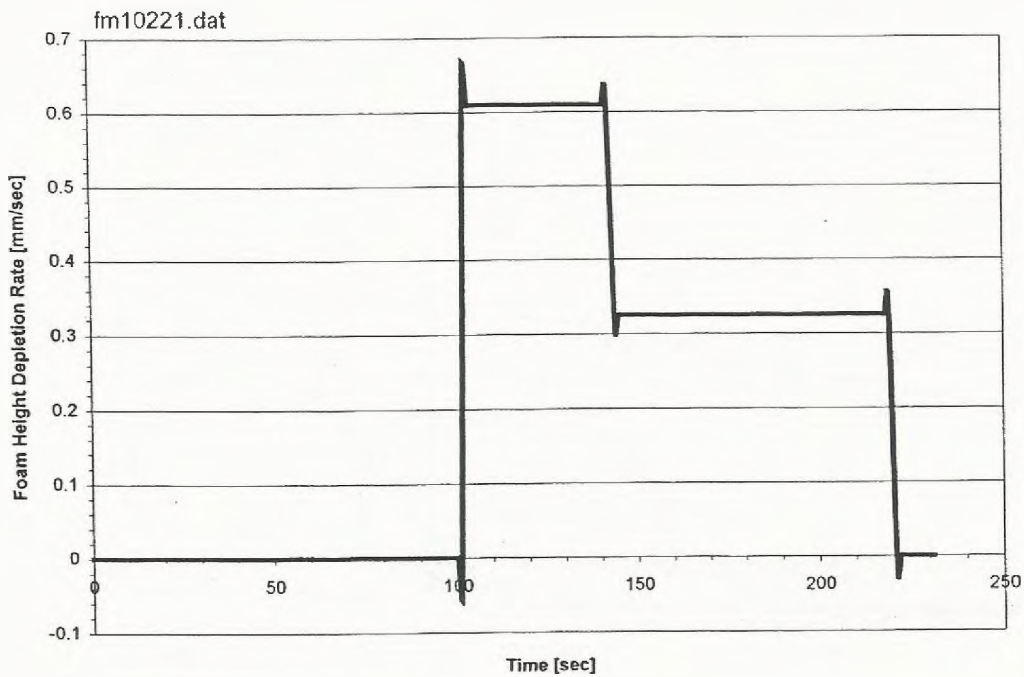


Fig. C288- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 9.56, irradiance= 50kW/m², initial foam height= 50mm.

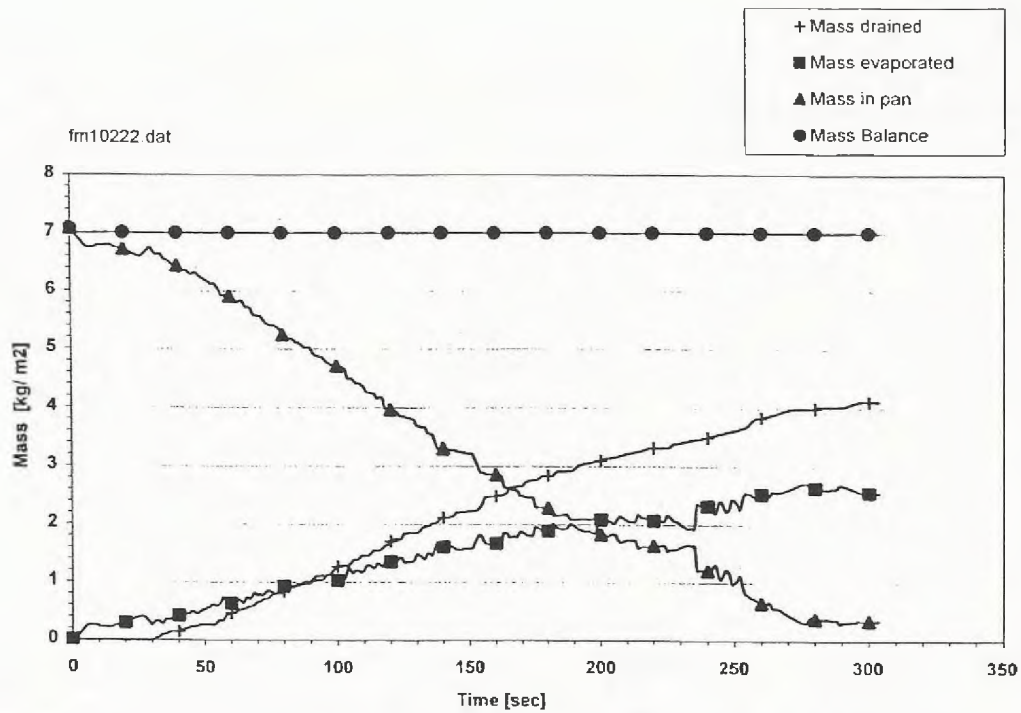


Fig. C289- Mass data in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 10.64, irradiance= 50kW/m², initial foam height= 75mm.

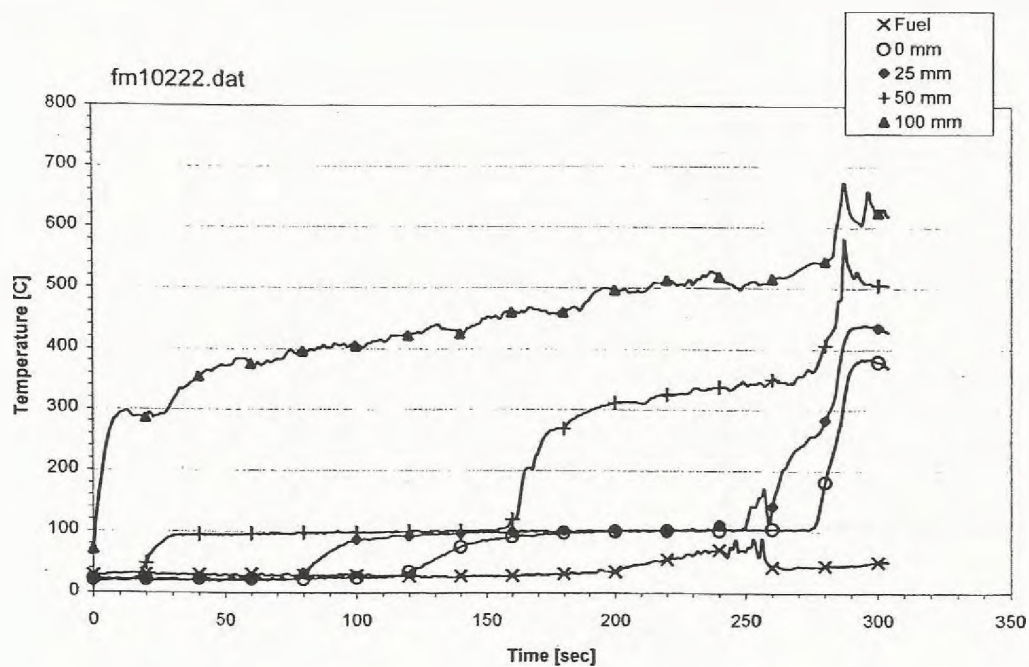


Fig. C290- Foam temperature in tests with foam on JP-5 at 20°C. Test conditions: expansion ratio= 10.64, irradiance= 50kW/m², initial foam height= 75mm.

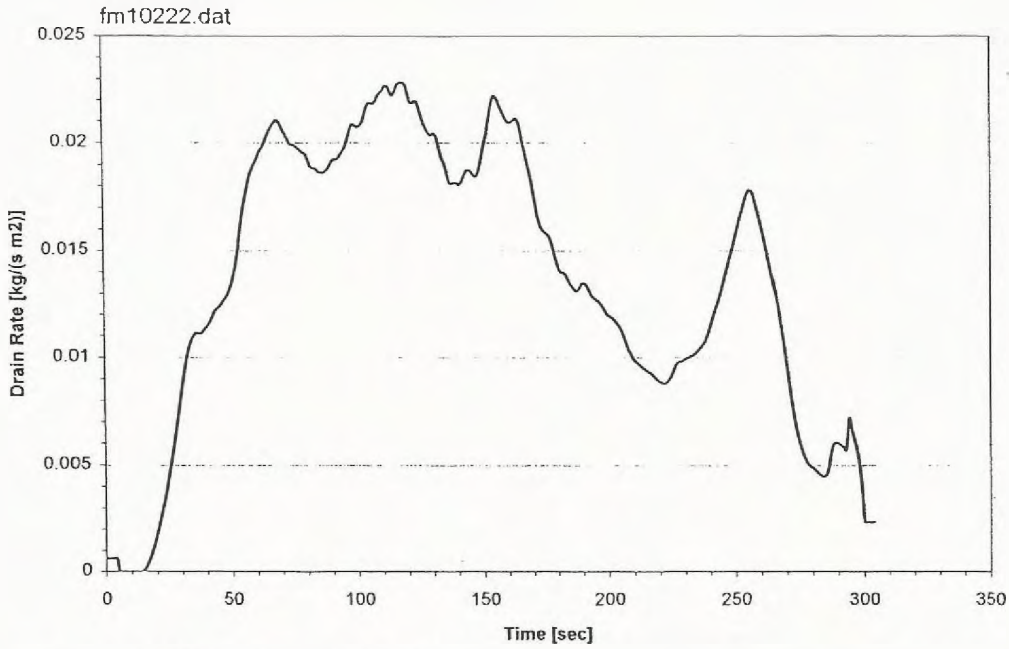


Fig. C291- Drain rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 10.64, irradiance= 50kW/m², initial foam height= 75mm.

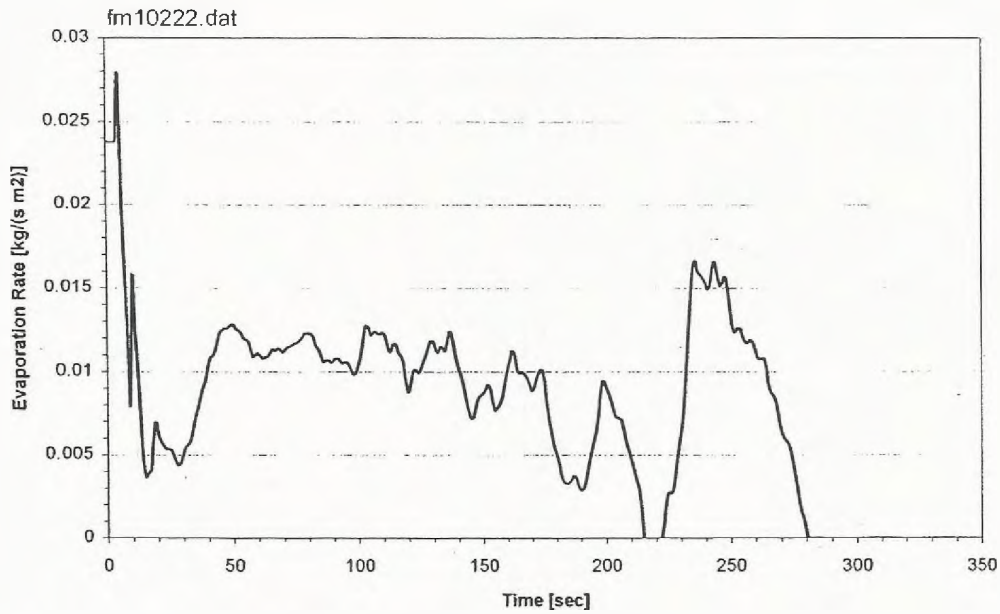


Fig. C292- Evaporation rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 10.64, irradiance= 50kW/m², initial foam height= 75mm.

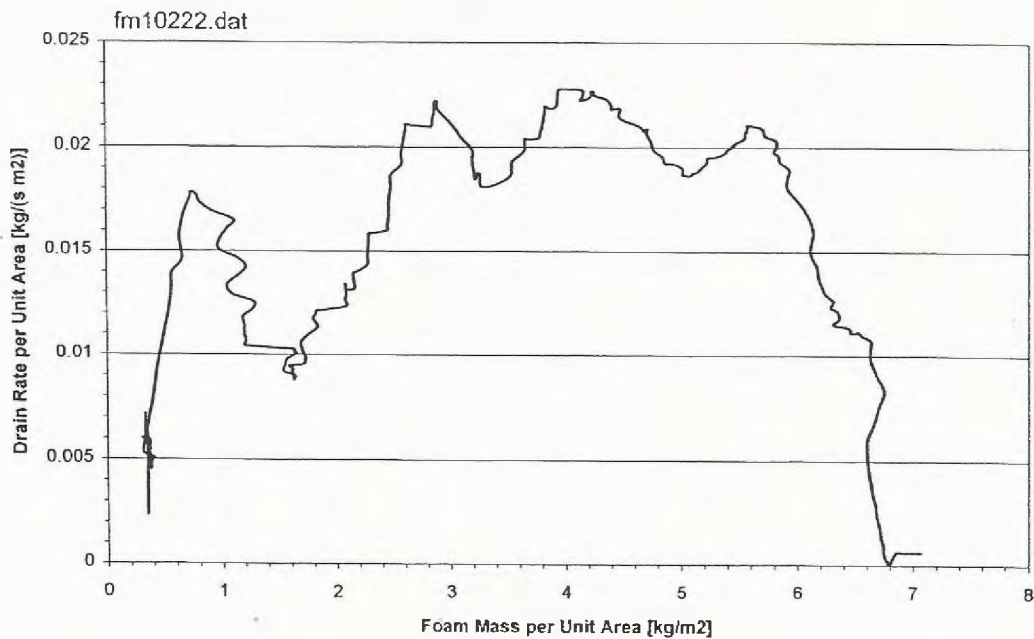


Fig. C293- Drain rate versus foam mass in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 10.64, irradiance= 50kW/m², initial foam height= 75mm.

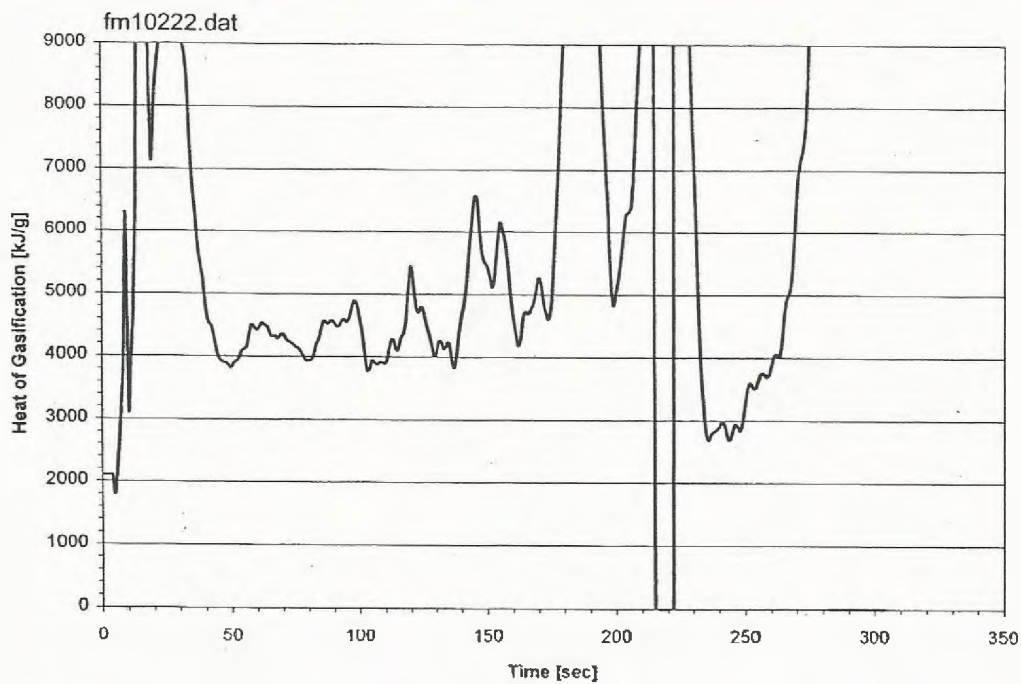


Fig. C294- Effective heat of vaporization in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 10.64, irradiance= 50kW/m², initial foam height= 75mm.

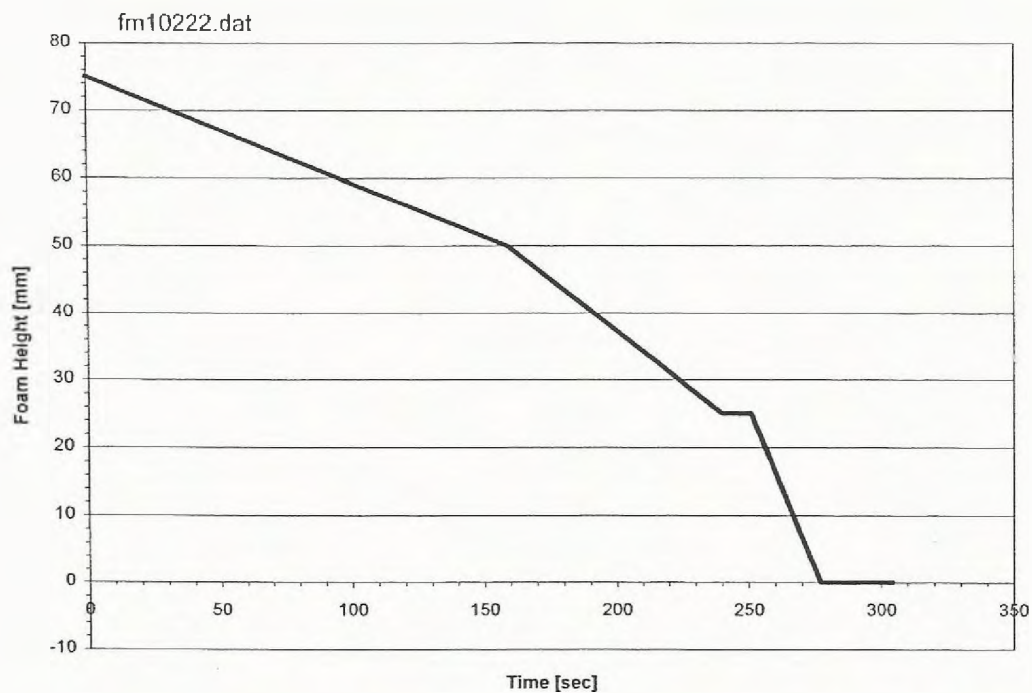


Fig. C295- Foam height in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 10.64, irradiance= 50kW/m², initial foam height= 75mm.

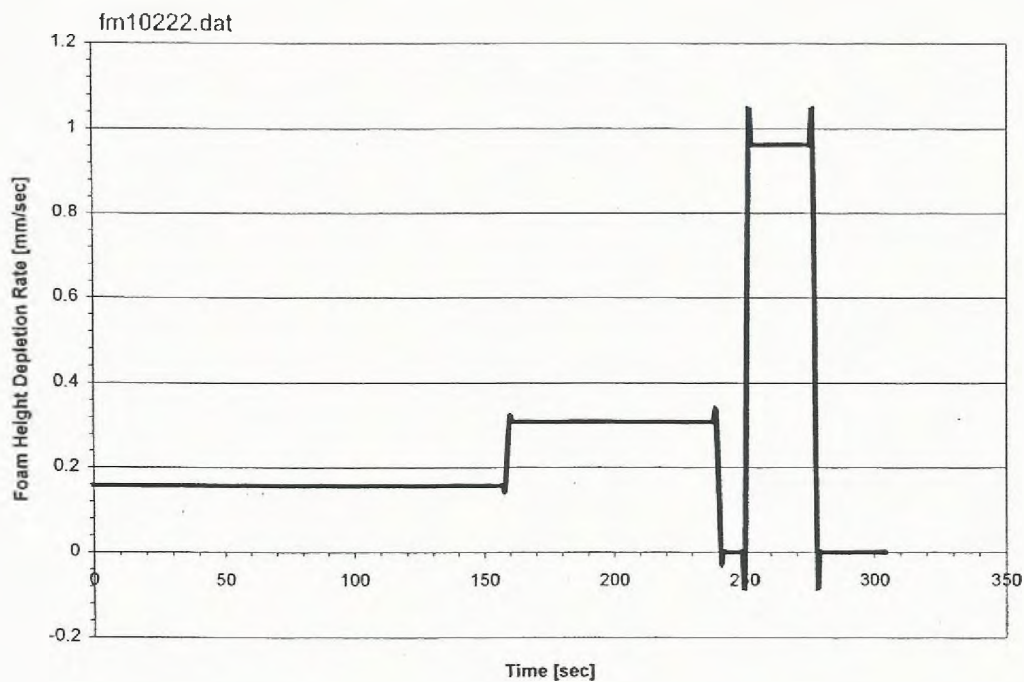


Fig. C296- Foam height depletion rate in tests with foam on JP-5 at 20C. Test conditions: expansion ratio= 10.64, irradiance= 50kW/m², initial foam height= 75mm.

APPENDIX D

TEST DATA – FOAM ON TOP OF JP-5 AT 50°C

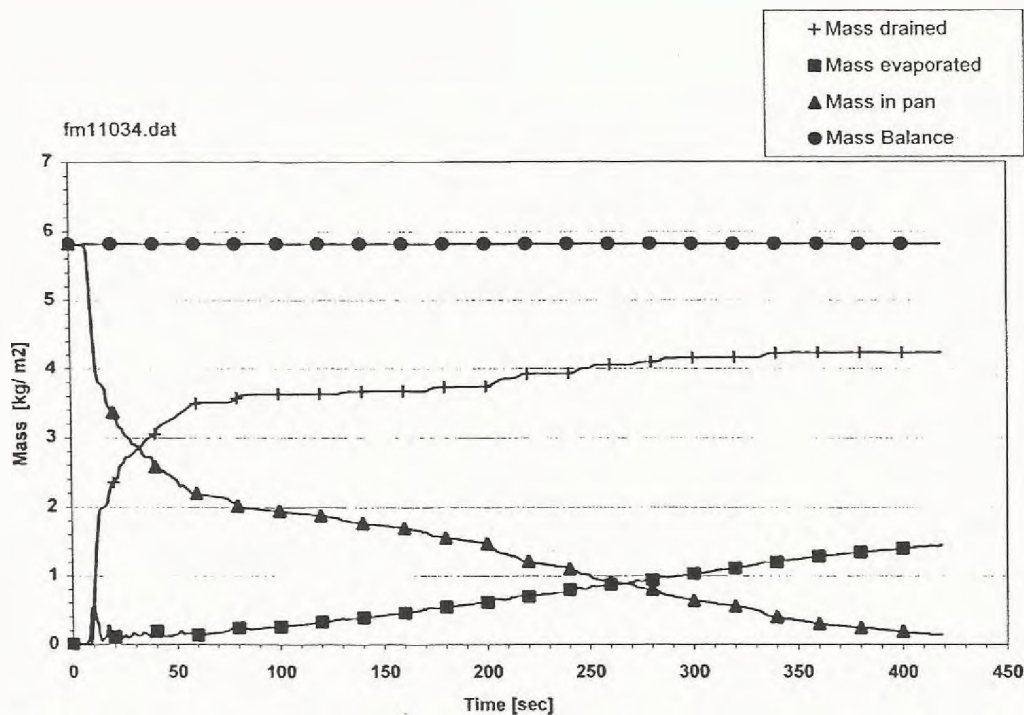


Fig. D1- Mass data in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 4.32, irradiance= 20kW/m², initial foam height= 25mm.

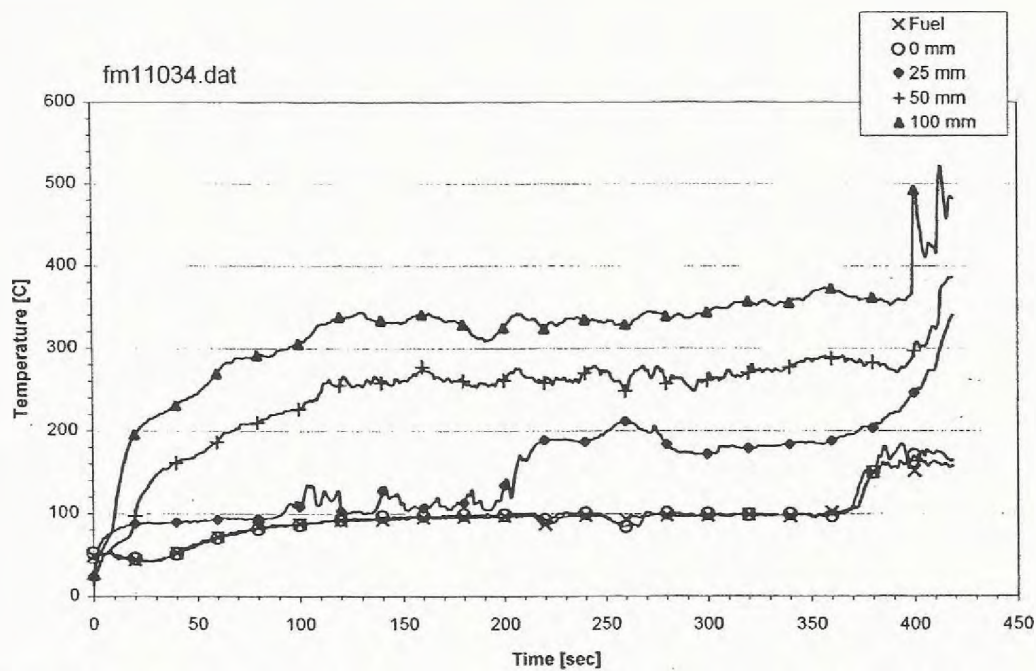


Fig. D2- Foam temperature in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 4.32, irradiance= 20kW/m², initial foam height= 25mm.

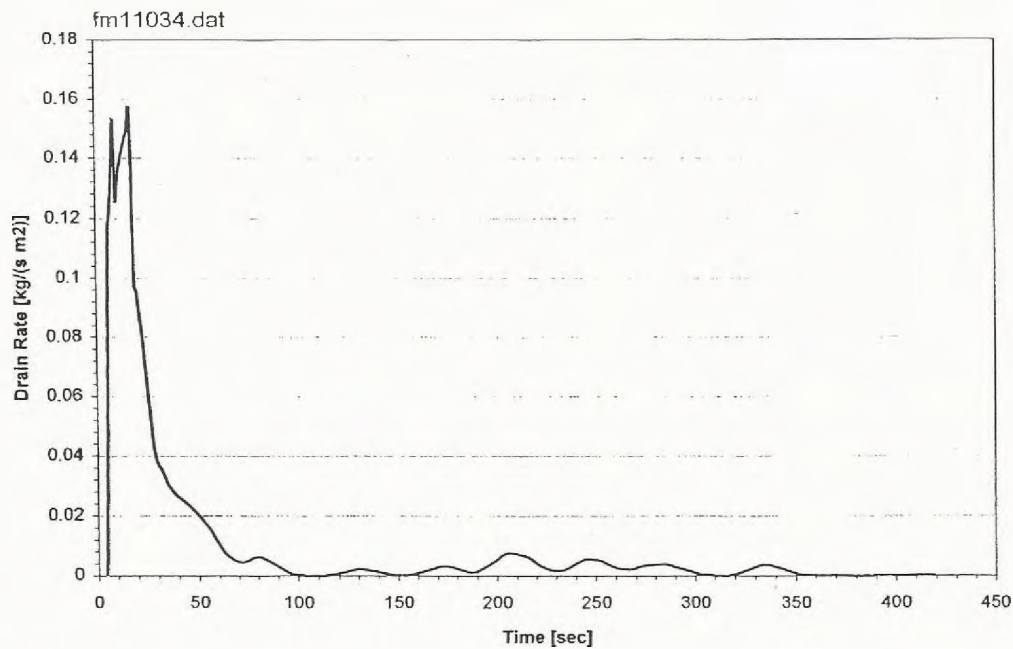


Fig. D3- Drain rate in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 4.32, irradiance= 20kW/m², initial foam height= 25mm.

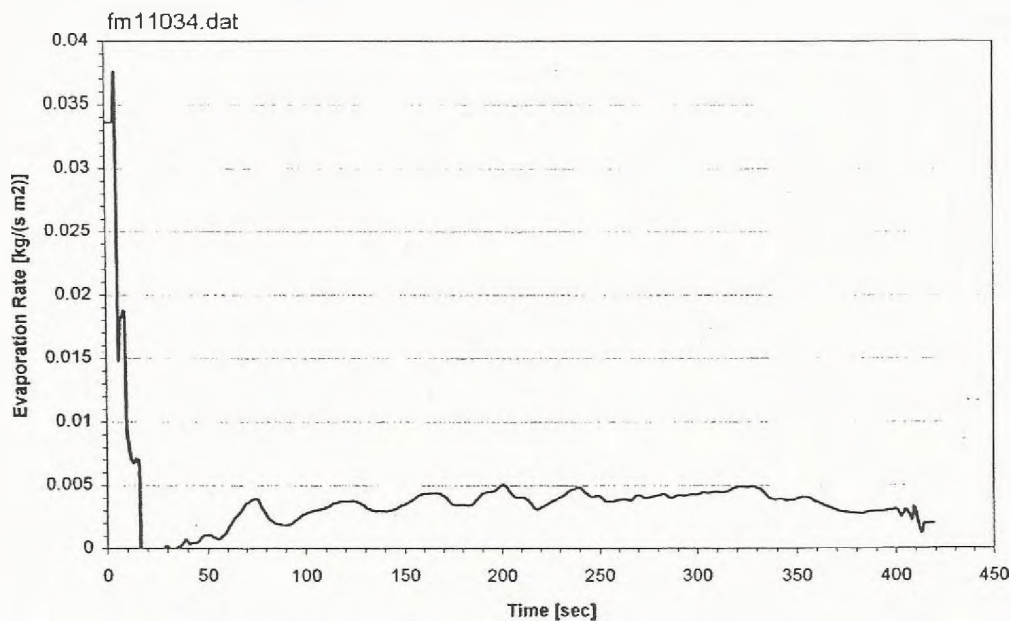


Fig. D4- Evaporation rate in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 4.32, irradiance= 20kW/m², initial foam height= 25mm.

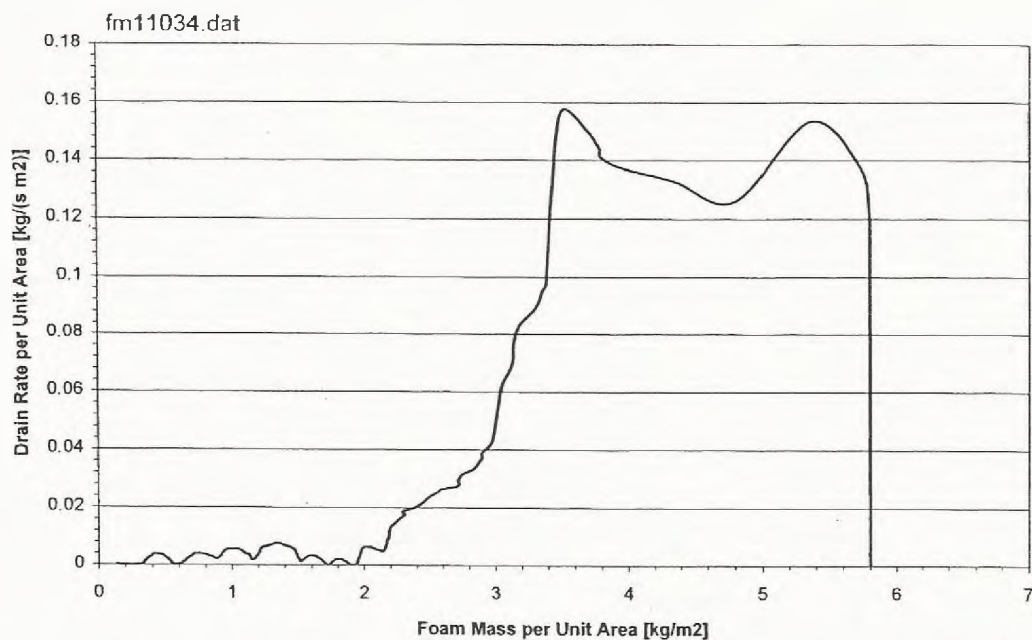


Fig. D5- Drain rate versus foam mass in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 4.32, irradiance= 20kW/m², initial foam height= 25mm.

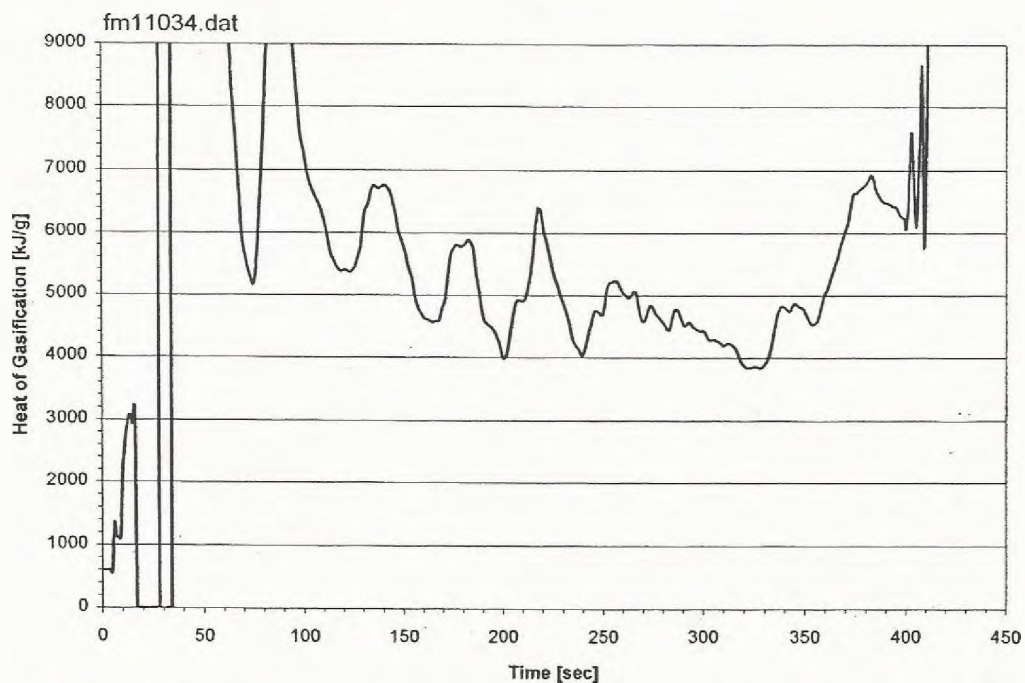


Fig. D6- Effective heat of vaporization in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 4.32, irradiance= 20kW/m², initial foam height= 25mm.

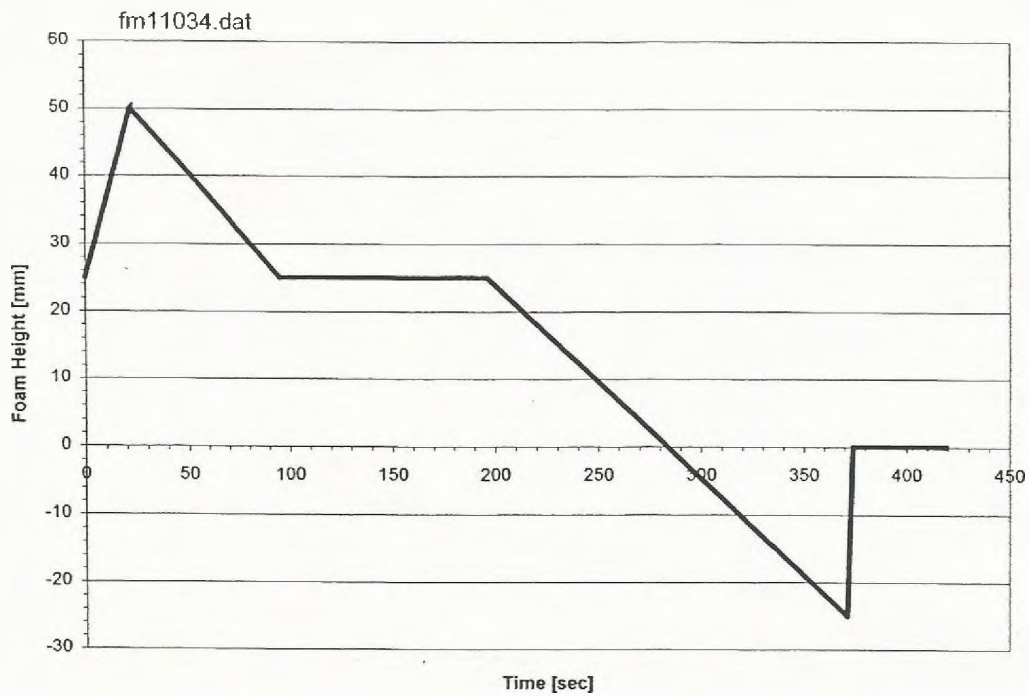


Fig. D7- Foam height in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 4.32, irradiance= 20kW/m², initial foam height= 25mm.

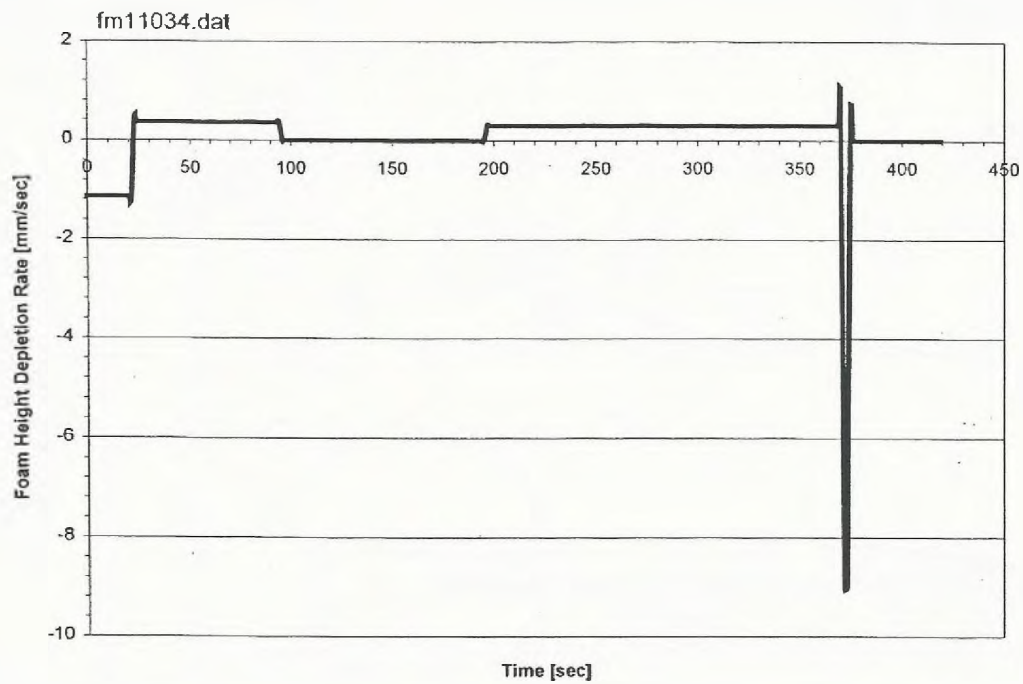


Fig. D8- Foam height depletion rate in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 4.32, irradiance= 20kW/m², initial foam height= 25mm.

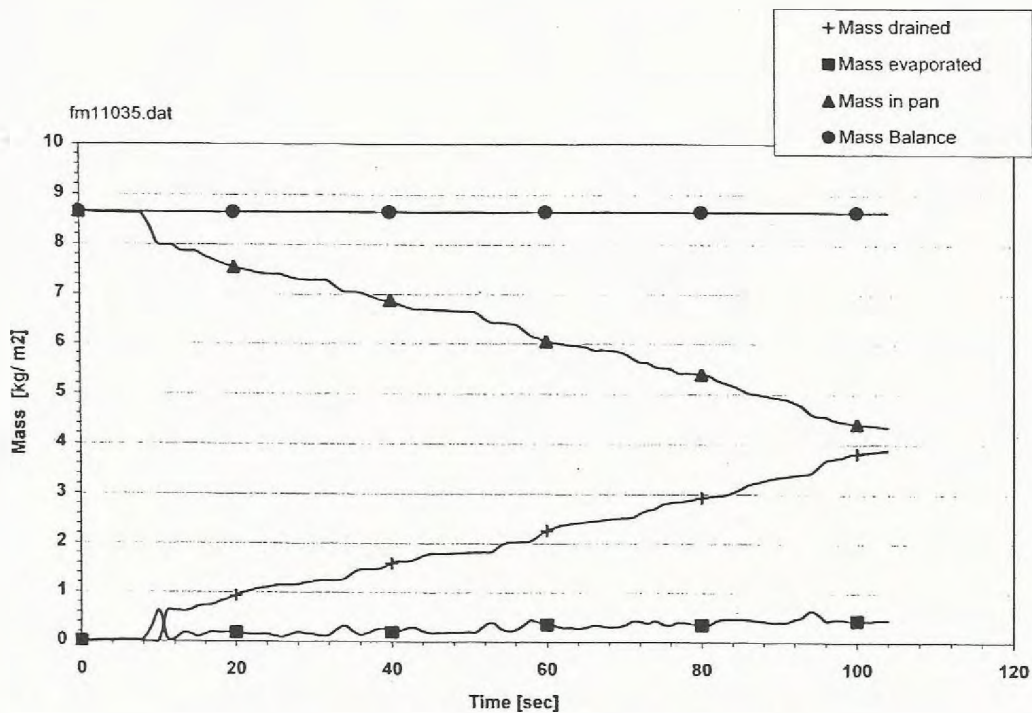


Fig. D9- Mass data in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 5.81, irradiance= 20kW/m², initial foam height= 50mm.

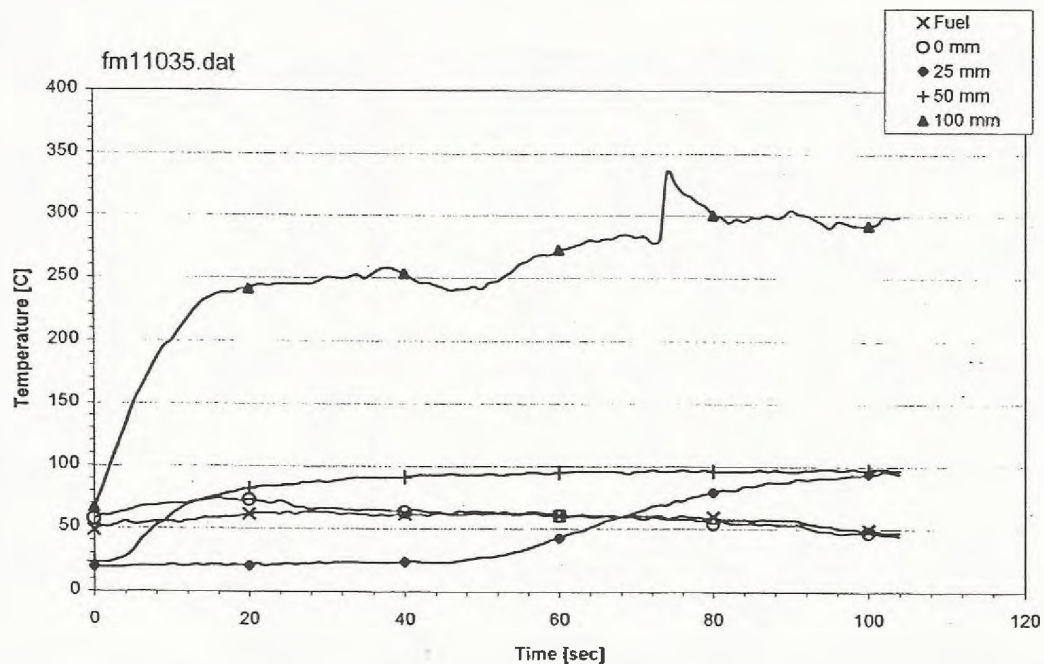


Fig. D10- Foam temperature in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 5.81, irradiance= 20kW/m², initial foam height= 50mm.

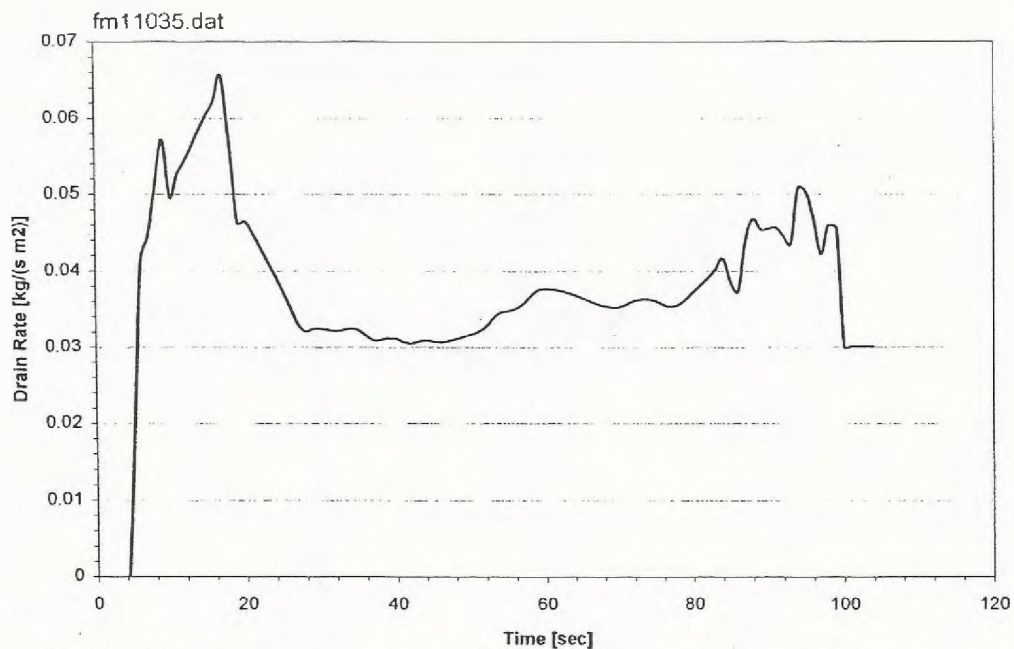


Fig. D11- Drain rate in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 5.81, irradiance= 20kW/m², initial foam height= 50mm.

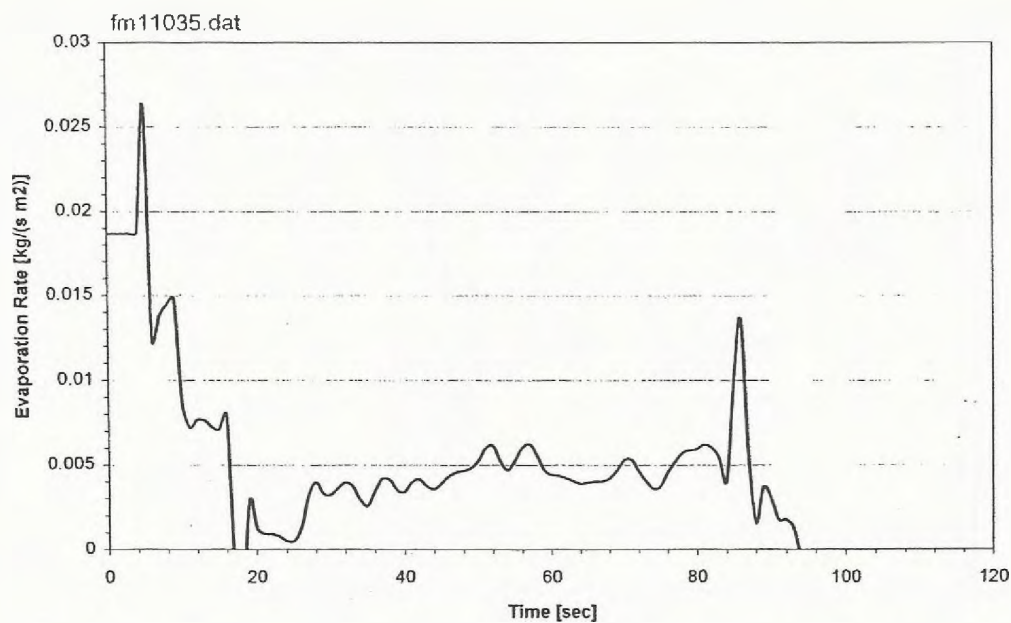


Fig. D12- Evaporation rate in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 5.81, irradiance= 20kW/m², initial foam height= 50mm.

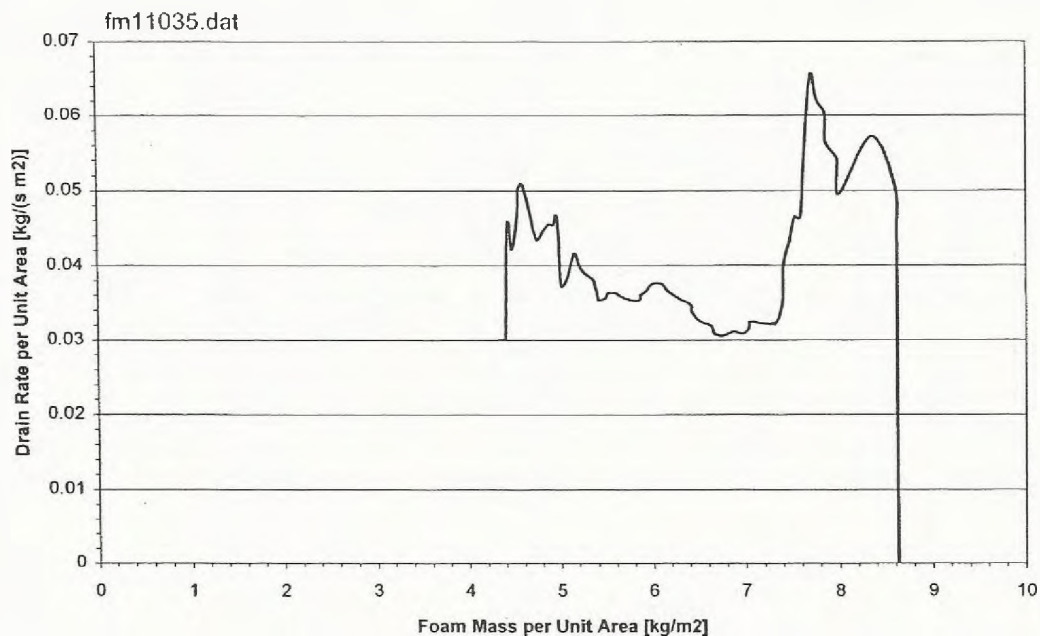


Fig. D13- Drain rate versus foam mass in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 5.81, irradiance= 20kW/m2, initial foam height= 50mm.

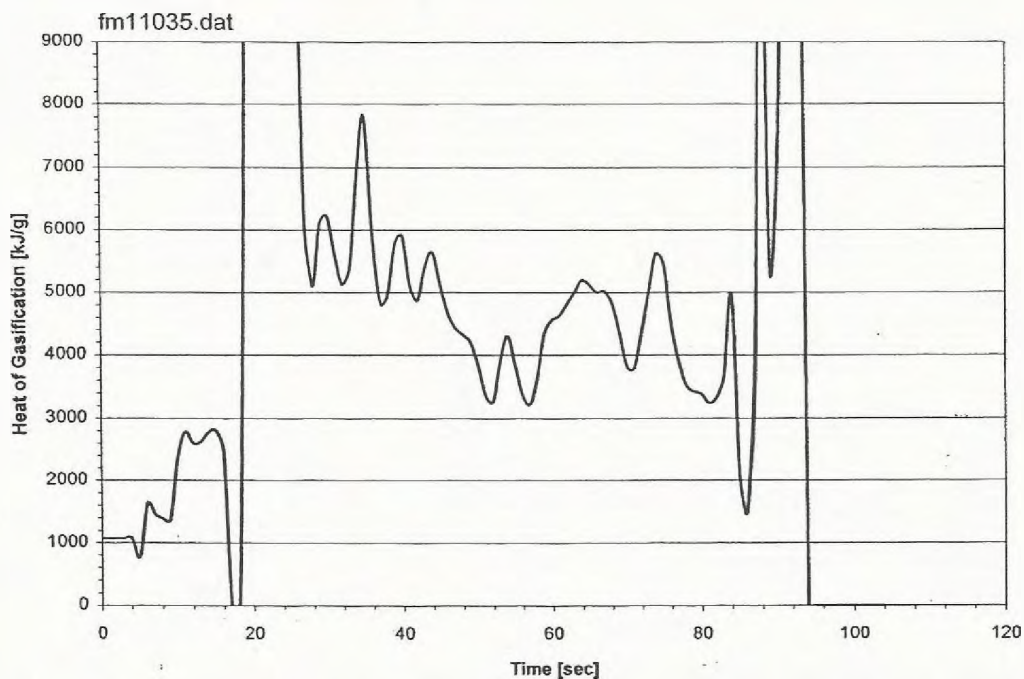


Fig. D14- Effective heat of vaporization in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 5.81, irradiance= 20kW/m2, initial foam height= 50mm.

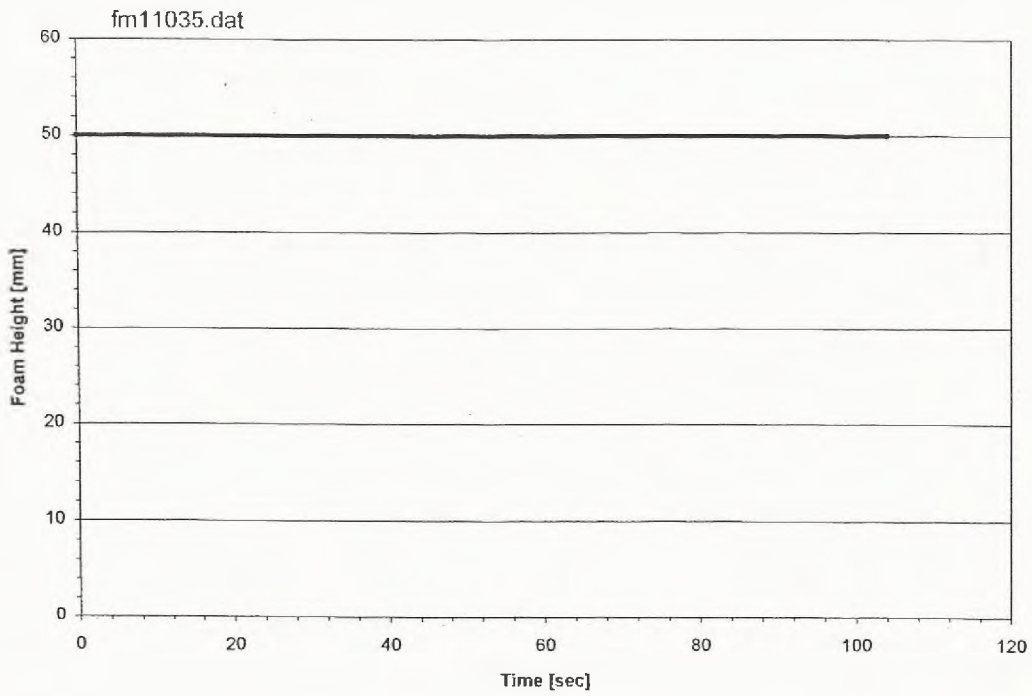


Fig. D15- Foam height in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 5.81, irradiance= 20kW/m², initial foam height= 50mm.

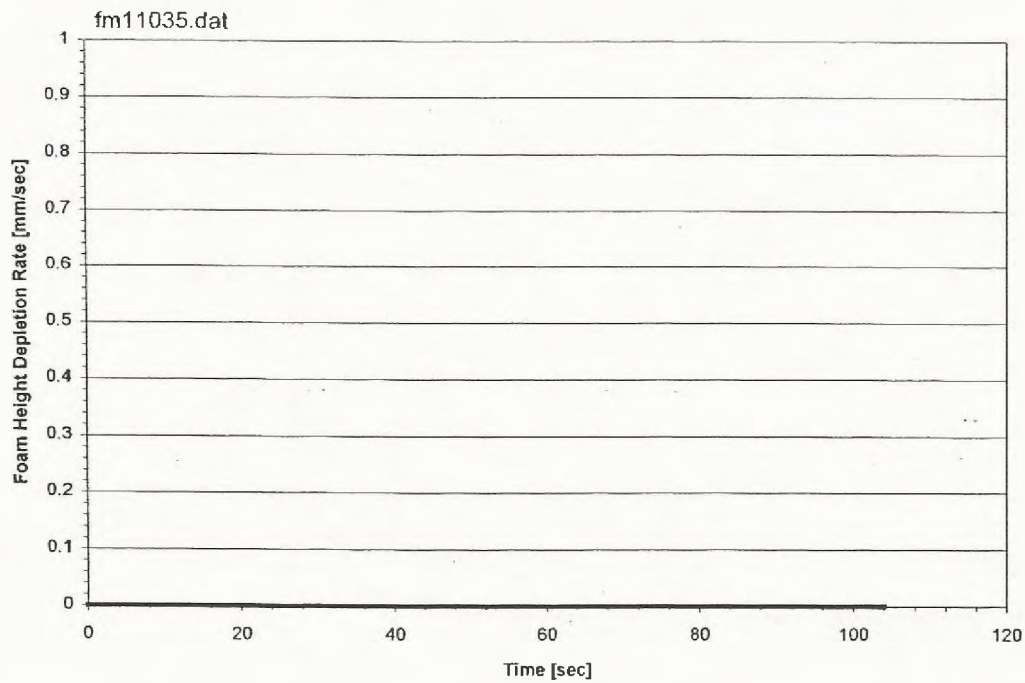


Fig. D16- Foam height depletion rate in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 5.81, irradiance= 20kW/m², initial foam height= 50mm.

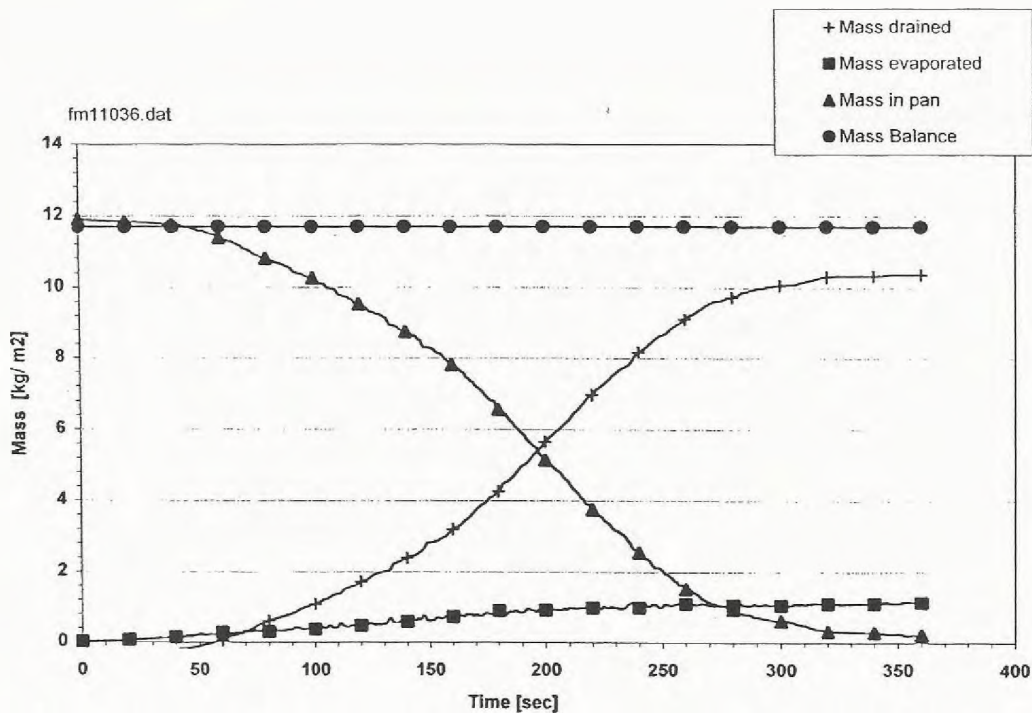


Fig. D17- Mass data in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.33, irradiance= 20kW/m², initial foam height= 75mm.

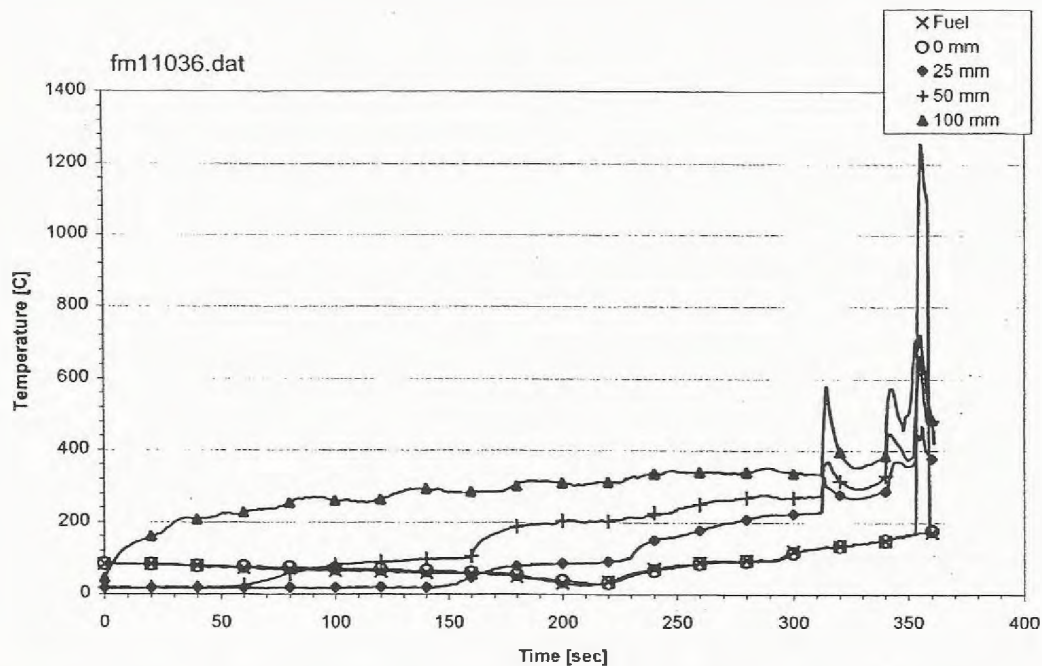


Fig. D18- Foam temperature in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.33, irradiance= 20kW/m², initial foam height= 75mm.

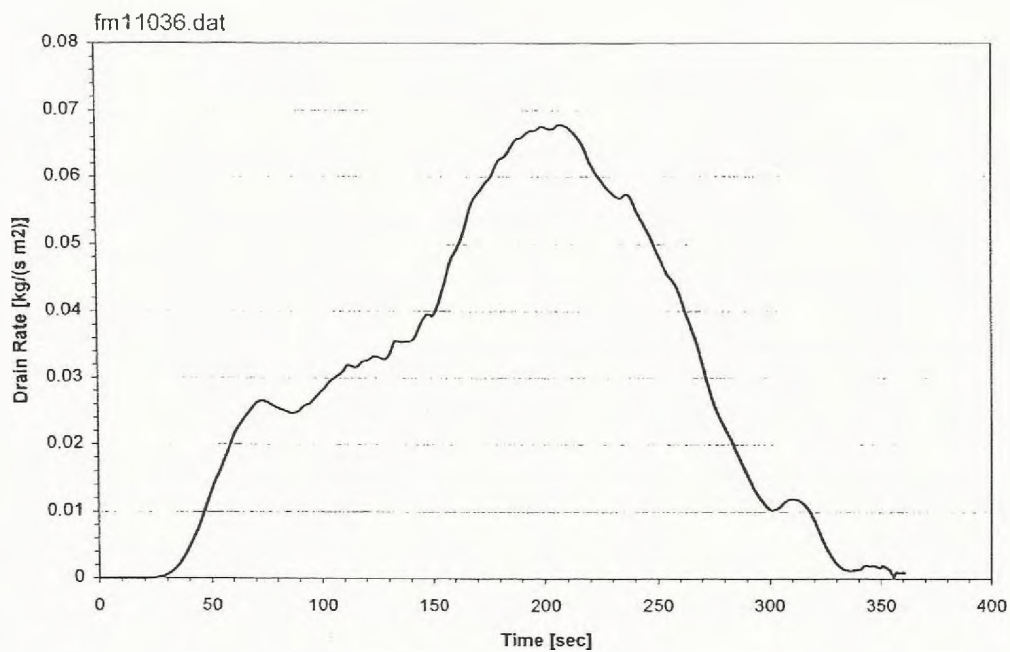


Fig. D19- Drain rate in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.33, irradiance= 20kW/m², initial foam height= 75mm.

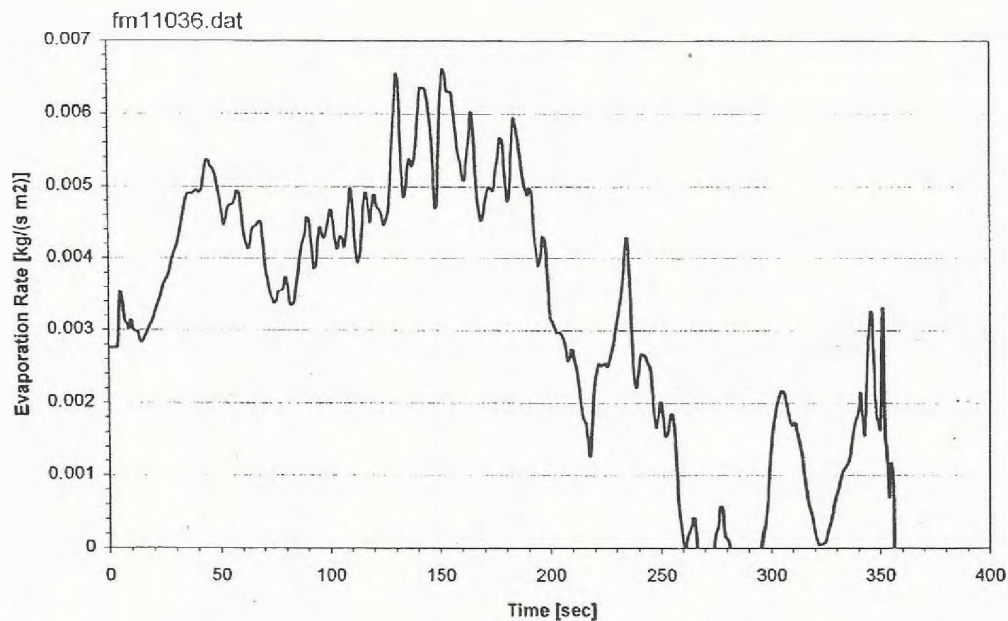


Fig. D20- Evaporation rate in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.33, irradiance= 20kW/m², initial foam height= 75mm.

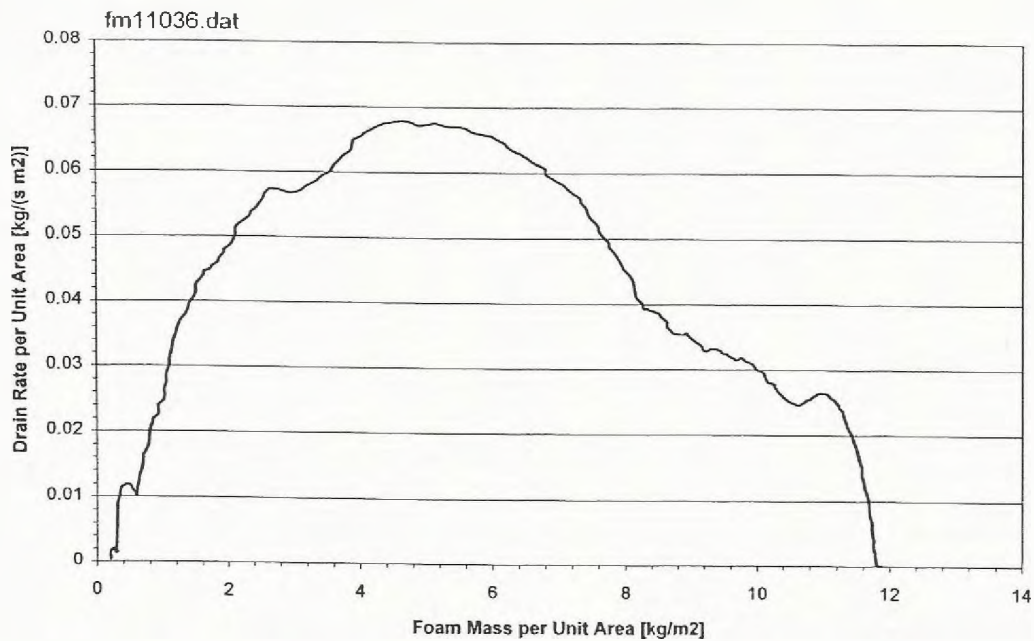


Fig. D21- Drain rate versus foam mass in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.33, irradiance= 20kW/m², initial foam height= 75mm.

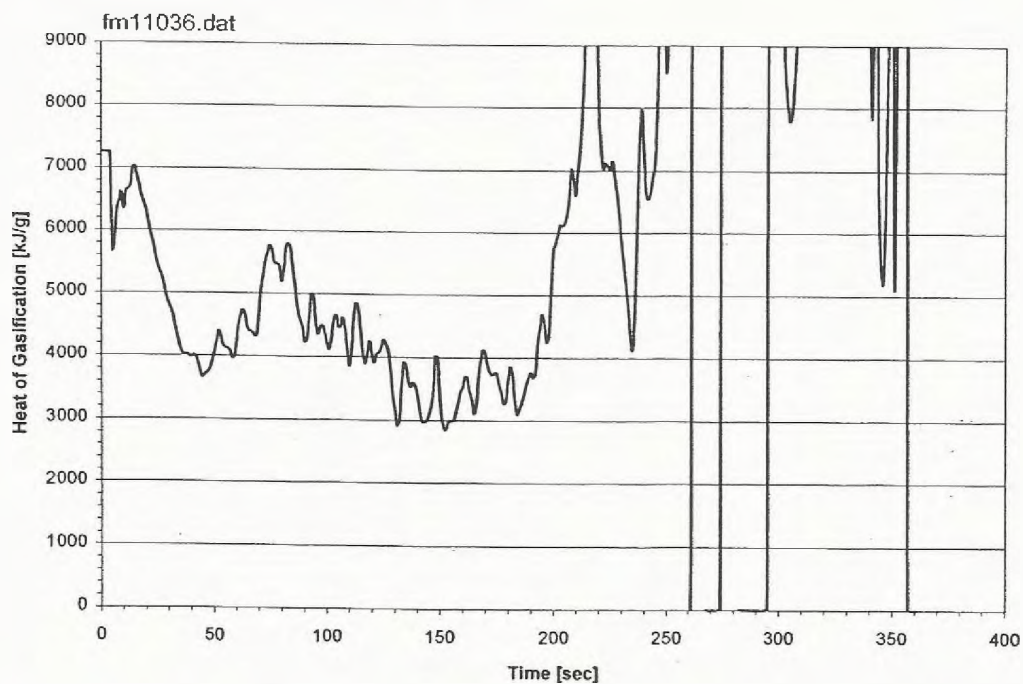


Fig. D22- Effective heat of vaporization in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.33, irradiance= 20kW/m², initial foam height= 75mm.

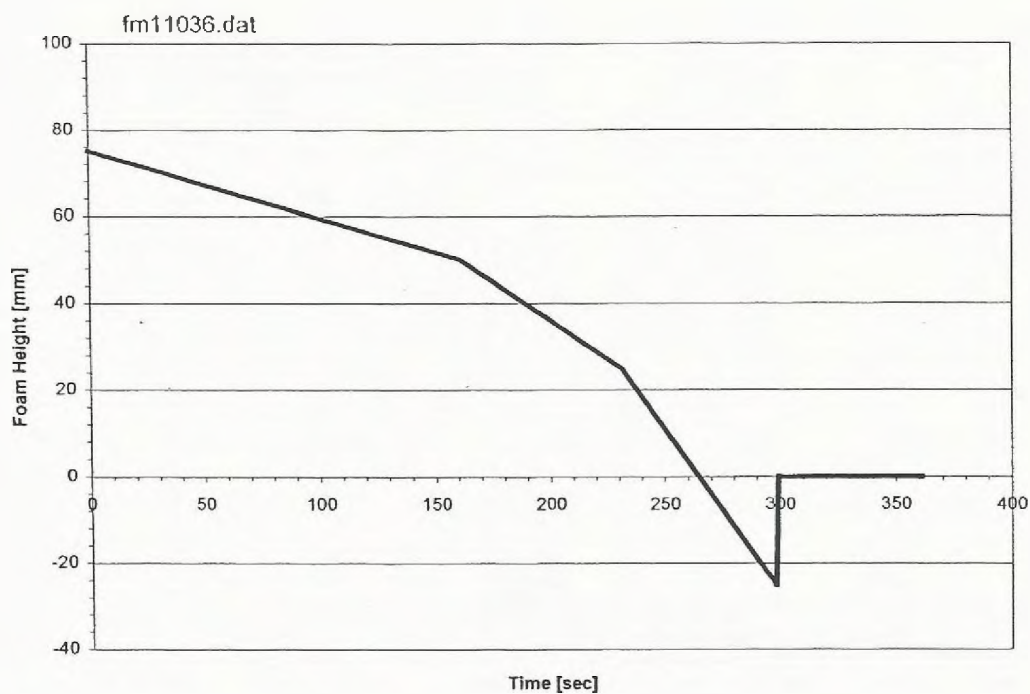


Fig. D23- Foam height in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.33, irradiance= 20kW/m2, initial foam height= 75mm.

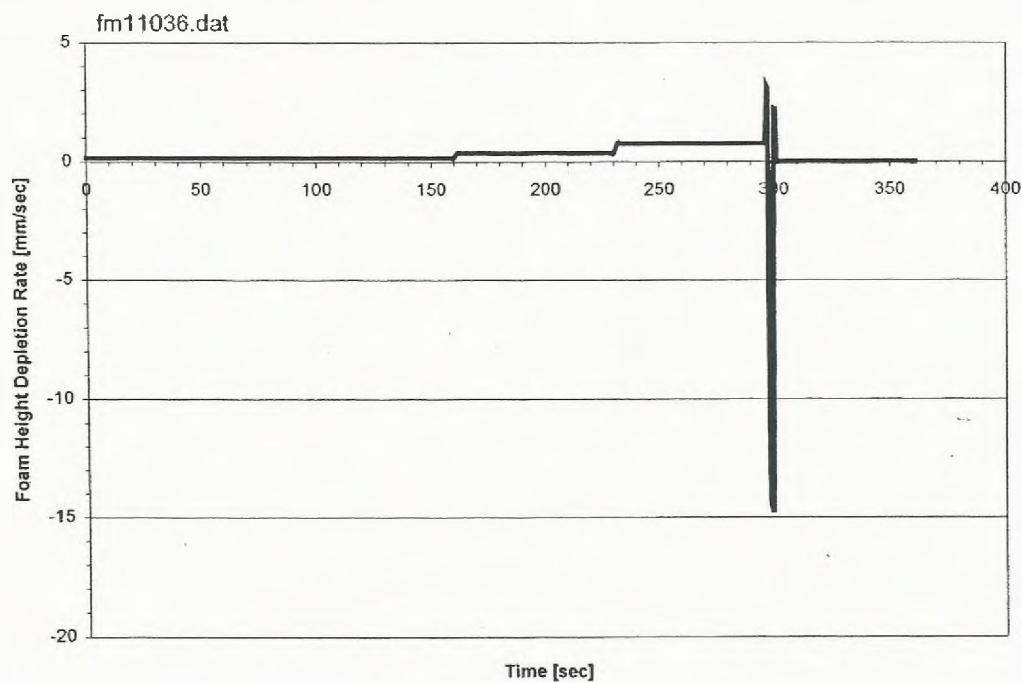


Fig. D24- Foam height depletion rate in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.33, irradiance= 20kW/m2, initial foam height= 75mm.

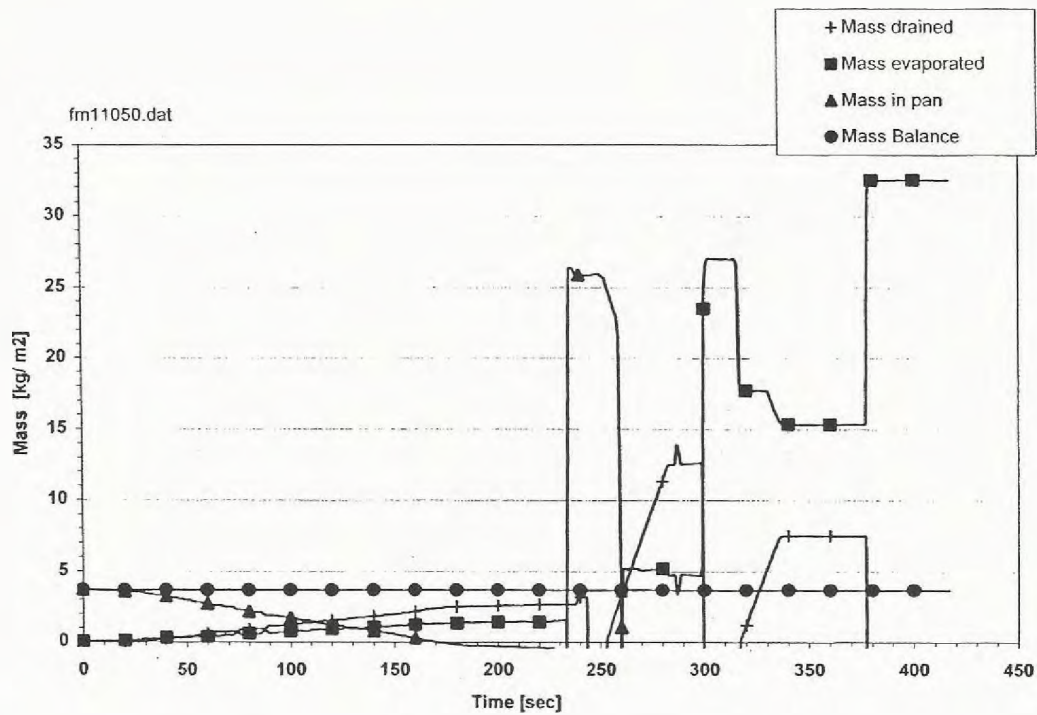


Fig. D25- Mass data in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.85, irradiance= 35kW/m², initial foam height= 25mm.

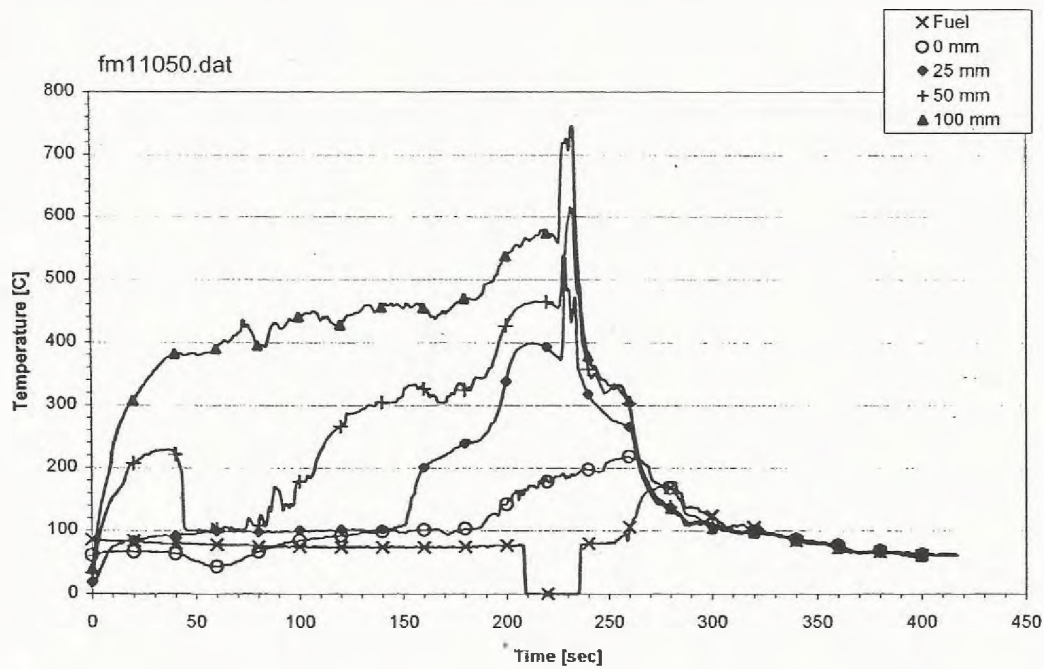


Fig. D26- Foam temperature in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.85, irradiance= 35kW/m², initial foam height= 25mm.

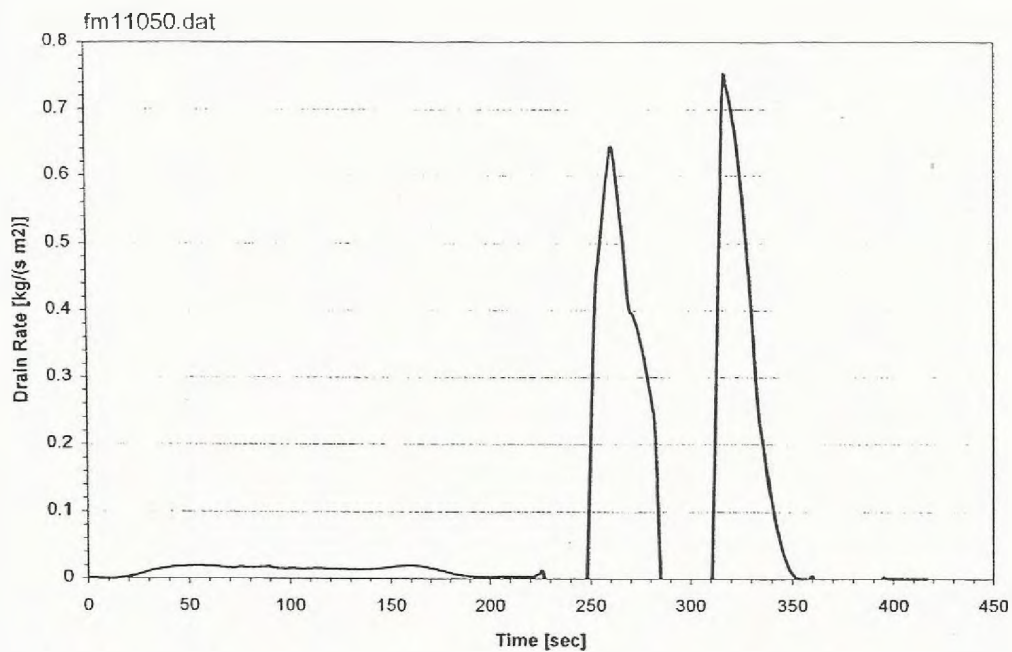


Fig. D27- Drain rate in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.85, irradiance= 35kW/m², initial foam height= 25mm.

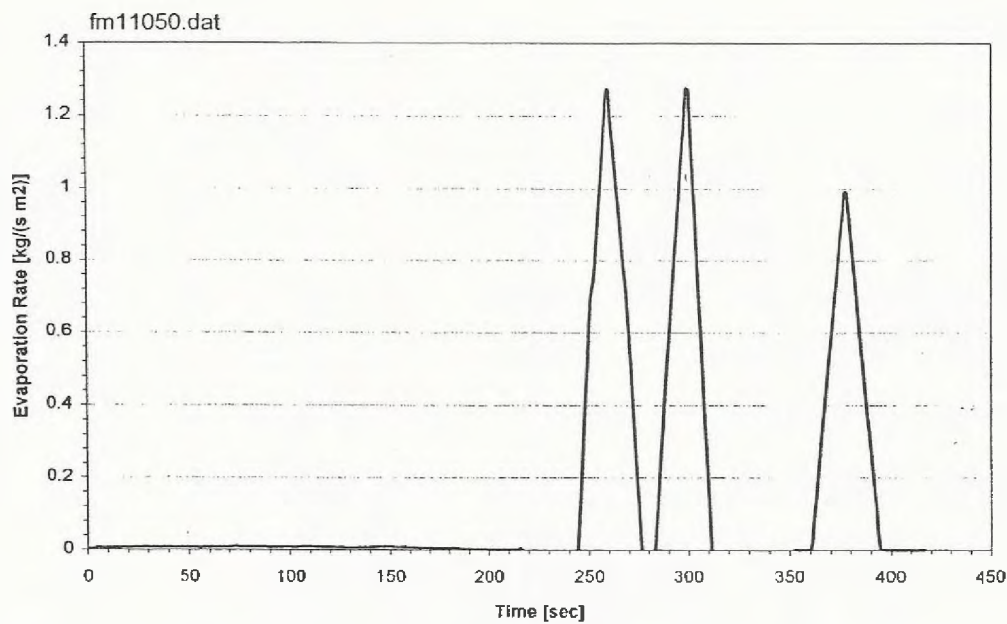


Fig. D28- Evaporation rate in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.85, irradiance= 35kW/m², initial foam height= 25mm.

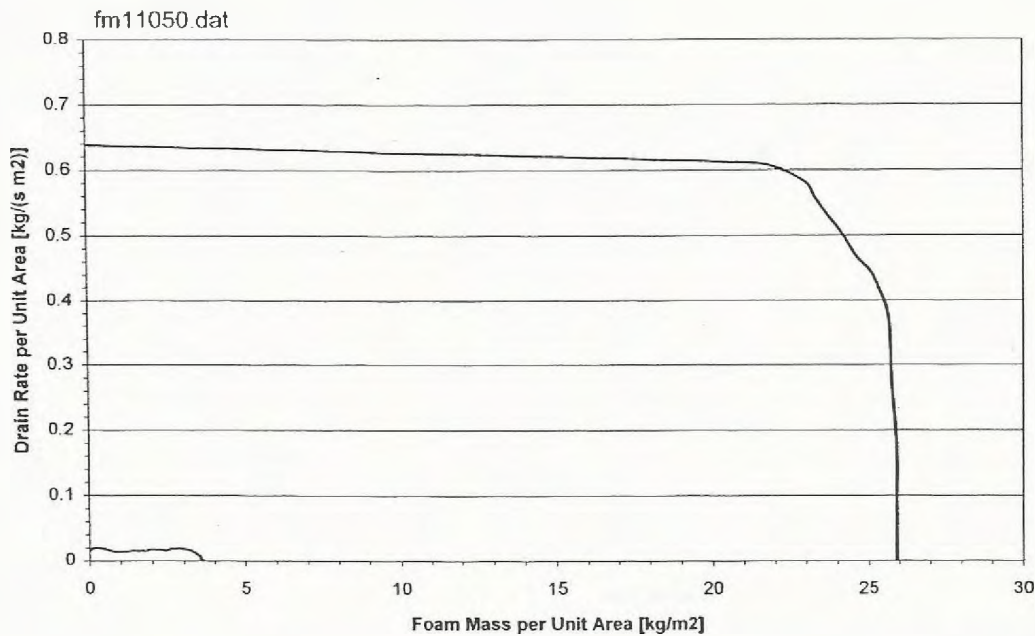


Fig. D29- Drain rate versus foam mass in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.85, irradiance= 35kW/m², initial foam height= 25mm.

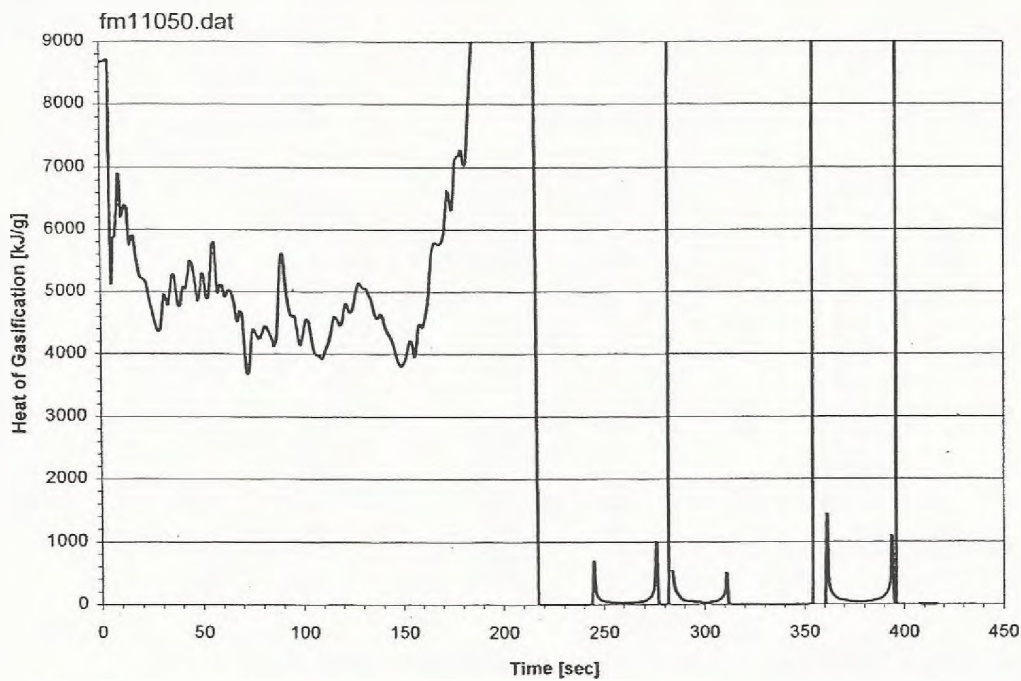


Fig. D30- Effective heat of vaporization in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.85, irradiance= 35kW/m², initial foam height= 25mm.

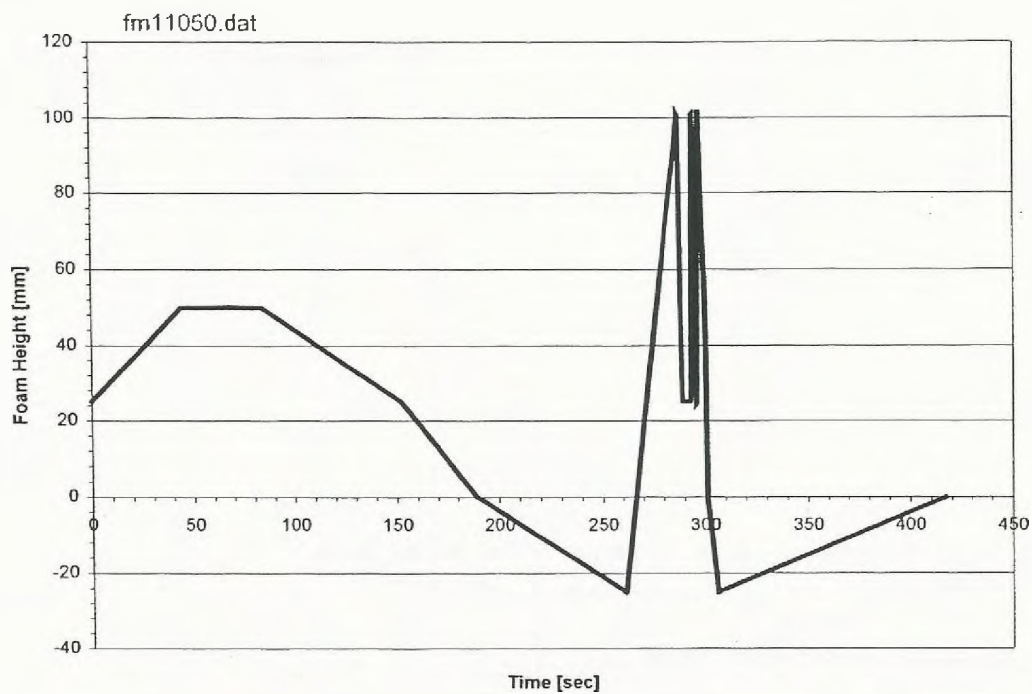


Fig. D31- Foam height in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.85, irradiance= 35kW/m², initial foam height= 25mm.

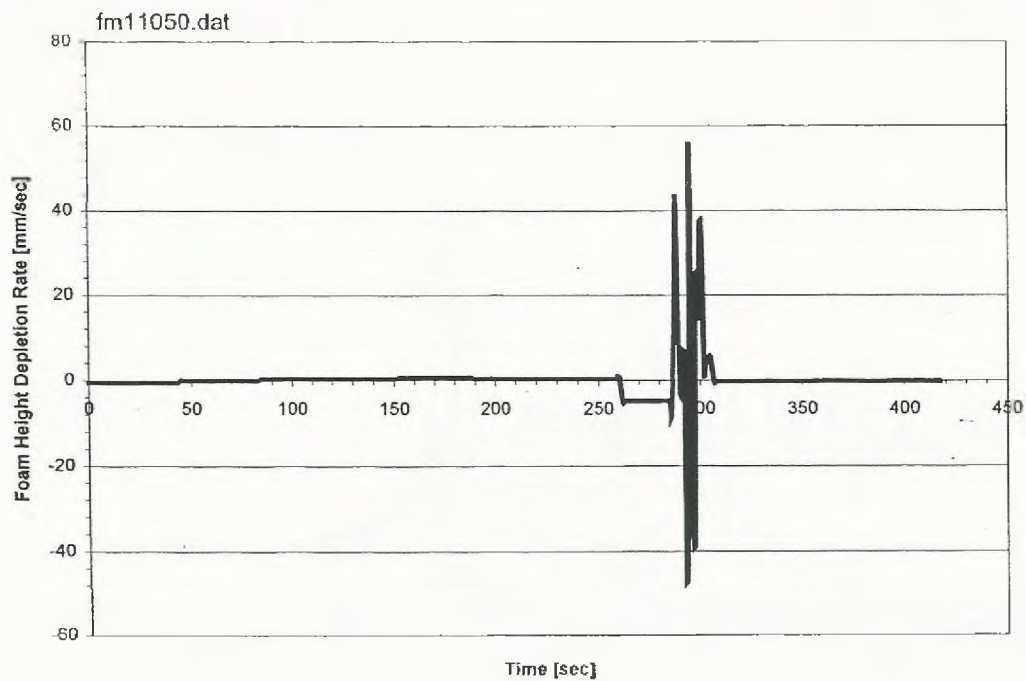


Fig. D32- Foam height depletion rate in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.85, irradiance= 35kW/m², initial foam height= 25mm.

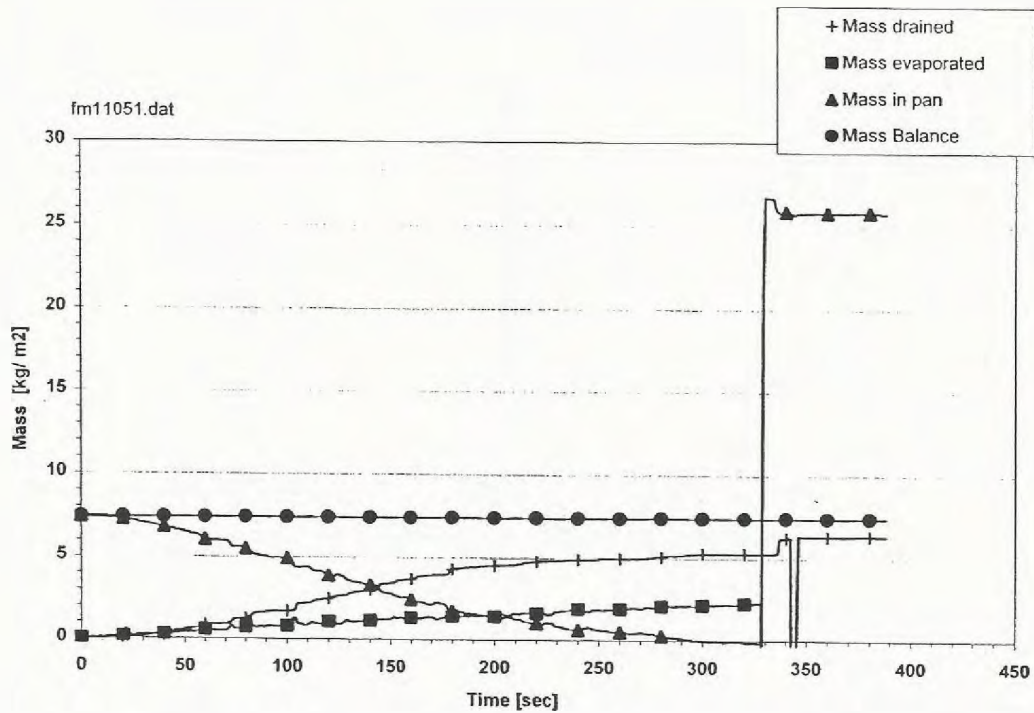


Fig. D33- Mass data in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.76, irradiance= 35kW/m², initial foam height= 50mm.

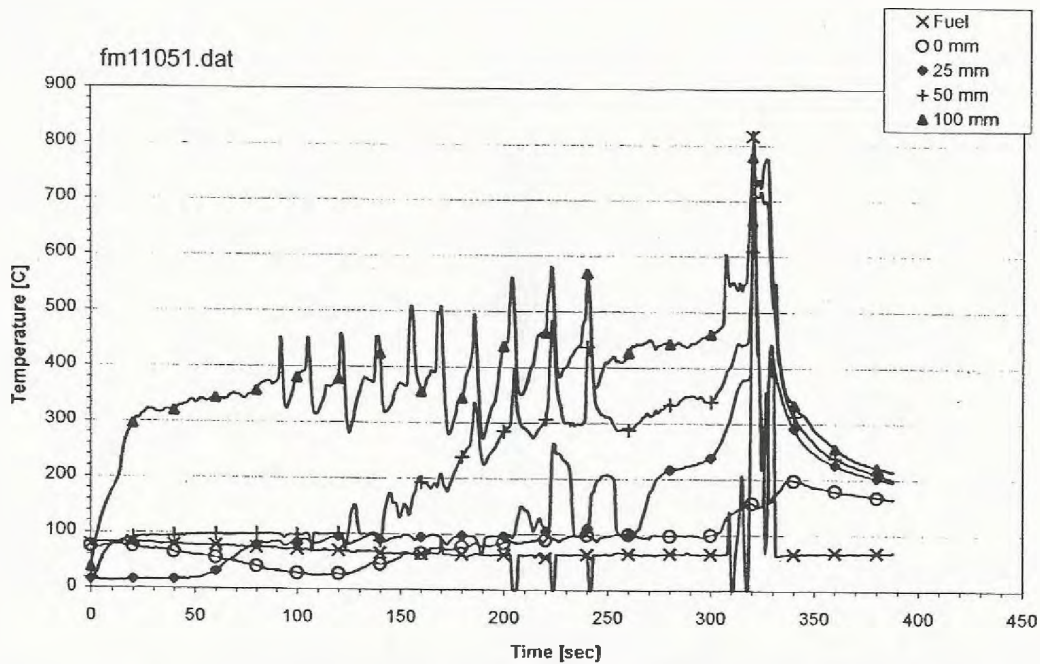


Fig. D34- Foam temperature in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.76, irradiance= 35kW/m², initial foam height= 50mm.

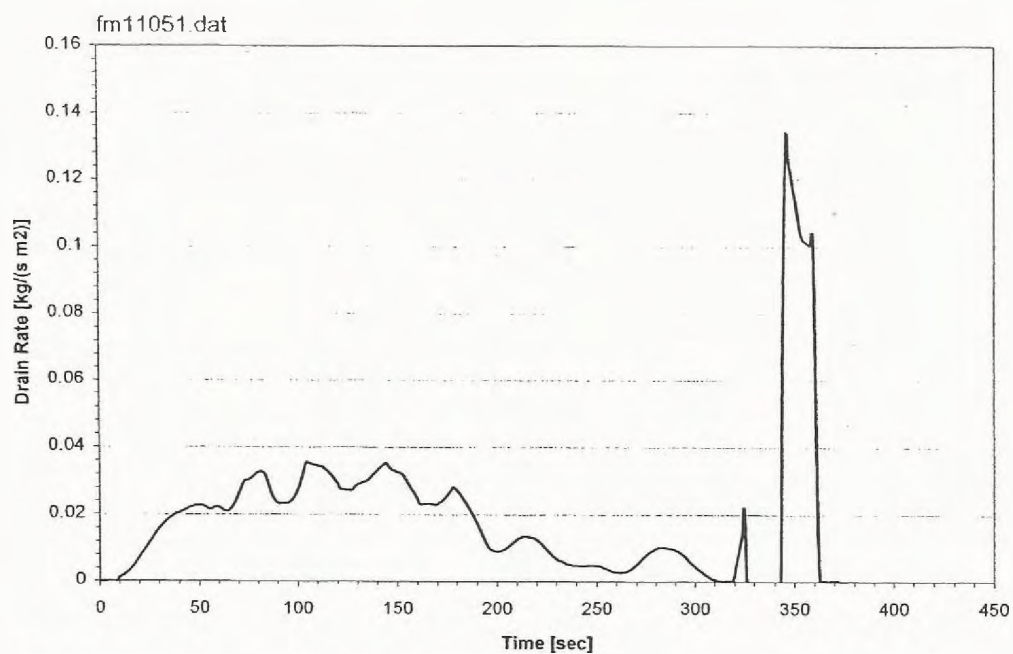


Fig. D35- Drain rate in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.76, irradiance= 35kW/m², initial foam height= 50mm.

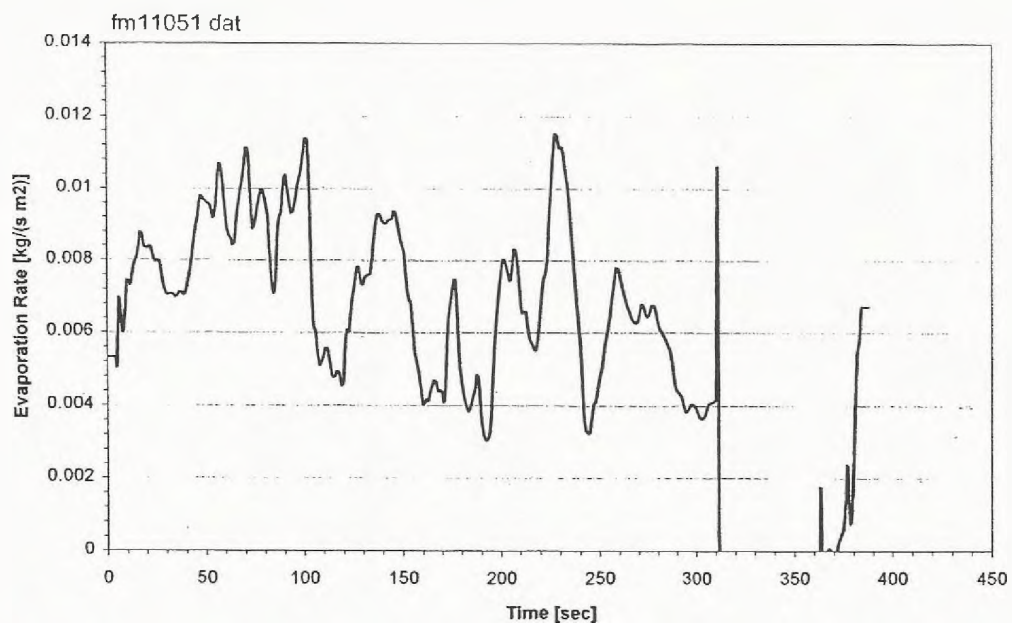


Fig. D36- Evaporation rate in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.76, irradiance= 35kW/m², initial foam height= 50mm.

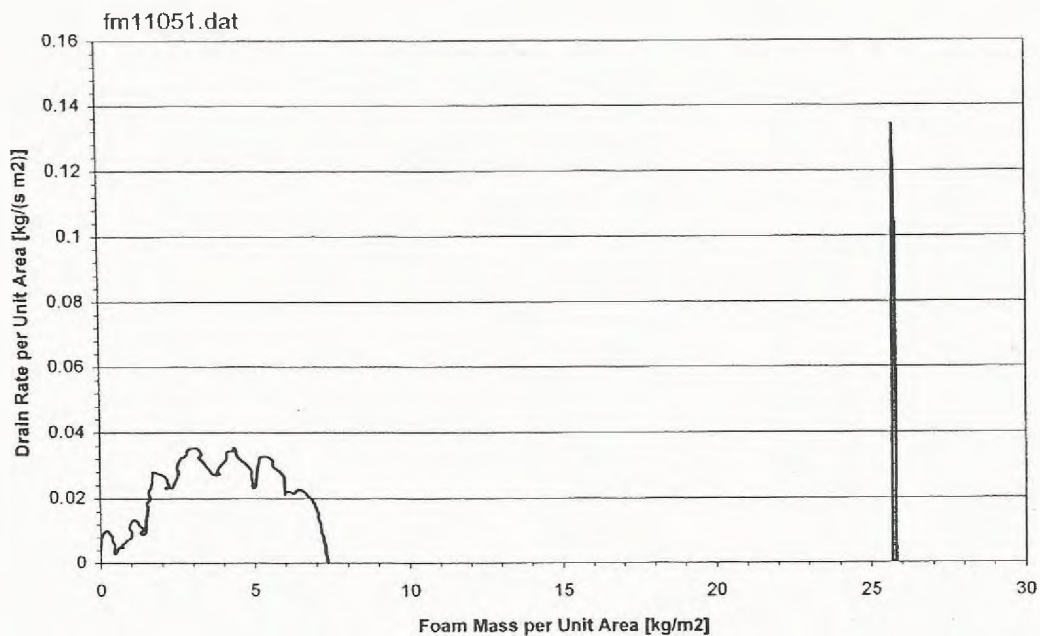


Fig. D37- Drain rate versus foam mass in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.76, irradiance= 35kW/m², initial foam height= 50mm.

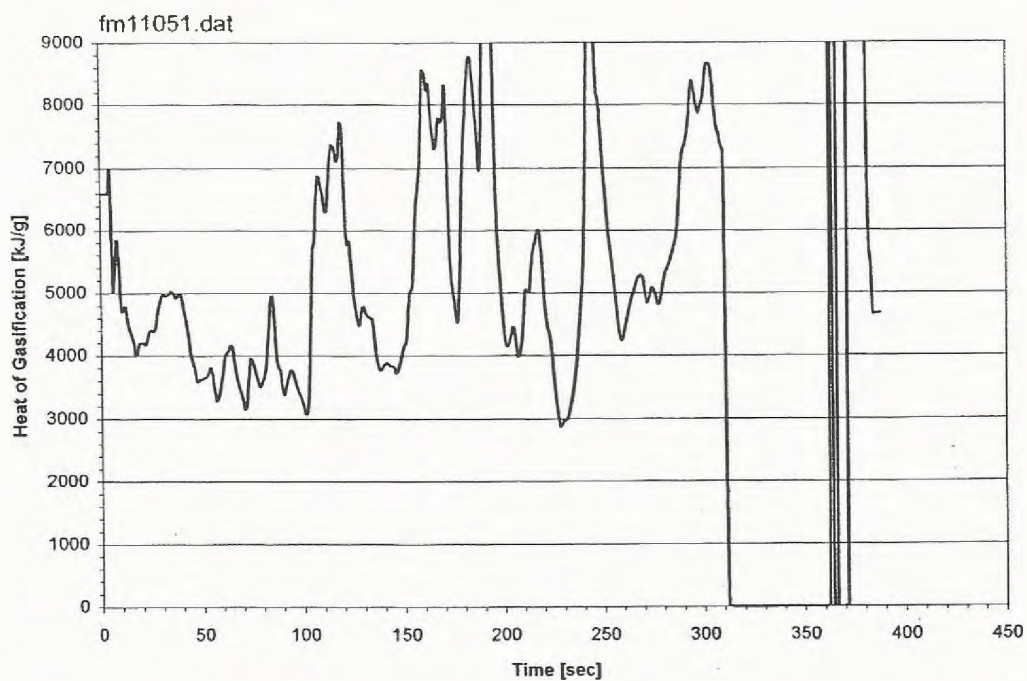


Fig. D38- Effective heat of vaporization in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.76, irradiance= 35kW/m², initial foam height= 50mm.

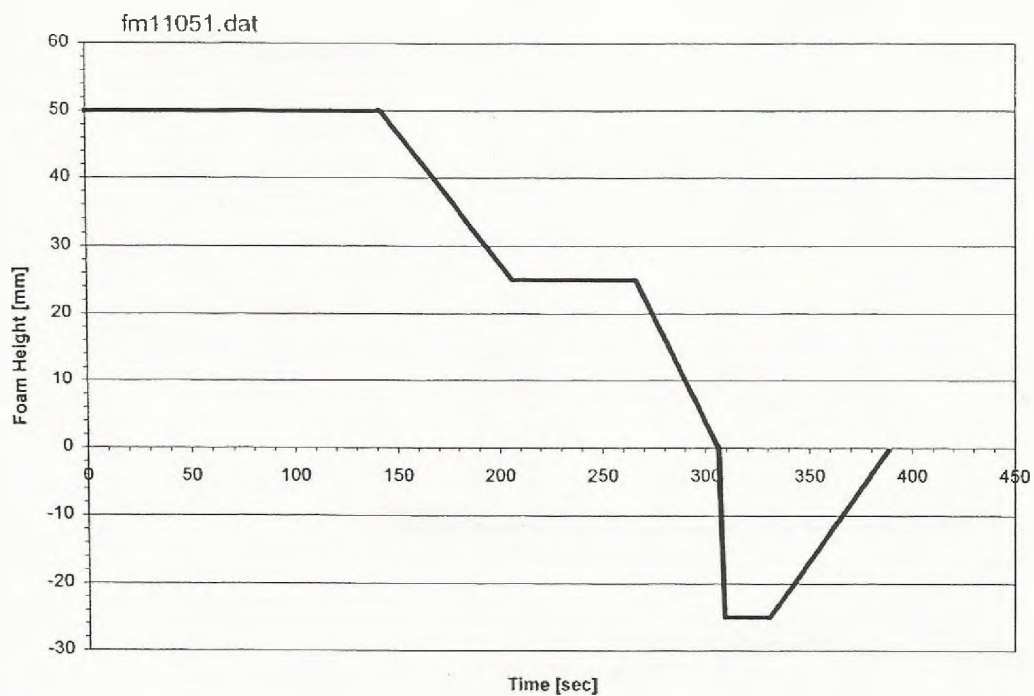


Fig. D39- Foam height in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.76, irradiance= 35kW/m², initial foam height= 50mm.

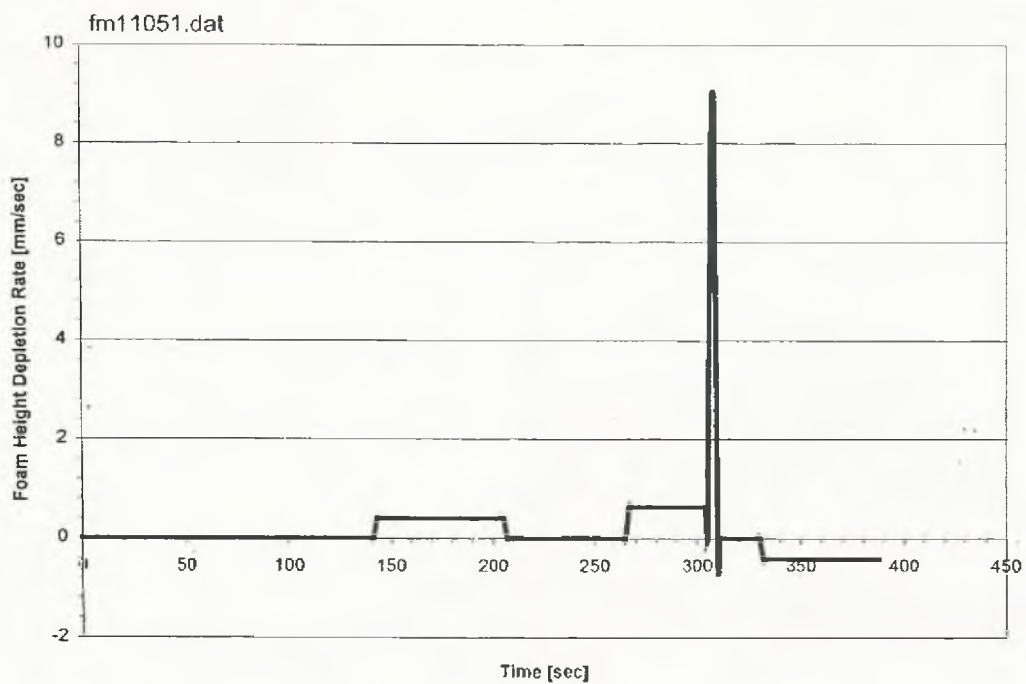


Fig. D40- Foam height depletion rate in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.76, irradiance= 35kW/m², initial foam height= 50mm.

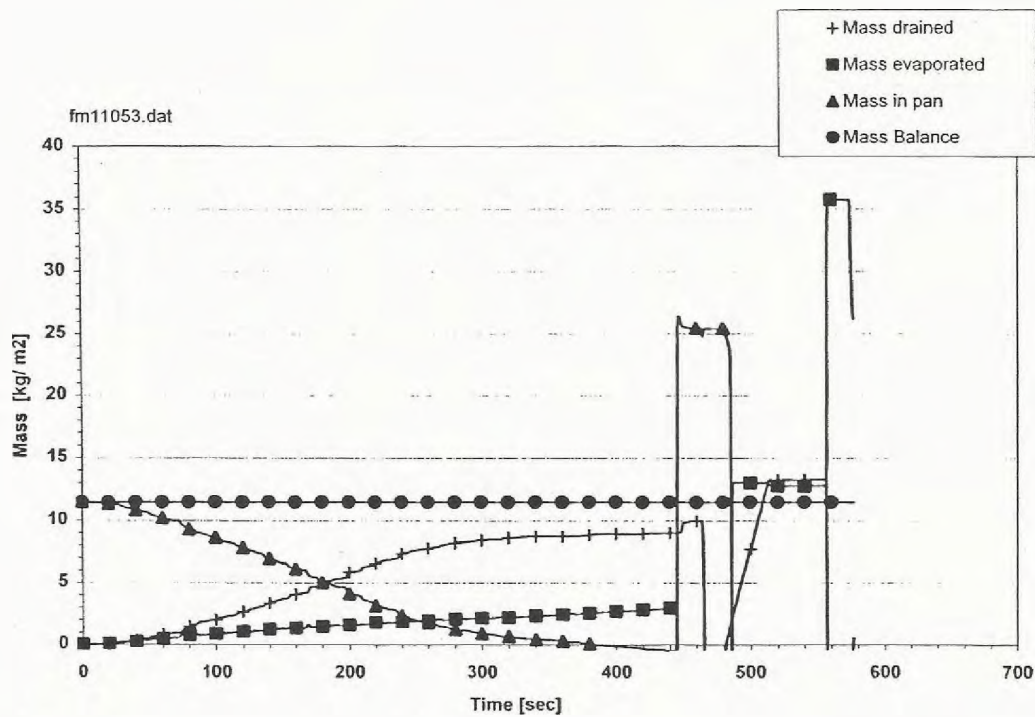


Fig. D41- Mass data in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.57, irradiance= 35kW/m2, initial foam height= 75mm.

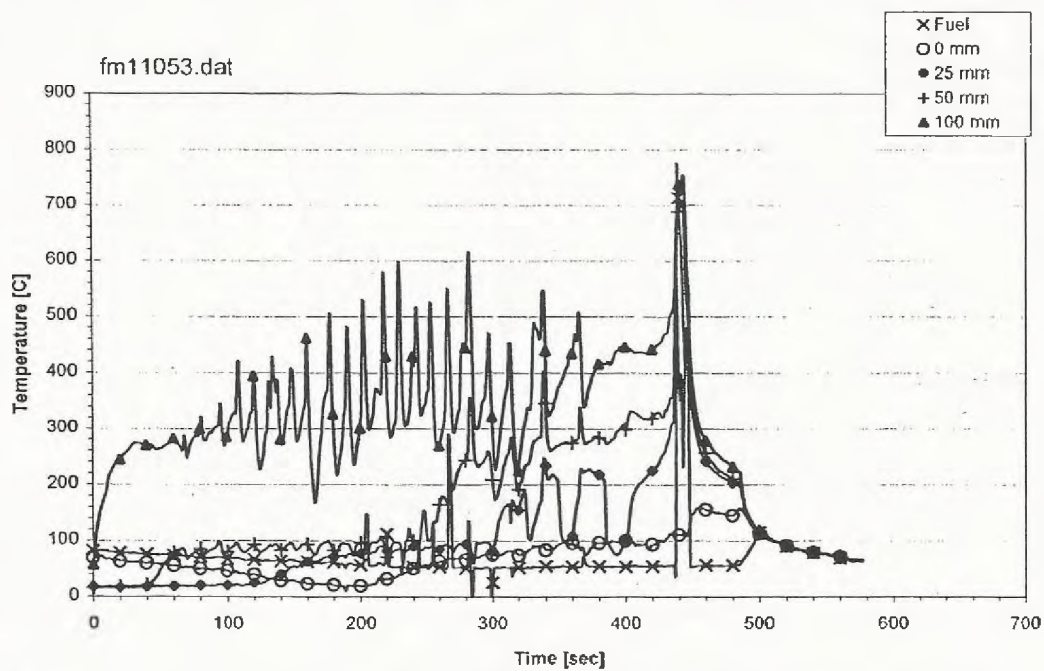


Fig. D42- Foam temperature in tests with foam on JP-5 at 50C. Test conditions: expansion ratio=6.57, irradiance= 35kW/m2, initial foam height= 75mm.

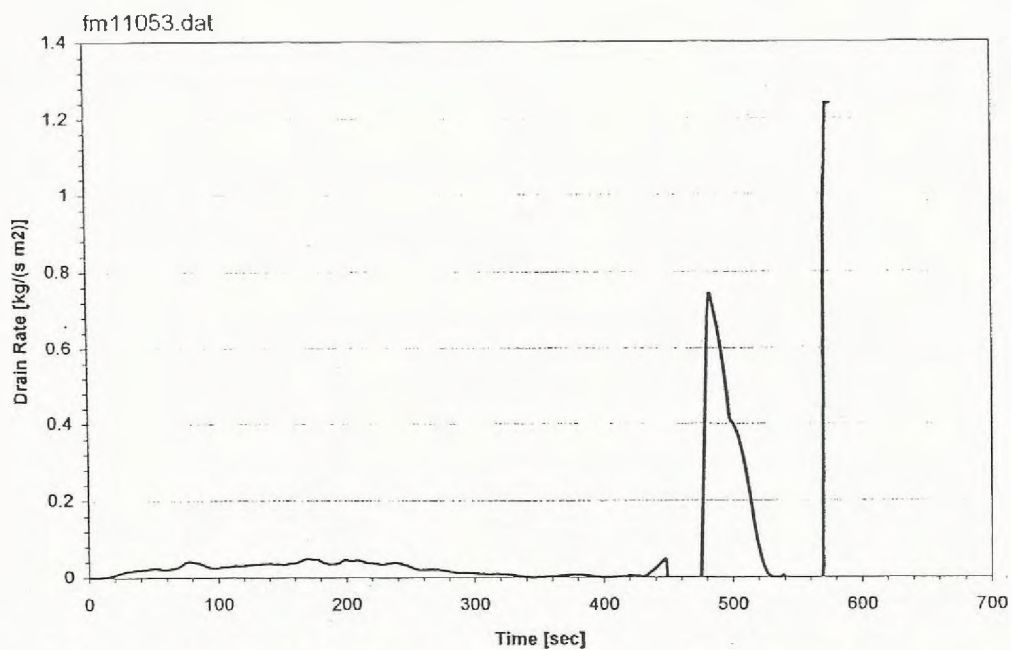


Fig. D43- Drain rate in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.57, irradiance= 35kW/m², initial foam height= 75mm.

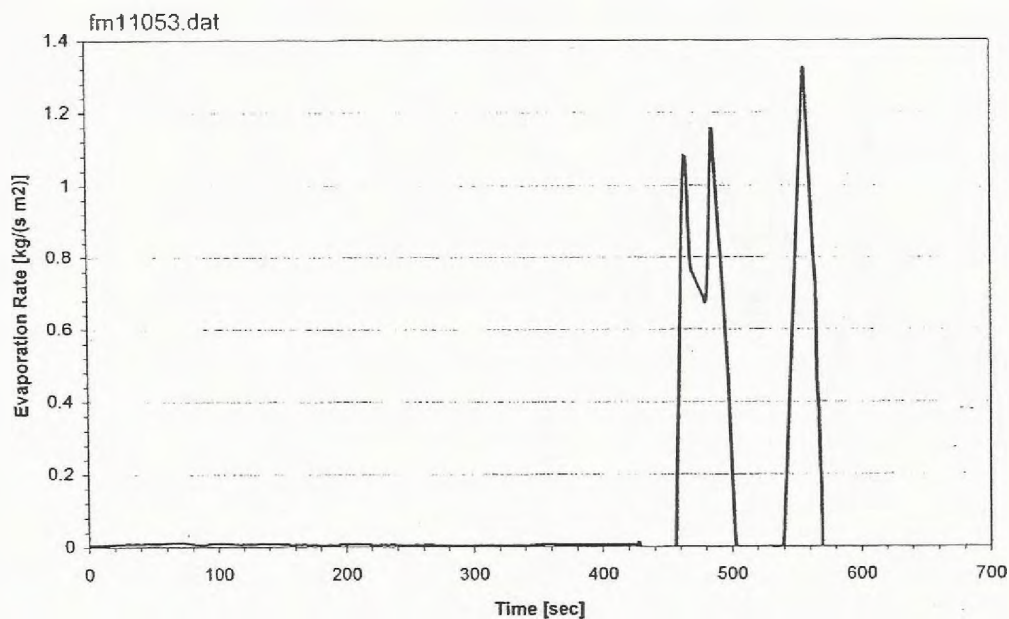


Fig. D44- Evaporation rate in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.57, irradiance= 35kW/m², initial foam height= 75mm.

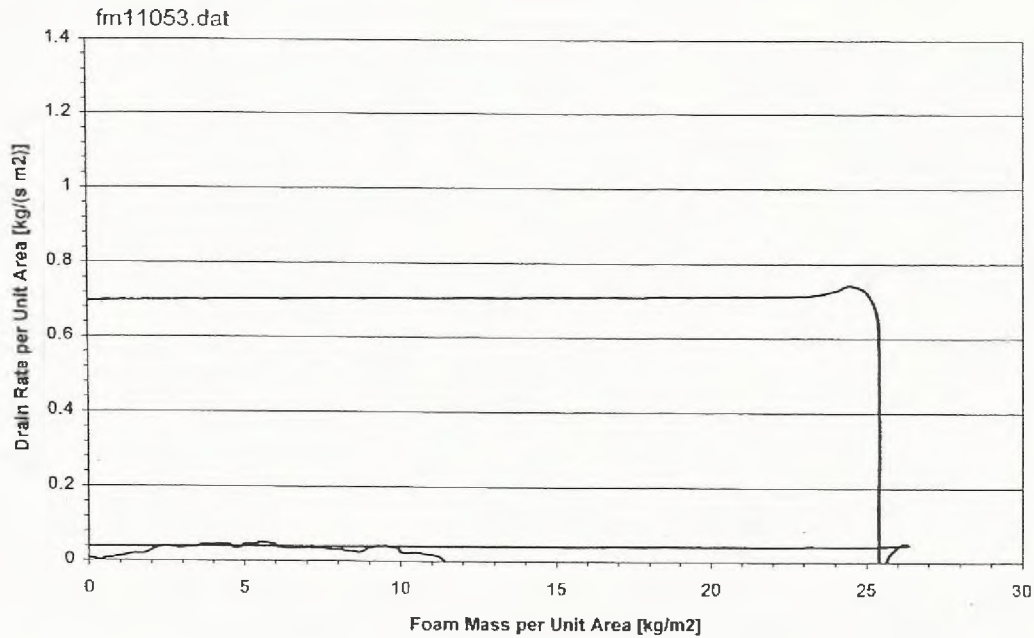


Fig. D45- Drain rate versus foam mass in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.57, irradiance= 35kW/m², initial foam height= 75mm.

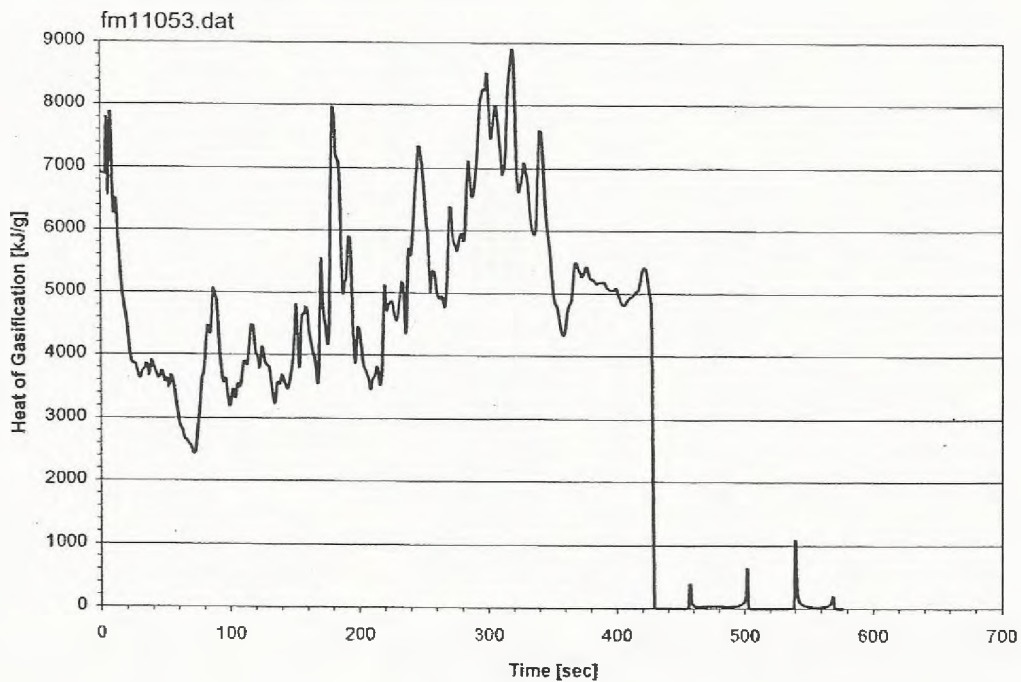


Fig. D46- Effective heat of vaporization in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.57, irradiance= 35kW/m², initial foam height= 75mm.

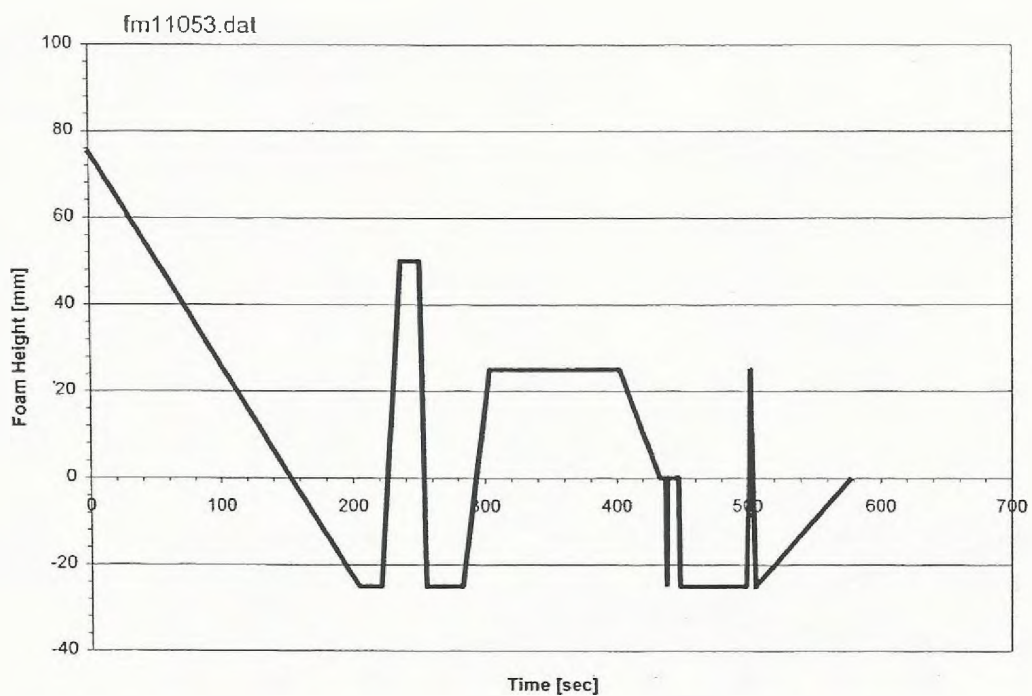


Fig. D47- Foam height in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.57, irradiance= 35kW/m², initial foam height= 75mm.

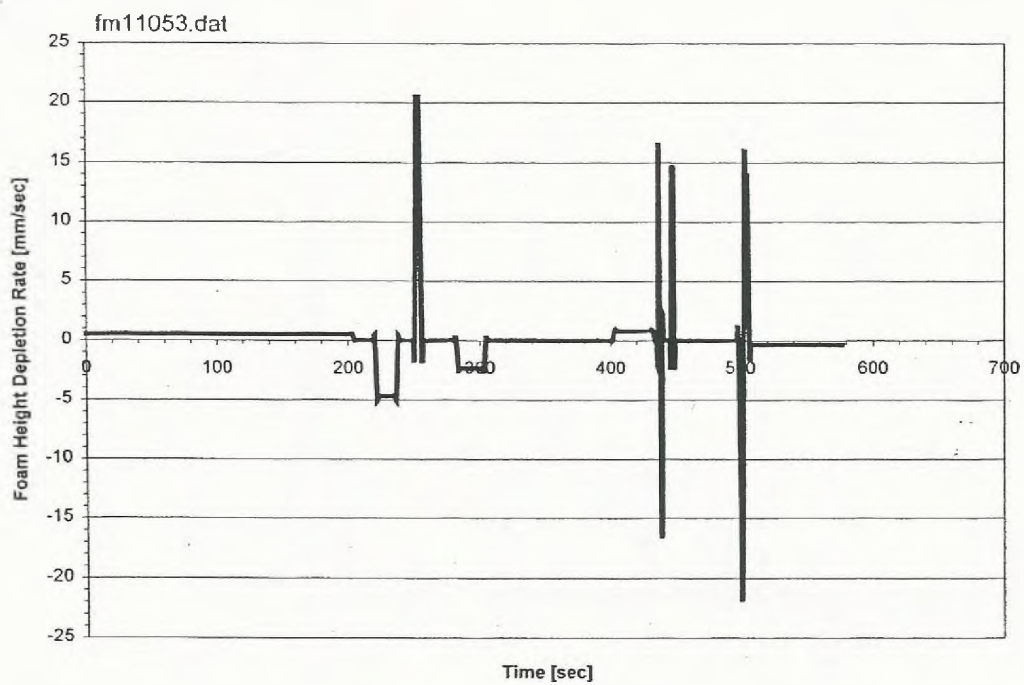


Fig. D48- Foam height depletion rate in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.57, irradiance= 35kW/m², initial foam height= 75mm.

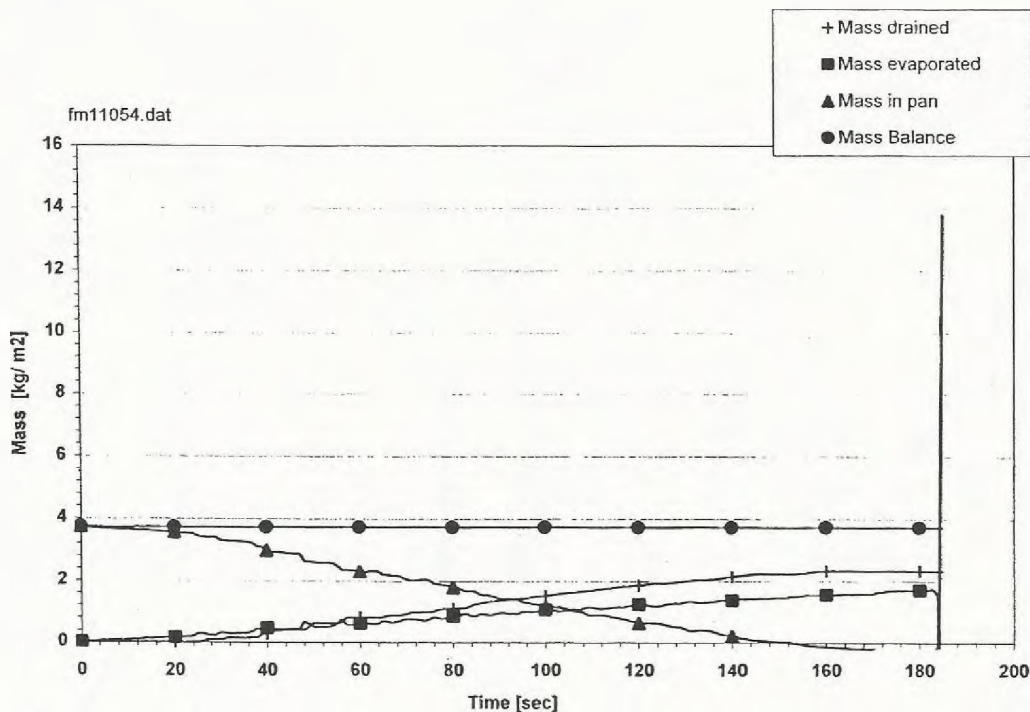


Fig. D49- Mass data in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.75, irradiance= 50kW/m2, initial foam height= 25mm.

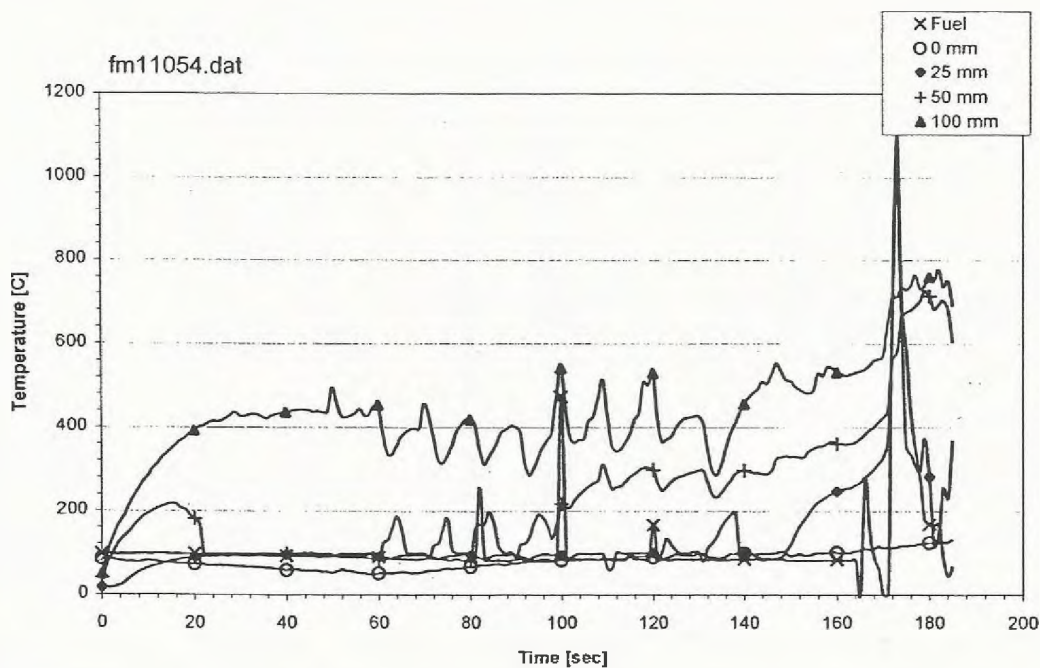


Fig. D50- Foam temperature in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.75, irradiance= 50kW/m2, initial foam height= 25mm.

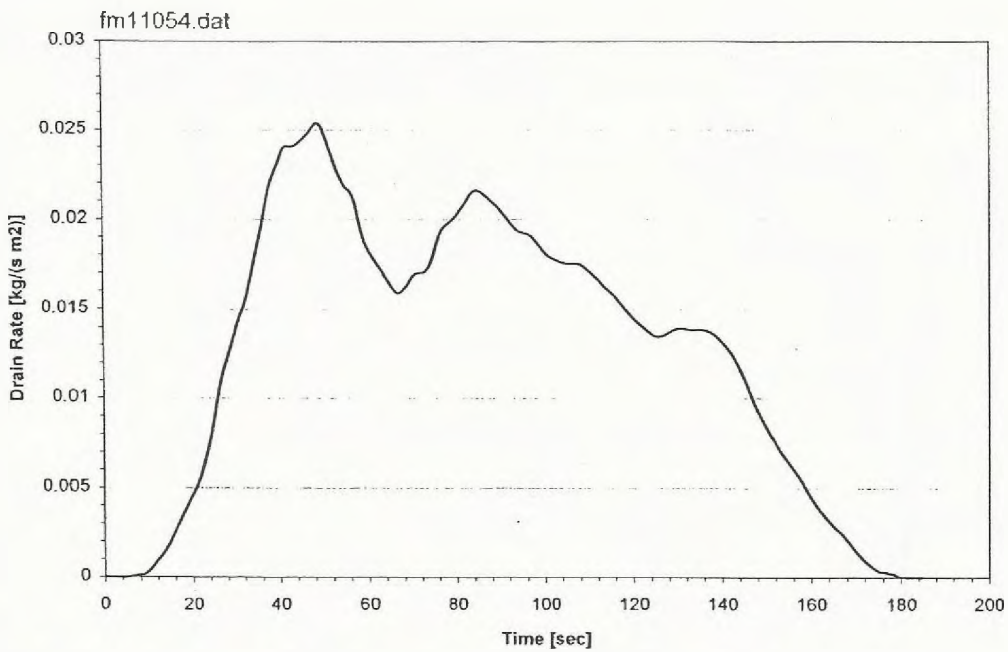


Fig. D51- Drain rate in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.75, irradiance= 50kW/m2, initial foam height= 25mm.

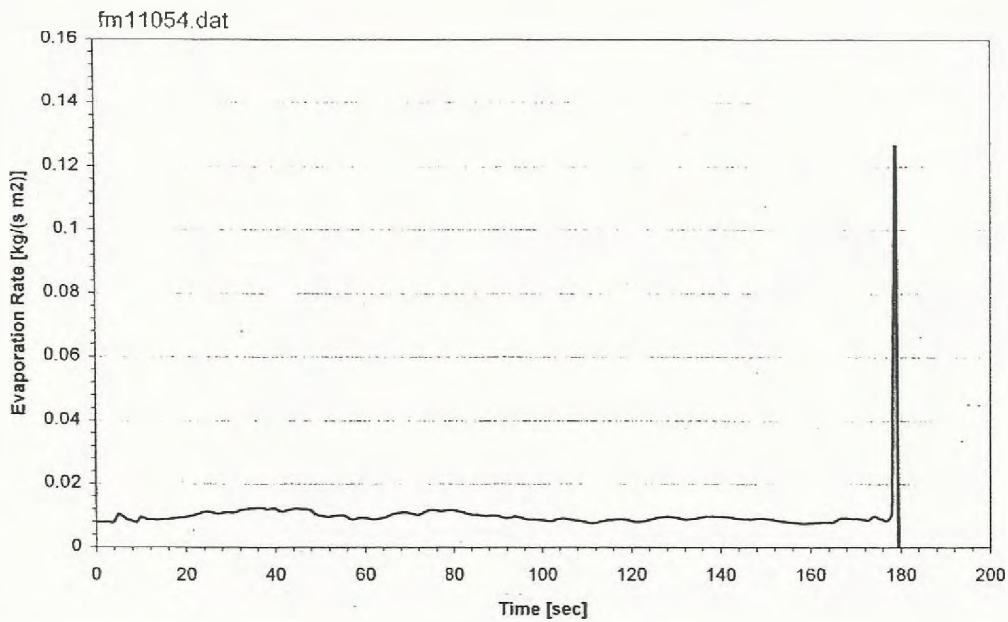


Fig. D52- Evaporation rate in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.75, irradiance= 50kW/m2, initial foam height= 25mm.

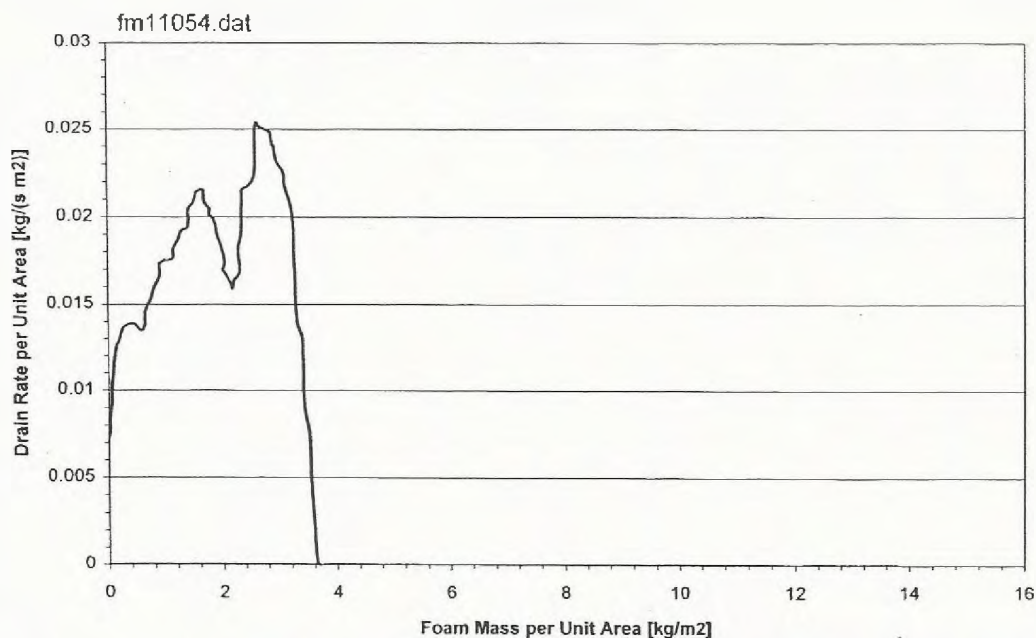


Fig. D53- Drain rate versus foam mass in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.75, irradiance= 50kW/m², initial foam height= 25mm.

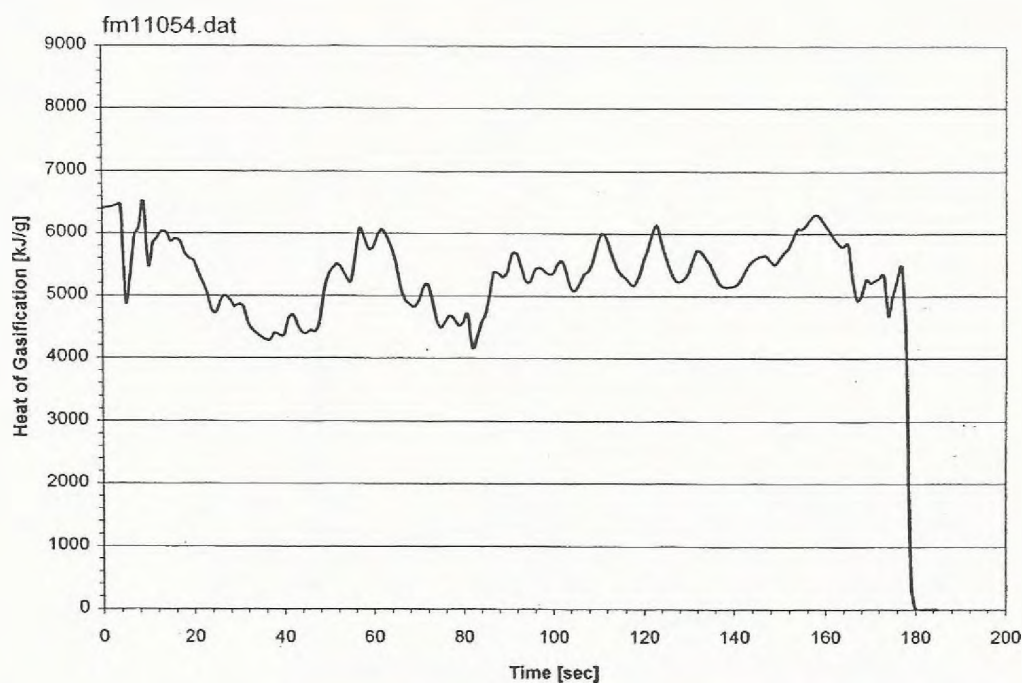


Fig. D54- Effective heat of vaporization in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.75, irradiance= 50kW/m², initial foam height= 25mm.

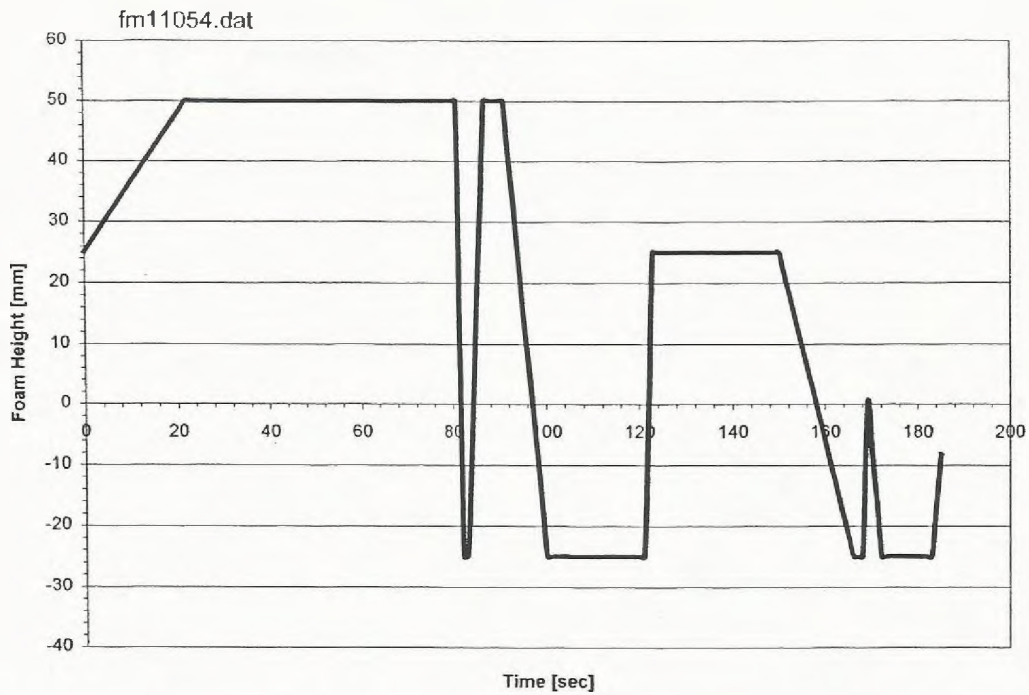


Fig. D55- Foam height in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.75, irradiance= 50kW/m², initial foam height= 25mm.

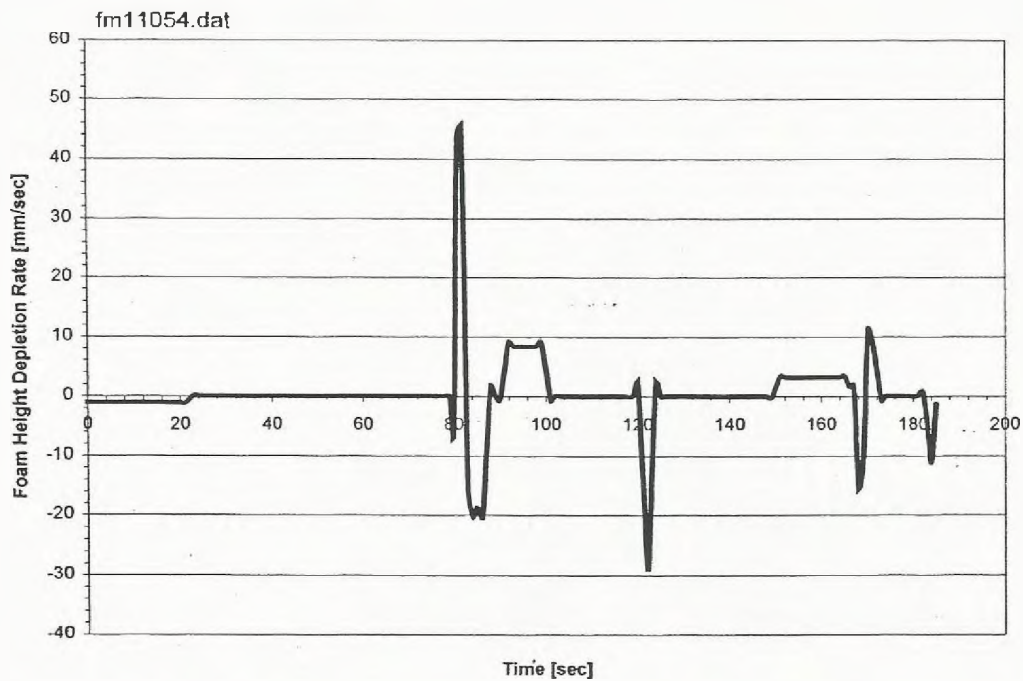


Fig. D56- Foam height depletion rate in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.75, irradiance= 50kW/m², initial foam height= 25mm.

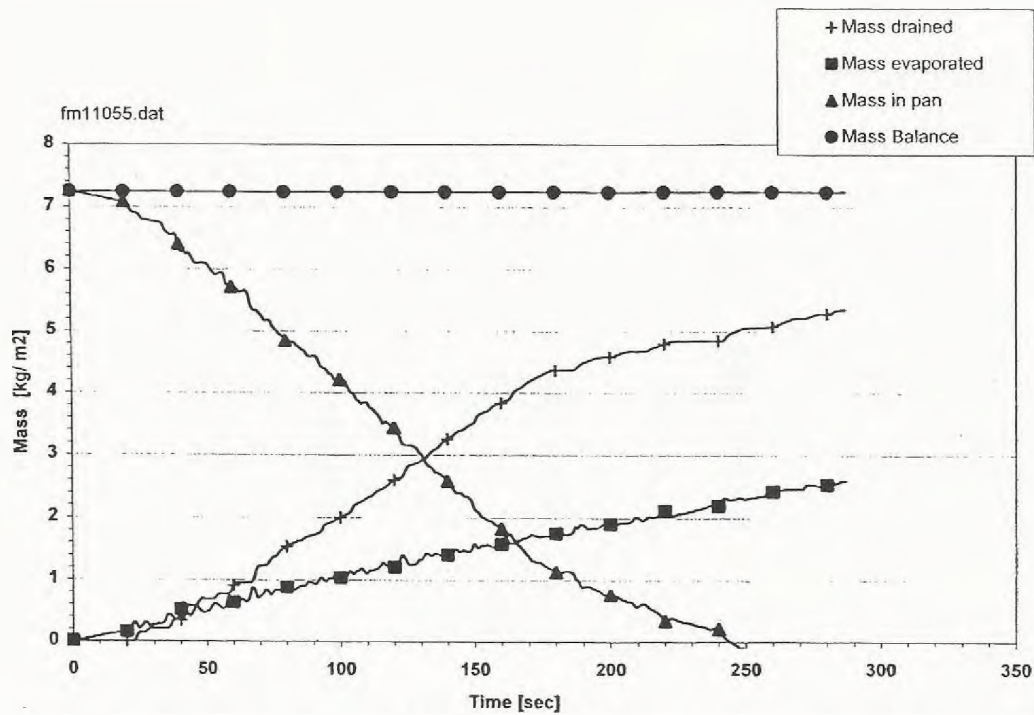


Fig. D57- Mass data in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.92, irradiance= 50kW/m², initial foam height= 50mm.

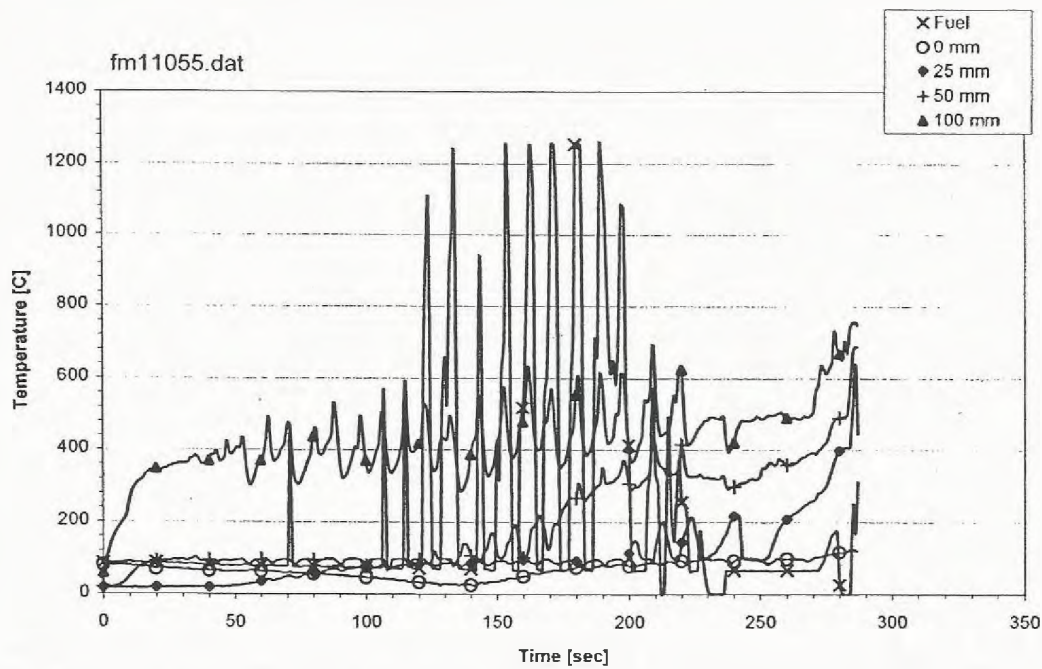


Fig. D58- Foam temperature in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.92, irradiance= 50kW/m², initial foam height= 50mm.



Fig. D59- Drain rate in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.92, irradiance= 50kW/m2, initial foam height= 50mm.

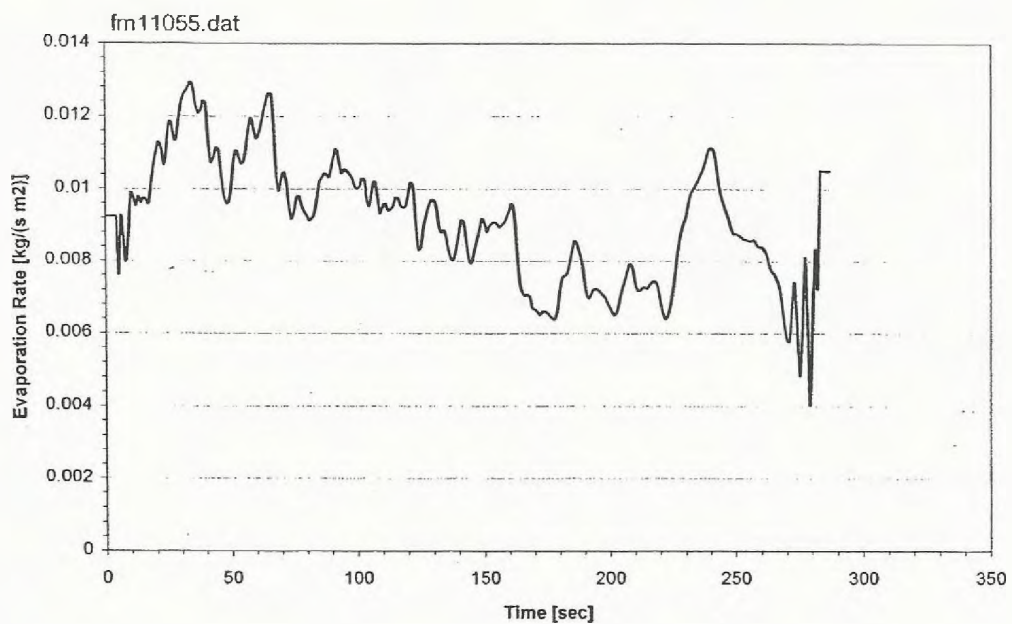


Fig. D60- Evaporation rate in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.92, irradiance= 50kW/m2, initial foam height= 50mm.

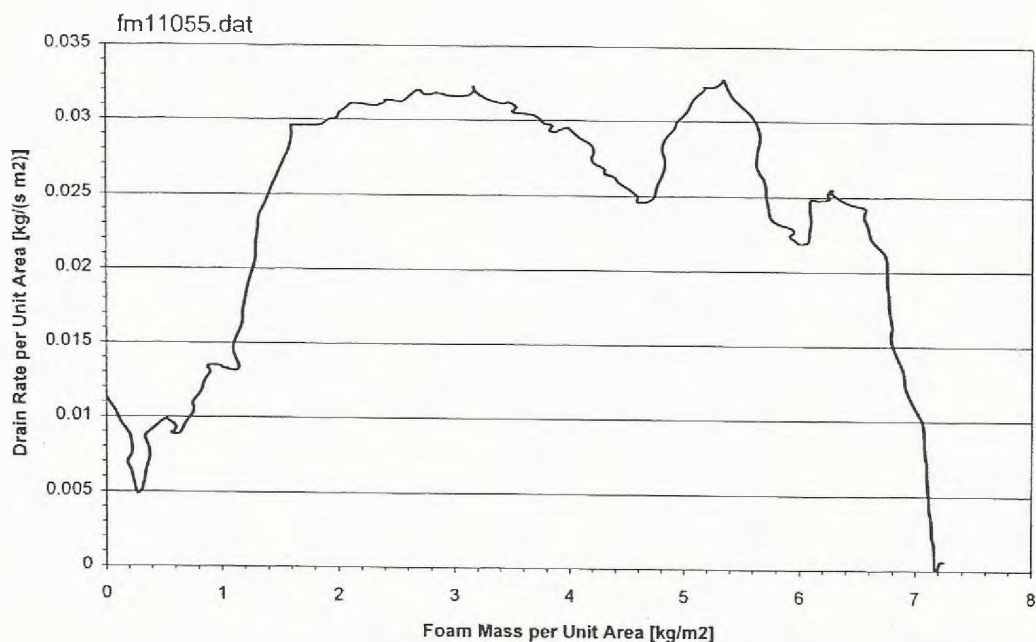


Fig. D61- Drain rate versus foam mass in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.92, irradiance= 50kW/m², initial foam height= 50mm.

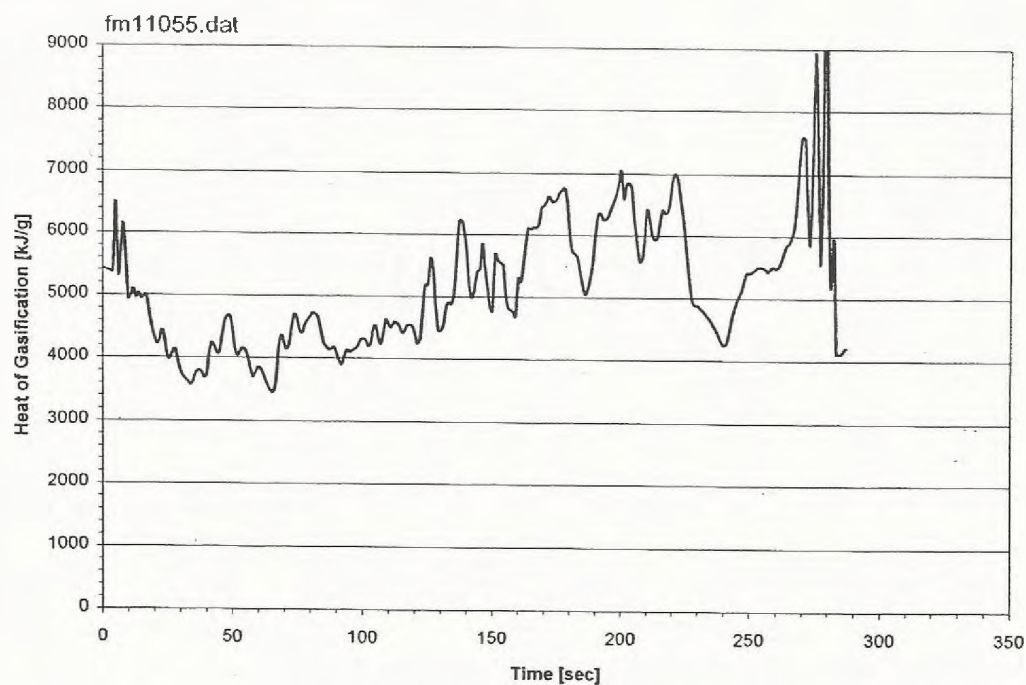


Fig. D62- Effective heat of vaporization in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.92, irradiance= 50kW/m², initial foam height= 50mm.

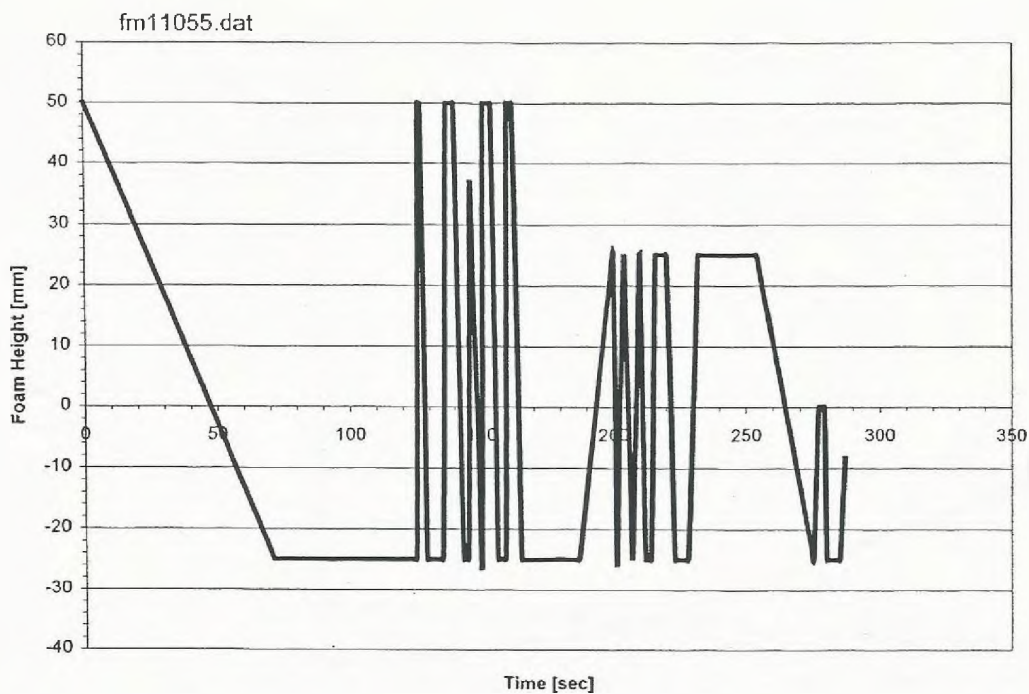


Fig. D63- Foam height in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.92, irradiance= 50kW/m², initial foam height= 50mm.

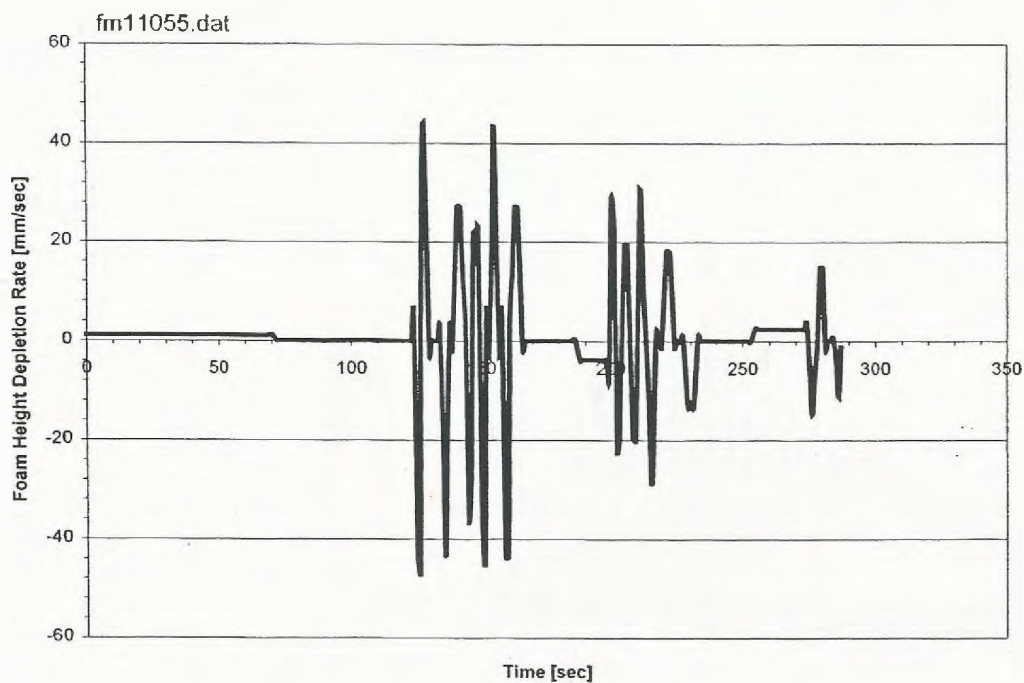


Fig. D64- Foam height depletion rate in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.92, irradiance= 50kW/m², initial foam height= 50mm.

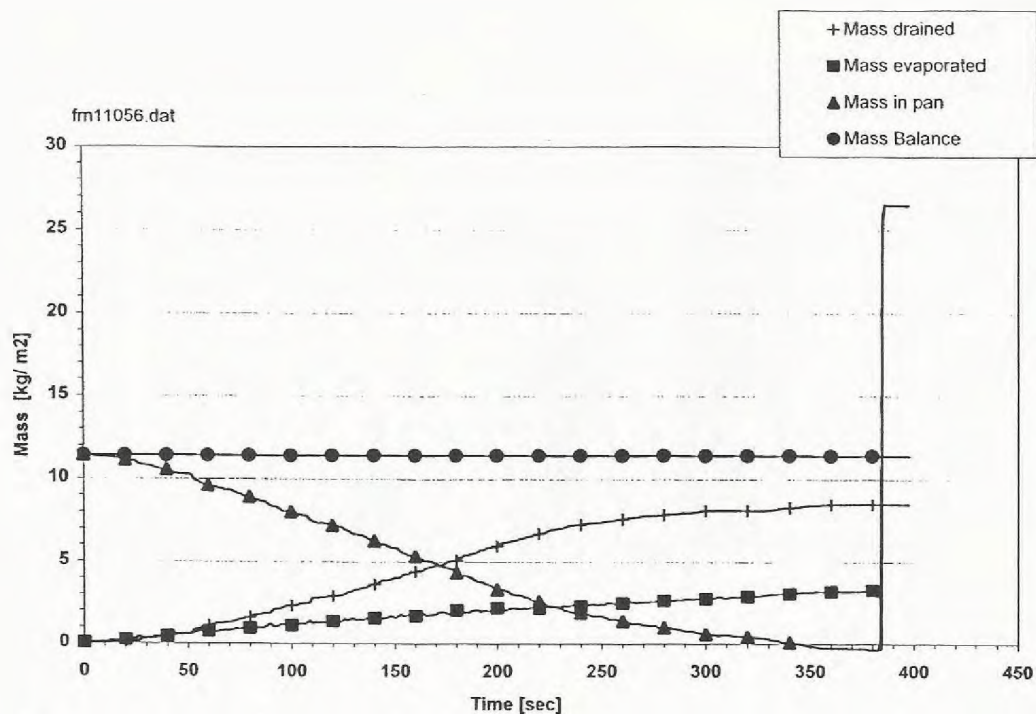


Fig. D65- Mass data in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.61, irradiance= 50kW/m², initial foam height= 75mm.

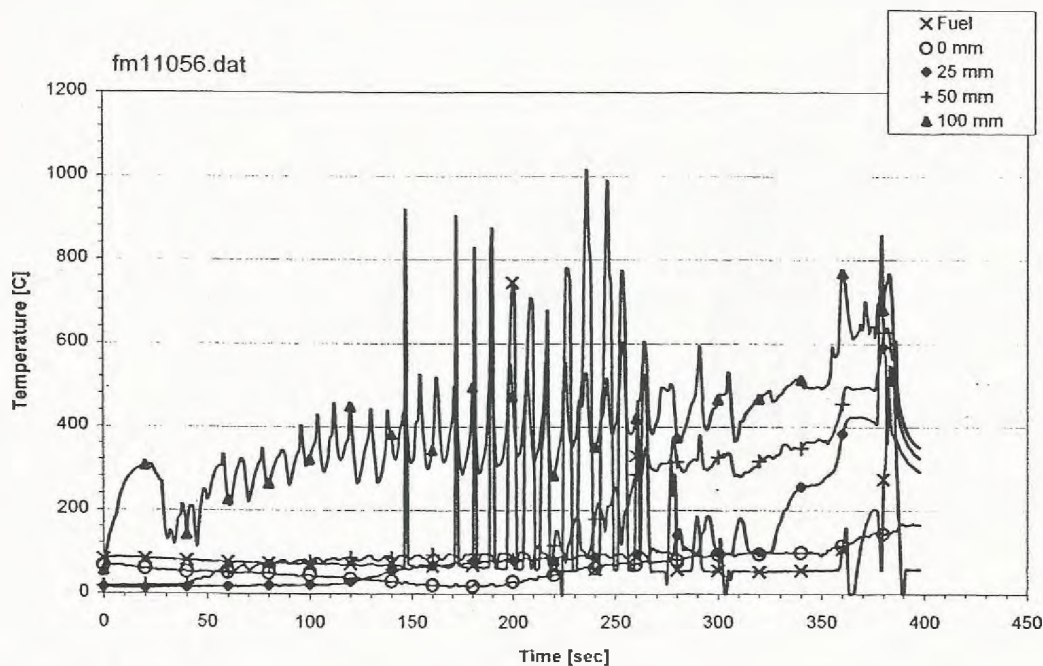


Fig. D66- Foam temperature in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.61, irradiance= 50kW/m², initial foam height= 75mm.

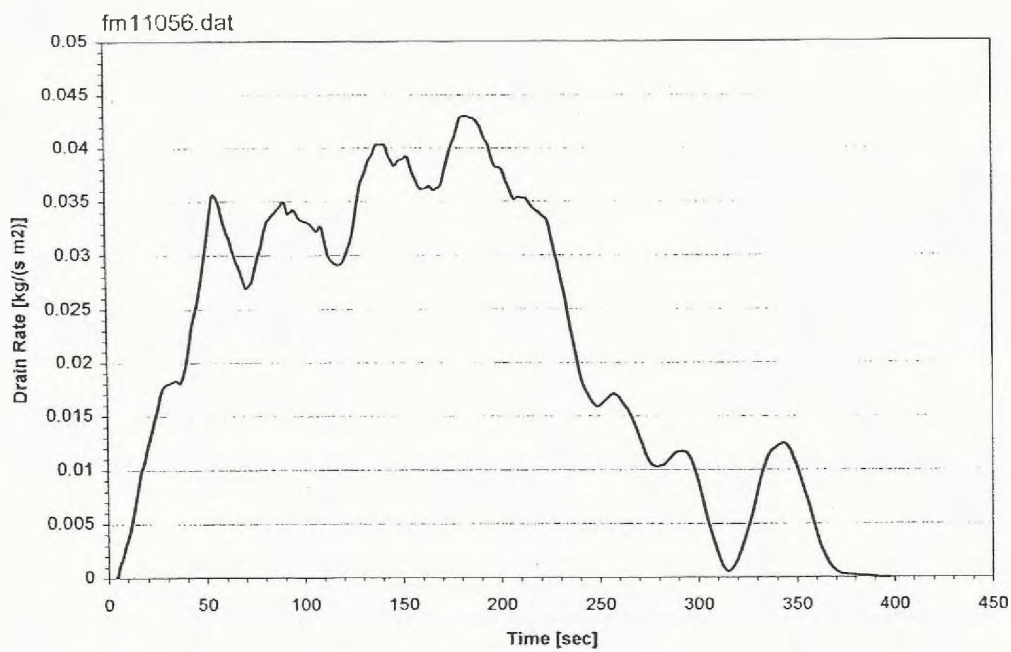


Fig. D67- Drain rate in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.61, irradiance= 50kW/m², initial foam height= 75mm.

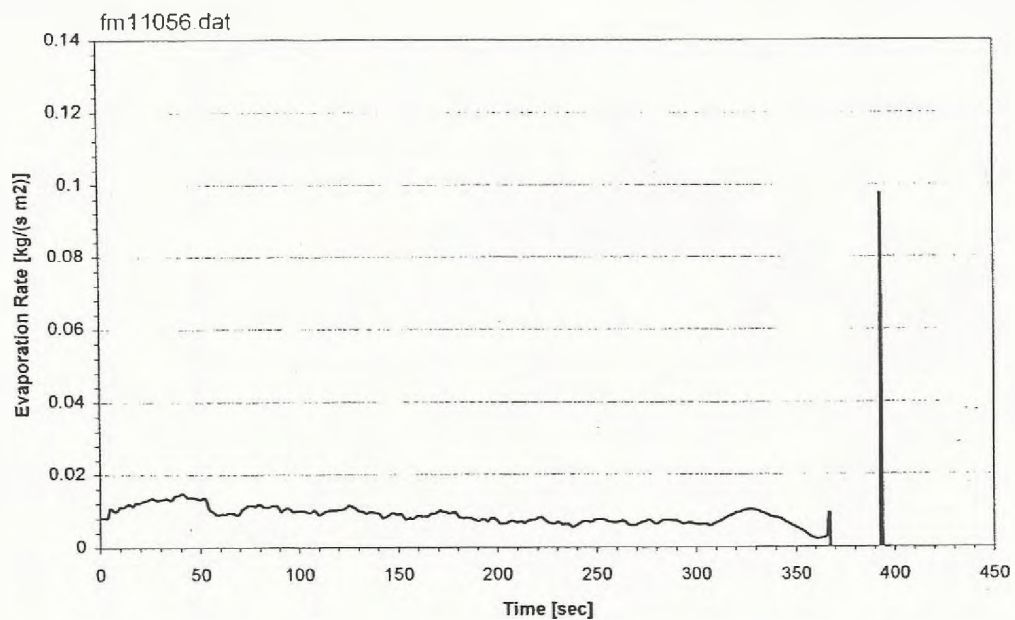


Fig. D68- Evaporation rate in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.61, irradiance= 50kW/m², initial foam height= 75mm.

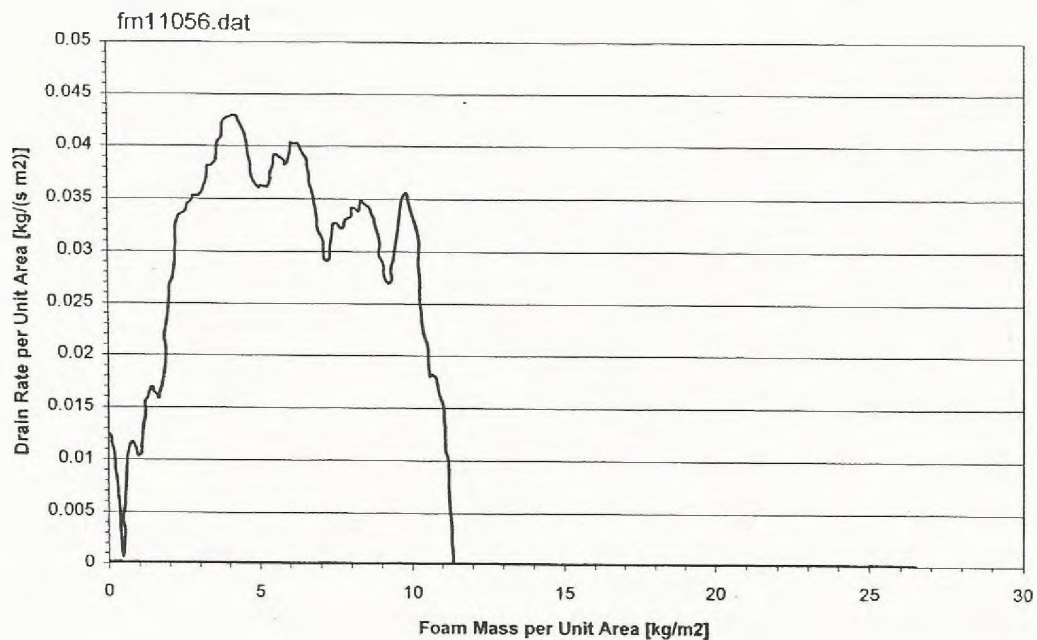


Fig. D69- Drain rate versus foam mass in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.61, irradiance= 50kW/m², initial foam height= 75mm.

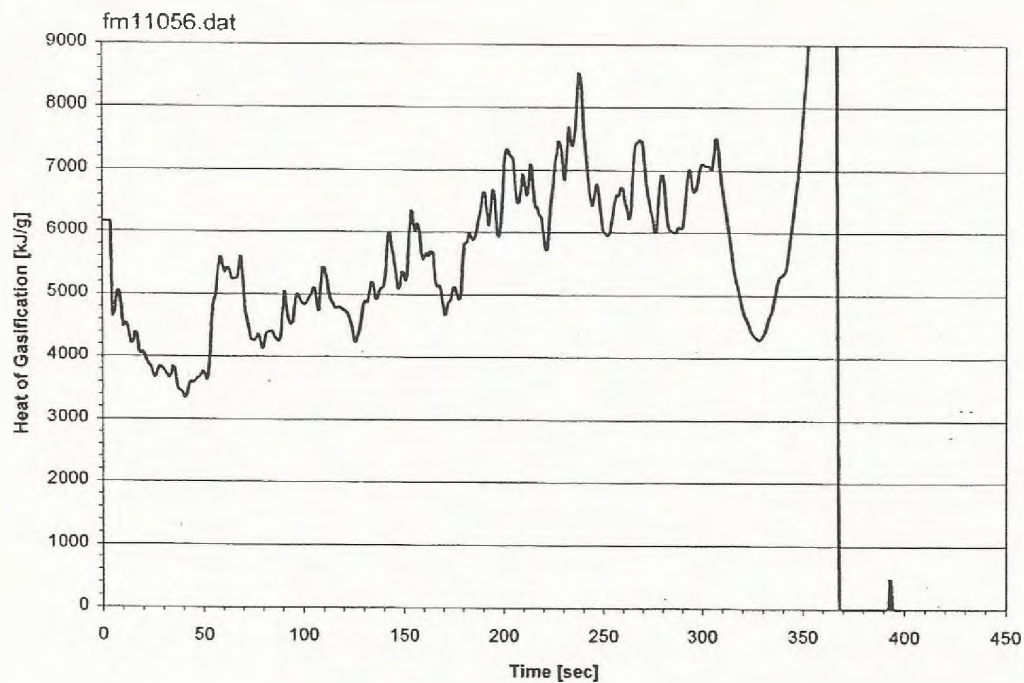


Fig. D70- Effective heat of vaporization in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.61, irradiance= 50kW/m², initial foam height= 75mm.

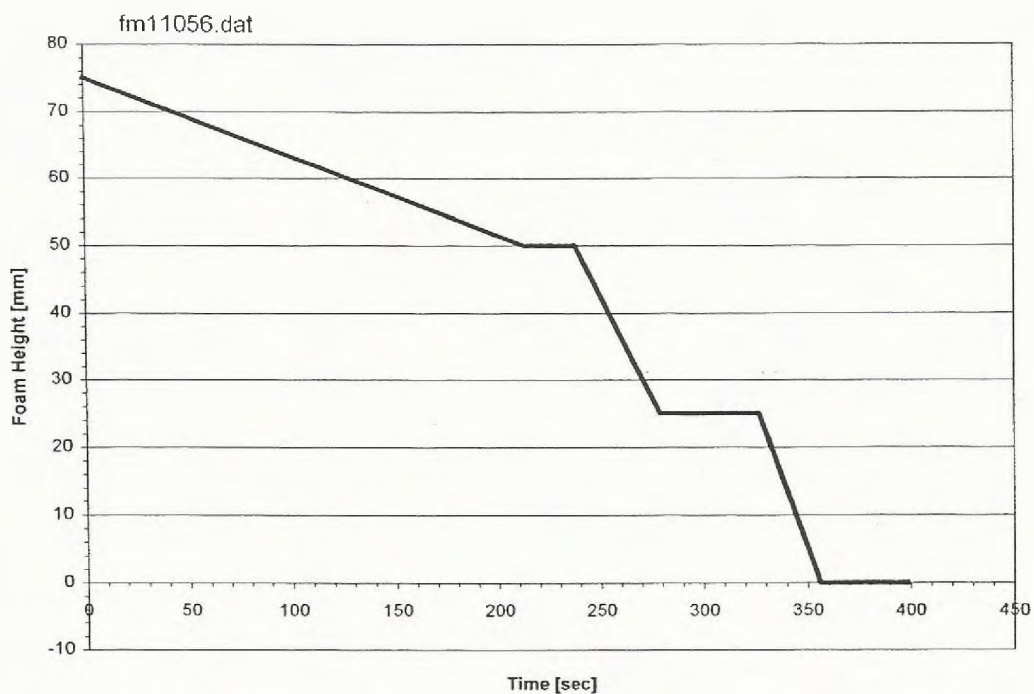


Fig. D71- Foam height in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.61, irradiance= 50kW/m2, initial foam height= 75mm.

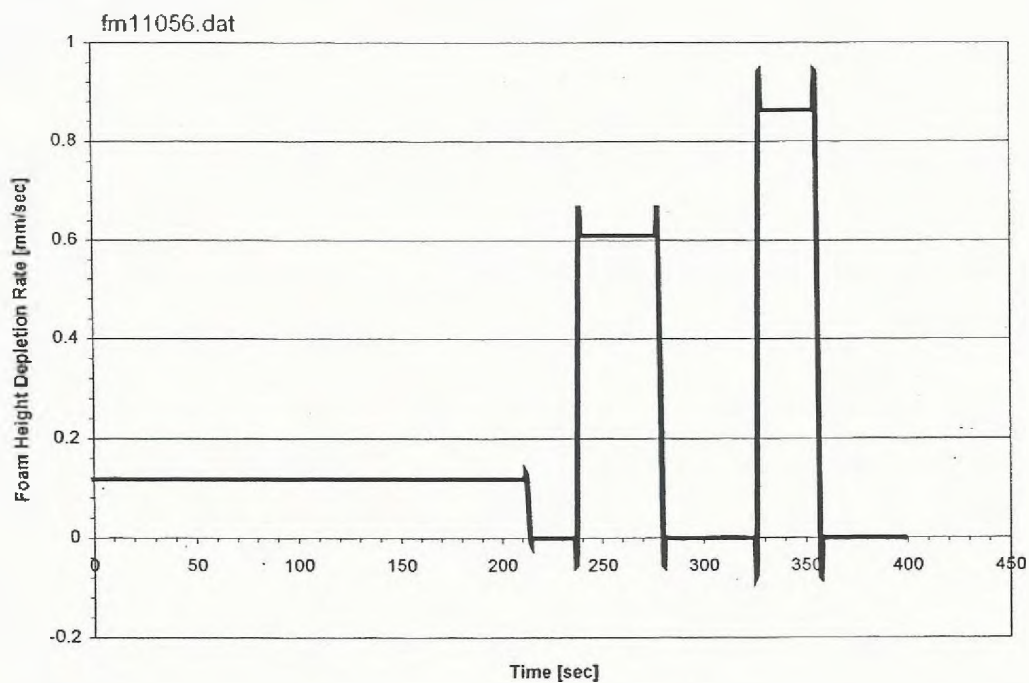


Fig. D72- Foam height depletion rate in tests with foam on JP-5 at 50C. Test conditions: expansion ratio= 6.61, irradiance= 50kW/m2, initial foam height= 75mm.

APPENDIX E
DROP THROUGH TEST DATA

Drop through tests were performed in the container shown in Fig. E-1. The square Pyrex container was 0.10 m on each side and was 0.10 m high. The side port was used to insert a 1.5 mm diameter, Type K sheathed thermocouple into the container to monitor the fuel temperature. For tests at elevated fuel temperatures, the container was placed on a hot plate to ensure the fuel temperature remained relatively constant over the test duration.

Tests were performed with 200 mL of fuel in the lower part of the container. AFFF solution was manually added to the surface directly using a 500 μ L Hamilton syringe with a Chaney adaptor for improved precision. The calibrated scale on the side of the syringe was used to monitor the amount of solution added to the surface. The addition accuracy was limited to the volume of a single drop of solution, which was approximately 10 μ L. During solution addition, the syringe was approximately 3.0 mm from the fuel surface to minimize the vertical acceleration effects of the drop. Two solution application methods were used in this study, 1) same location and 2) random locations. Data were recorded on the volume of solution necessary to cause one to five drop of solution to fall through the surface.

Tests were performed with three different types of fuel: *n*-Hexane (Fisher Spectranalyzed grade), Cyclohexane (Fisher Spectranalyzed grade) and JP-5 fuel obtained from Naval Research Laboratory (NRL) at their Chesapeake Beach Detachment (CBD). Fuels were tested at room temperature ($\sim 20^{\circ}\text{C}$) and at approximately 66°C . The AFFF concentrate was 3M 6% AFFF, FC 206CF. To aid in the visualization of the AFFF spreading over the fuel surface, a water soluble fluorescent dye was added to the solution. Tests without the dye confirmed the dye had no impact on the drop through results.

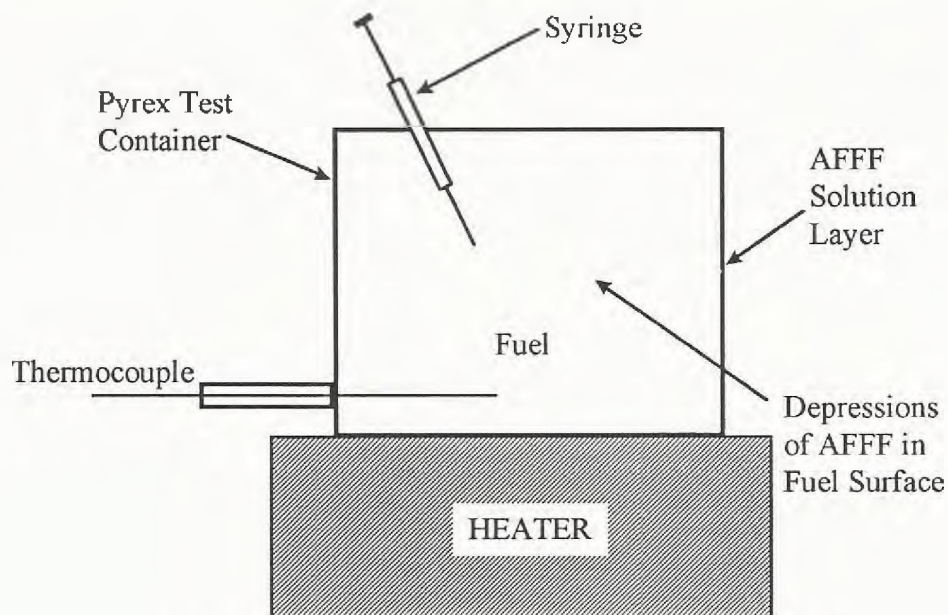


Figure E- 1. The drop through test apparatus.

The results of the tests on the three different fuels at room temperature are provided in Tables E1 – E3. When the solution was initially added, it was observed to spread out radially from the addition point over the fuel surface. As additional solution was added, depressions began to develop in the fuel surface where the AFFF solution was collecting. Adding more solution caused these depressions to become deeper and more defined until, eventually, the weight of the solution in the depression exceeded the interfacial surface tension resistance. At this point, the majority of the solution in the depression dropped through the surface and fell to the bottom of the container. Solution added at a single location developed fewer depressions than solution added at random locations.

The amount of solution necessary for drop through was found to be somewhat fuel dependent. The *n*-Hexane fuel was found to require the least amount of solution to cause the first drop to fall through the surface, while JP-5 required the most. This result is consistent with the interfacial surface tension results for these fuels. Of the three fuels, *n*-Hexane has the lowest interfacial surface tension meaning this fuel has the least resistance to solution drop through. Less solution had to be added to the surface to cause subsequent drops to fall through. This

amount ranged from 30-56 μL (on average) for the different fuels tested when solution was added at a single location. Tests where solution was added at random locations on the fuel surface required 2-3 times more solution to for the initial drop to fall through the surface. However, only slightly more solution, 30-76 μL (on average), was necessary to cause subsequent drops to fall through the fuel surface.

Table E1 - Drop through test results with *n*-Heptane at 20°C.

Addition Method	Net Volume* AFFF Added for Drop Through [μL]					Total Volume Added [μL]
	1 st Drop	2 nd Drop	3 rd Drop	4 th Drop	5 th Drop	
Single	60	30	**	30	30	150
Single	30	20	35	30	55	170
Single	45	35	20	50	35	185
AVG	45	28	19	37	40	168
Random	70	**	210	60	40	310
Random	60	60	180	55	15	360
Random	75	105	115	70	**	365
AVG	65	55	168	62	19	345

*Net Volume=volume of AFFF added after previous drop fell through surface

**Drop fell through with previous drop

Single=solution added to surface at a single location

Random=solution added to surface at random locations

Table E2 - Drop through test results with Cyclohexane at 20°C.

Addition Method	Net Volume* AFFF Added for Drop Through [μL]					Total Volume Added [μL]
	1 st Drop	2 nd Drop	3 rd Drop	4 th Drop	5 th Drop	
Single	160	40	30	20	25	275
Single	165	25	20	30	25	265
AVG	163	33	25	25	25	270
Random	390	5	35	130	40	600
Random	400	**	55	5	40	500
AVG	395	3	45	68	40	550

*Net Volume=volume of AFFF added after previous drop fell through surface

**Drop fell through with previous drop

Single=solution added to surface at a single location

Random=solution added to surface at random locations

Table E3 - Drop through test results with JP-5 at 20°C.

Addition Method	Net Volume* AFFF Added for Drop Through [μL]					Total Volume Added [μL]
	1 st Drop	2 nd Drop	3 rd Drop	4 th Drop	5 th Drop	
Single	175	60	45	95	50	425
Single	200	80	40	60	50	430
Single	200	60	40	40	50	390
AVG	192	67	42	65	50	415
Random	735	**	15	20	**	770
Random	650	40	30	**	85	805
Random	610	**	20	55	**	685
Random	590	15	25	85	115	830
AVG	646	14	23	40	50	773

*Net Volume=volume of AFFF added after previous drop fell through surface

**Drop fell through with previous drop

Single=solution added to surface at a single location

Random=solution added to surface at random locations

The values in Tables E1-3 can be used to determine the minimum amount of solution that must drain from the foam before solution will begin to drop through the surface. Critical values for drop through are provided in Table E4 for fuels at 20°C. In general, the amount of solution for initial drop through will be higher than the amount necessary for subsequent drops. Data for JP-5 indicate that the drain rate must initially be higher than 0.0646 kg/(m² s) for the fuel to not have an effect on the drain rate. After the initial drop falls through the surface, the critical drain rate for no delay in solution drainage decreases to 0.0056 kg/(m²s).

Table E4 – Critical AFFF levels to cause drop through different fuel surfaces at 20°C.

Fuel Type	Addition Method	1 st Drop		Subsequent Drops	
		Critical Volume [μL]	Critical Mass per Unit Area [kg/m^2]	Critical Volume [μL]	Critical Mass per Unit Area [kg/m^2]
<i>n</i> -Heptane	Single	45	0.0045	31	0.0031
<i>n</i> -Heptane	Random	65	0.0065	76	0.0076
Cyclohexane	Single	163	0.0163	27	0.0027
Cyclohexane	Random	395	0.0395	39	0.0039
JP-5	Single	192	0.0192	56	0.0056
JP-5	Random	646	0.0646	32	0.0032

Single=solution added to surface at a single location

Random=solution added to surface at random locations

A different behavior was observed when AFFF at 20°C was added to fuel at an elevated temperature (66°C which is near the boiling point of *n*-Hexane). In these tests, no depressions were observed to form at the fuel surface. Instead, the solution appeared to drop directly through the fuel surface. When the solution drop through the fuel surface, it was not as a drop but appeared to flow through the surface as a slow stream of solution. In tests with JP-5 and Cyclohexane, the solution was observed to spread across the fuel and then fall through the surface. The solution was not observed to spread in tests with *n*-Heptane, but instead just fell directly through the surface. Similar results were observed when AFFF heated to 66°C was added to the fuel surface.

APPENDIX F
SURFACE TENSION DATA

A series of tests was performed to quantify the surface tension of various fuels and a single formulation of AFFF (3M 6%), and the interfacial surface tension between the fuels and the AFFF. The fuels evaluated in this test series were Heptane, Cyclohexane, and JP-5. Tests were performed with the solutions at temperatures ranging from 10°C – 50°C. Solution temperatures were achieved by maintaining the test vessel at a constant temperature. This was done using a hollow Pyrex test vessel that had fluid from a water bath, set at the desired temperature level, continuously flowing through the vessel.

Tests were performed at the Naval Research Laboratory (NRL) at the Chesapeake Beach Detachment (CBD) using a Autotensiomat® Surface Tension Analyzer, Fisher Model 215. Tests were conducted in accordance to the procedures outlined in ASTM D 1331-89 "Standard Test Method for Surface and Interfacial Tension of Solutions of Surface-Active Agents". A single Platinum-Iridium Ring (5.920 cm diameter, $R/r=53.0322$) was used in the study. Reported values were corrected as specified in ASTM D 1331.

Surface tension results for the different solutions are shown in Figure F1 at various temperatures. Surface tension levels decreased almost linearly with temperature at a rate similar to that determined by Moran *et al.* [16]; however, the magnitude of the surface tension was approximately 5-10% lower than values in Ref. [16]. The reason for the discrepancy is unknown.

Interfacial surface tension between AFFF and Cyclohexane, and AFFF and JP-5 are shown in Figure F2. For both combinations, interfacial surface tension was measured to remain relatively constant with temperature. Moran *et al.* [16] previously reported interfacial surface tension values to decrease at nominally the same rate as surface tension of the hydrocarbon liquid, which is different than the result shown in Fig. F2. The reason for the discrepancy is unknown.

Data from Figures F1 and F2 were used to determine the spreading coefficient, which is defined for these tests as

$$\sigma_{net} = \sigma_{AFFF} - \sigma_{fuel} - \sigma_{IF}, \quad (F\ 1)$$

where σ_{net} is the spreading coefficient, σ_{AFFF} is the surface tension of the AFFF, σ_{fuel} is the surface tension of the fuel, and σ_{IF} is the interfacial surface tension. The spreading coefficient is a measure of the ability of AFFF to spread along the fuel; a spreading coefficient greater than zero indicates AFFF can spread along the fuel surface without dropping through. The spreading coefficient for AFFF on Cyclohexane and JP-5 is shown in Fig. F3 at various temperatures. Temperature was measured to decrease the spreading coefficient by 20-30%, which agrees with the conclusions of Moran *et al.* [16] that temperature has only a slight effect on the spreading coefficient.

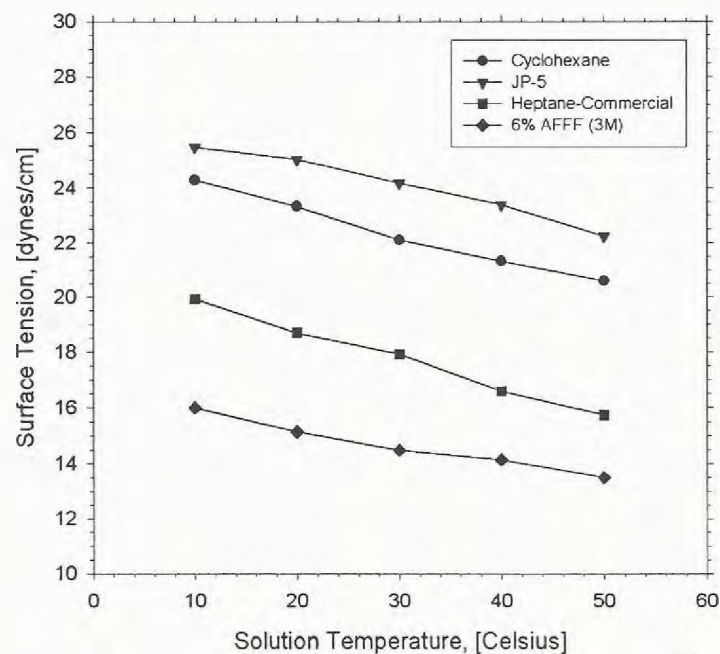


Figure F 1 – Surface tension of various solutions at different temperatures.

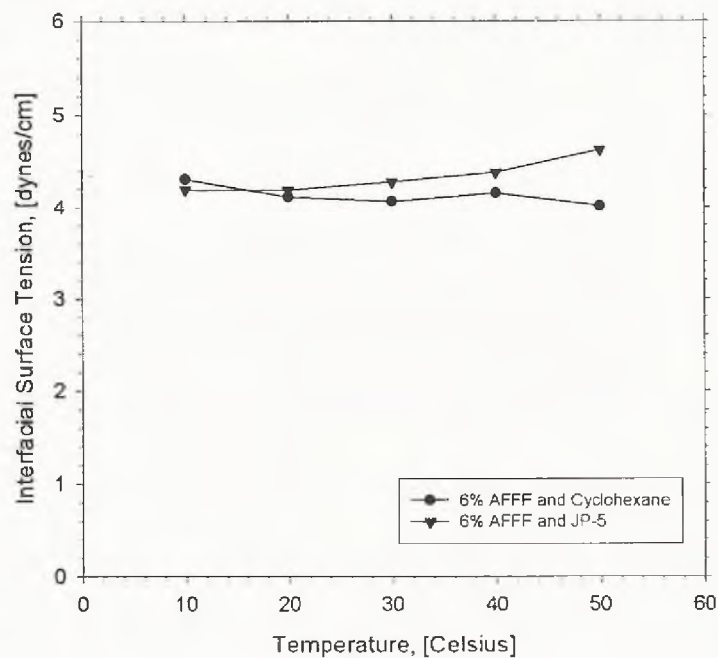


Figure F 2 – Interfacial surface tension between fuel and AFFF at different temperatures.

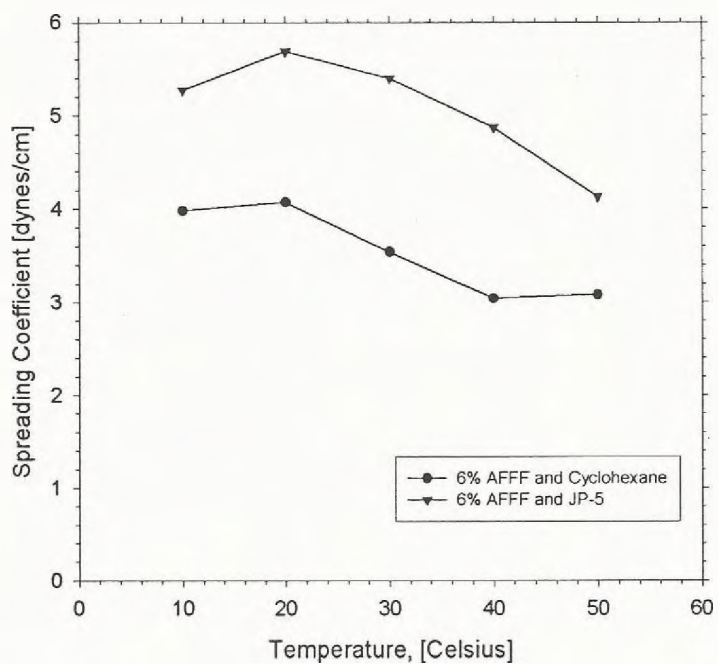


Figure F 3- Spreading coefficient of AFFF on fuels at different temperatures.

REFERENCES

1. Moran, H.E. Burnett, J.C. and Leonard, J.T., "Suppression of Fuel Evaporation by Aqueous Films of Fluorochemical Surfactant Solutions," NRL Report 7247, Naval Research Laboratory, Washington, D.C. (1971)