Instructions to launch and run gen_dose_cycle.m in MATLAB

Transfer the following three files to your MATLAB folder:

- gen_dose_cycle.m,
- Leggettadjust_parta.m,
- Leggettadjust_partb.m

This set of scripts allows you to examine the maximum dose (in micrograms [µg]) received on a day over a 10 year period for a range of dosing cycles (different time periods between the dosing days) that would keep an adult male of average bodyweight (80 kg) below a change in blood lead of 15 µg/dL (i.e., µg per deciliter).

Open MATLAB and type in the name of the first file "gen_dose_cycle" in the command window.

An introduction to this tool will appear in the command window.

```
Command Window
New to MATLAB? See resources for Getting Started.
  >> gen_dose_cycle
  %This script called gen_dose_cycle, generates a recursive back-calculation of maximum dose
  %over 10 years that keeps an 80 kg adult from reaching a Blood-lead
  %of 15 ug/dL. The initial and final predictions are generated from the adjusted
  %Leggett model (OEHHA 2013). The user will be asked to input the first and last dosing cycles of
  %interest.  This script allows the user to examine the maximum oral dose for dosing cycles ranging from every day to
  %every 120th day. At the end of the last dosing cycle, a figure will appear that
  %shows the time course in years of blood lead (ug/dL)for the last cycle
  %chosen by the user. The time it takes(in seconds)to complete each ithday cycle appears in the command window
  %The results will appear as a data array in the command window including the ith_day
  %cycle, maximum blood lead (BLLmax)and the oral dose per cycle. A Newton-Raphson method is employed
  %to find the specific solution to the back-calculation problem.
  pause; %Press any key to continue
```

After reading the introduction, press any key to continue. The script will instruct you to enter the first i^{th}day dosing cycle of interest, then press return. The script then will instruct you to enter the last i^{th}day dosing cycle of interest, then press return. This sets up the range of dosing cycles you want the model to run (e.g. every day up to every 7th day).

If, for example, you want the model to start with finding the maximum µg dose that, if taken every day, would result in a change in blood lead level just below 15 µg/dL, you would select the first i^{th}day dosing cycle = 1 and press return. And if you want to see how dosing changes as dosing becomes less frequent such as every 7th day inclusive, and would result in a change in blood lead level just below 15 µg/dL, you would select the last i^{th}day dosing cycle = 7 and press return.

```
Command Window                                                                    ⊙
New to MATLAB? See resources for Getting Started.                                 ✕

  enter the first ithday dosing cycle of interest then press return:1
  enter the last ithday dosing cycle of interest then press return:7
fx
```

During the run, the time it takes to run each cycle also appears in the command window. At the end of the run, results appear in the command window for all the selected dosing cycles in a data array. This array includes the i^{th}day cycle, the maximum blood lead level and the dose associated with the ith cycle. The column headings of the array appear after the array of results.


```
Command Window                                                                    ⊙
New to MATLAB? See resources for Getting Started.                                 ✕

  enter the first ithday dosing cycle of interest then press return:1
  enter the last ithday dosing cycle of interest then press return:7
  Elapsed time is 16.069623 seconds.
  Elapsed time is 16.258701 seconds.
  Elapsed time is 14.931104 seconds.
  Elapsed time is 14.818102 seconds.
  Elapsed time is 13.372688 seconds.
  Elapsed time is 12.132340 seconds.
  Elapsed time is 9.626209 seconds.

  resultsout =

              1        14.993       170.69
              2        14.994       339.33
              3        14.993       506.06
              4        14.994       670.91
              5        14.994       832.24
              6        14.994       988.34
              7        14.994       1141.1


  columnheader =

      'ithdaycycle'    'BLLmax'    'intake_per_ithday'

fx >>
```

In addition, a figure showing the time course of lead in blood during the last dosing cycle will also appear.

```
Command Window                                                                    ⊚
New to MATLAB? See resources for Getting Started.                                 ×
   enter the first ithday dosing cycle of interest then press return:1
   enter the last ithday dosing cycle of interest then press return:7
   Elapsed time is 16.069623 seconds.
   Elapsed time is 16.258701 seconds.
   Elapsed time is 14.931104 seconds.
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   columnheader =

      'ithdaycycle'    'BLLmax'    'intake_per_ithday'

fx >>
```
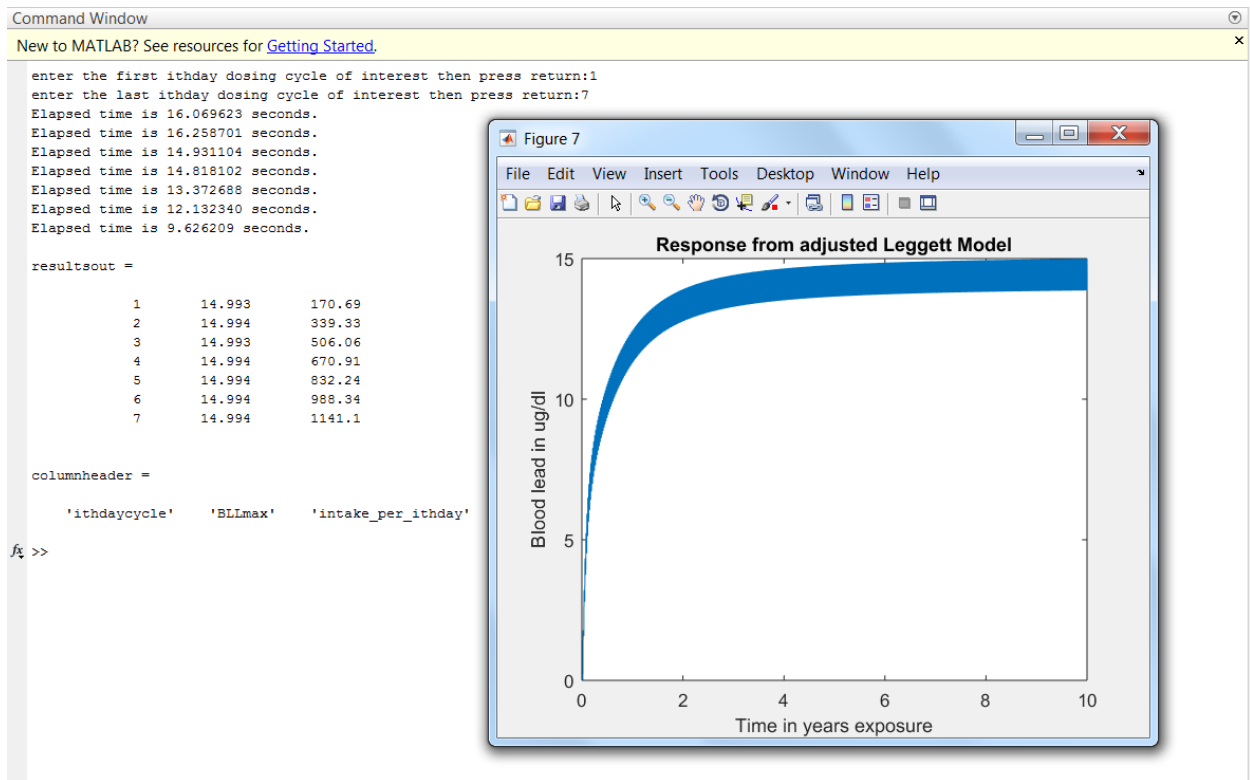

Figure 7 — Response from adjusted Leggett Model. Blood lead in ug/dl vs. Time in years exposure.

If you want to conduct a second run, type gen_dose_cycle in the command window and select a new range of runs.