

FRED V7.1.1 RELEASE NOTE

Key Enhancements

Minor Enhancements

Bug Fixes

Release Note

for

Shell FRED

Version 7.1.1

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Document History

Date	Issue	Reason for Change	Author	Approved by/ Content Owner
26-Feb-20	0	First Version	Steven Betteridge	Lee Phillips (Shell) Graham Morrison (Gexcon)

Executive Summary

A couple of significant issues have been identified in the release of FRED 7.1 which can cause FRED to exit without saving results. It has therefore been necessary to create a small fix to FRED to address these issues and also resolve a small number of usability issues that have been identified. This version of FRED is labelled FRED 7.1.1.

An update to the FRED User and Technical Guides is not required for these changes and therefore this release note summarises the bug fixes and small enhancements.

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1. Introduction

This report summarises the small number of changes that have been made to FRED for the release of version 7.1.1.

2. Minor Enhancement

- The calculation of the pool area when a bund is defined in the Unified Scenario has been improved. The maximum area should now match the requested bund area within $\pm 1 \text{ m}^2$.
- The layout of the liquid and vapour components in pool results summary in the Unified Scenario has been improved. This has been achieved by truncating the fluid name so that it fits within a single column and so a key/legend has been added under the results to indicate the full name of the fluid (s).
- The CHIC model requires at least one vent to be defined to allow the influx of fresh air and outflow of combustion products. In the previous versions of FRED, it was possible to set the vent size to be unrealistically small, e.g. $< 1 \text{ cm}^2$. The model has now been improved, so that it will not calculate below 0.001 m^2 . In addition, the user is warned that they are outside the experimental range below 1 m^2 and the extrapolated range below 0.1 m^2 .
- Persistence of results has been added to the Dense Gas Scenario to match other scenarios. This means that calculation results are stored when the scenario window is closed. The results are only recalculated when the inputs have changed, and the user selects the calculate option.

3. Bug Fixes

Significant issues

- A Dense Gas Scenario would crash if it was opened a second time if there were associated warnings. This issue was created in FRED 7.1, following the modification to keep the results when the scenario window is closed down. This has been resolved in this version of FRED.
- Generating a report in the Pressurised Release scenario can cause a crash if a Receiver is connected to the Pressurised Release AND the user requests Receiver and Jet Fire results to be included in the same report. This has been fixed in FRED 7.1.1.
- The error checks associated with the creation of an associated Dense Gas scenario from within the Unified Scenario have been improved. In previous versions of FRED, the scenario could crash if the vapour pressure above the transient pool was always below the lower emission rate for the Dense Gas Scenario (10^{-4} kg/s). In FRED 7.1.1, FRED will now inform the user that a Dense Gas Scenario cannot be generated.

Science

- The error message “ERROR: no convergence of iterative thermodynamic calculations in THRMNO” when the momentum dispersion model (Aeroplume) tries to link to the passive dispersion model (Hegadas) during a release of LNG has been resolved. The tolerance on the thermodynamic calculation used to start the Hegadas calculation has been improved.
- The BLEVE model was found to crash if the ambient temperature was set to be lower than the atmospheric boiling point temperature of the selected liquid. This was caused by a failure to calculate the fluid’s vapour density at this temperature. Instead the BLEVE model now uses the vapour density at the atmospheric boiling point.
- The orientated radiation was occasionally calculated to be higher than the maximum radiation. This occurred when a receiver was located at a very specific position relative to its connected pool fire and a specific orientation with respect to north.
- Investigation showed that the orientated radiation could not be calculated for the given set of inputs. Therefore, in these cases, the orientated radiation has been set to the maximum radiation value and a warning is given to the user.

User Interface

- In FRED 7.1, the Jet Fire summary in the Pressurised Release scenario was no longer shown if the flame impingement results could not be calculated. This has now been fixed and the Jet Fire summary is always shown.
- The distance to half width and maximum half width was always shown as n/a in FRED 7.1. This has been fixed in FRED 7.1.1.
- In FRED 7.1, the warning dialog icon was disabled when a scenario was opened for a second time. This has been fixed in FRED 7.1.1.

Bibliographic Information

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Gexcon is a world-leading company in the field of safety and risk management and advanced dispersion, explosion, and fire modelling.

Our experience arises from detailed knowledge of explosion phenomena built up throughout years of conducting extensive research projects, carrying out safety assessment, performing accident investigations, and performing physical testing at the company's facilities.

About Shell

An international energy company that aims to meet the world's growing need for more and cleaner energy solutions in ways that are economically, environmentally and socially responsible.

For more information and product enquiries.

Email: fred@gexcon.com

Norway	+47 55 57 43 40	UAE	+971 50 64 00 227
US	+1 301 915 9922	China	+86 139 1663 9854
UK	+44 1925 202430	India	+91 20 65 200 818
France	+33 6 42 19 17 87	Indonesia	+62 21 8067 4611
Netherlands	+31 6 83 55 78 89	Australia	+61 8 92 27 80 01

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