Quick Start Guide – A Brief Tutorial for DRAS 4

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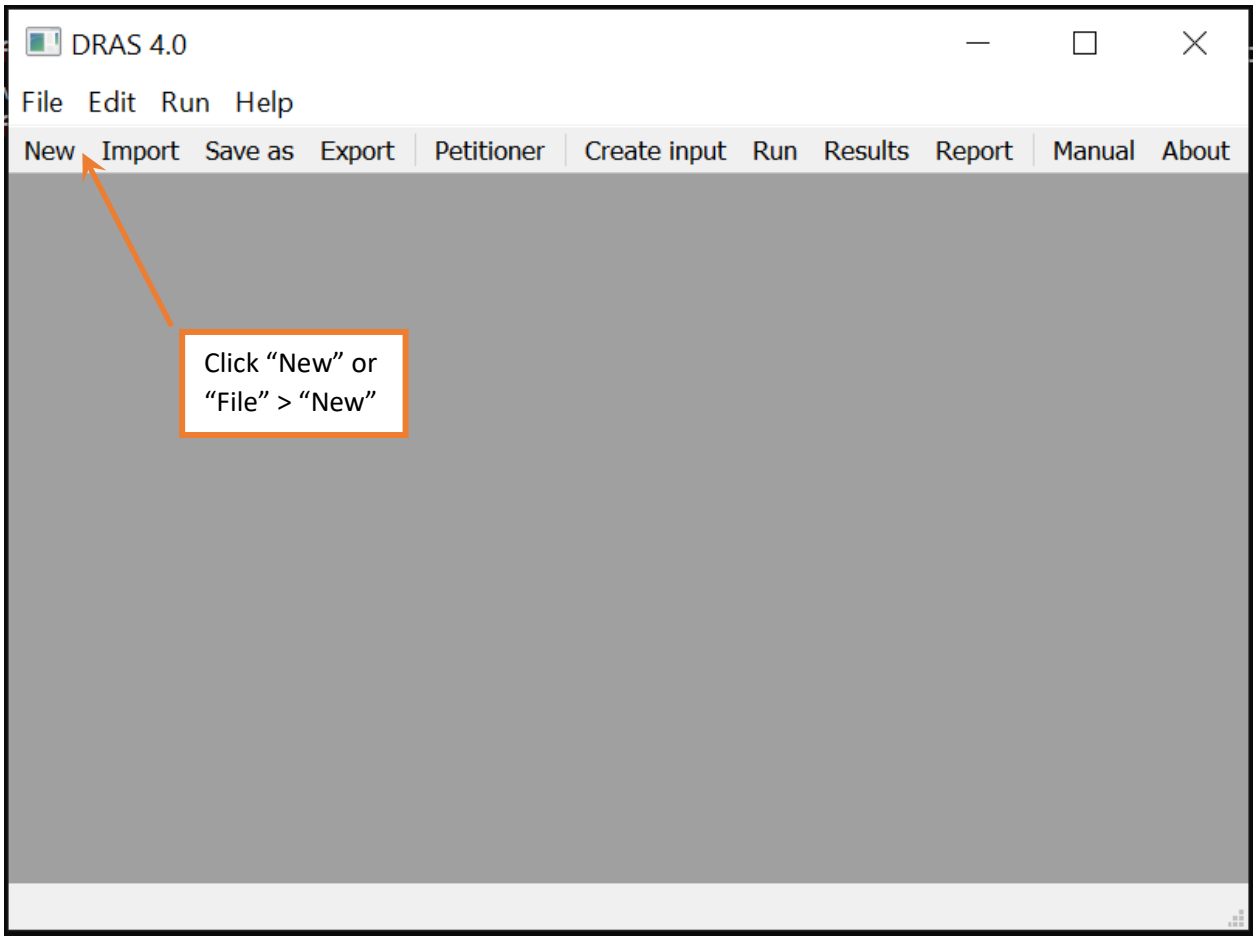
Task 1: Start DRAS 4

Step 1. From the EPA Delisting website, copy DRAS4_20200803.exe to a location on your hard drive where you have read/write access.

Step 2. Double-click the DRAS4_20200803.exe file or execute it from the command line window. Wait until the main window pops up.

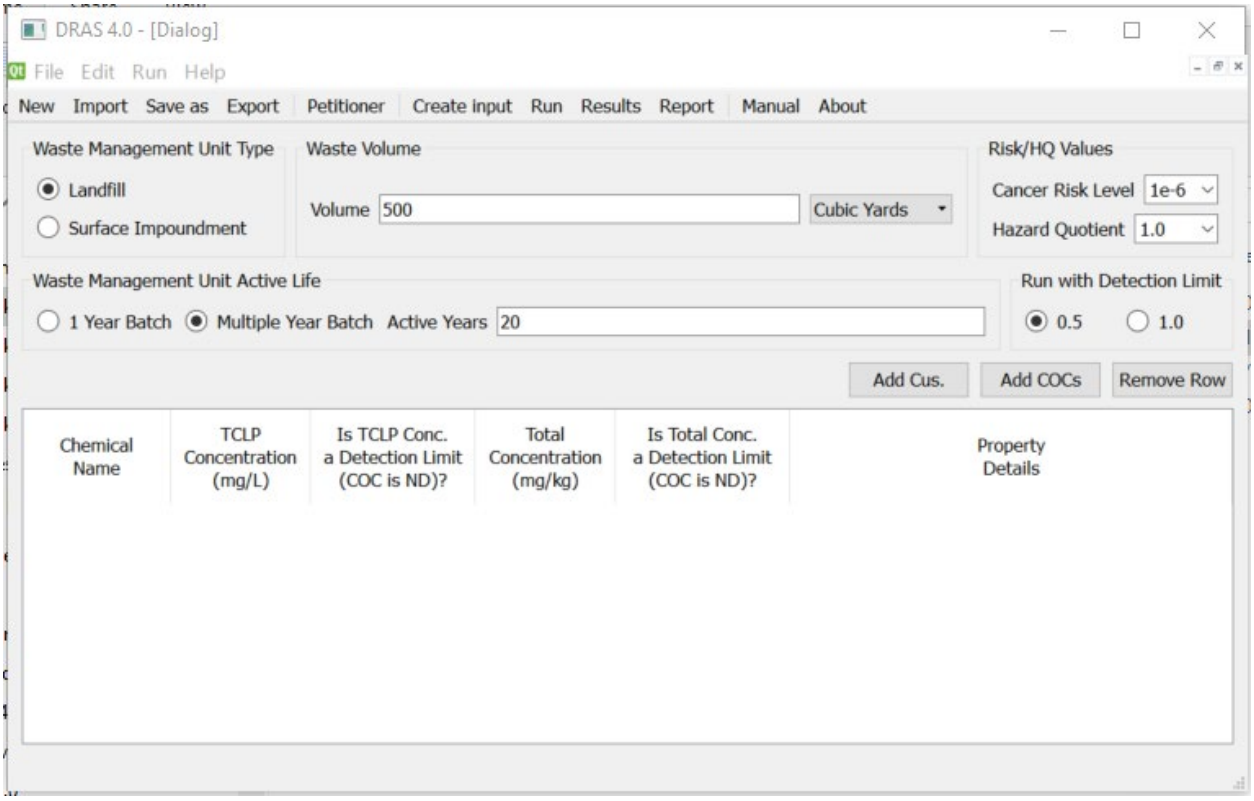
Step 3. Click "New" from Toolbar or select "File" > "New" from the drop-down menu.



For more detail on DRAS 4 Toolbars and Drop-Down Menus, see Section 3.2 of the DRAS 4 User's Manual.

Task 2: Set up a new project:

Step 1: Set up Waste Management Unit (WMU) properties in the upper portion of the main window.



Waste Management Unit Type: Choose *Landfill* or *Surface Impoundment*.

Waste Management Unit Active Life:

1 Year Batch is for one-time projects such as dig-and-haul remediation projects.
Multiple Year Batch is for ongoing generated waste.

You must specify an assumed waste management unit *Active Life* for *Multiple Year Batch* projects. (EPA recommends 20 years for landfills and 50 years for surface impoundments.)

Waste Volume: *1 Year Batch* Projects, enter the total project waste volume.
Multiple Year Batch Projects, enter annual waste volume.

Risk/HQ Values: Specify target cancer risk and hazard values the project.

Run with Detection Limits: Choose the fraction of the detection limit to be used in estimates of risk and hazard from waste constituents that were not detected at an identified detection limit.

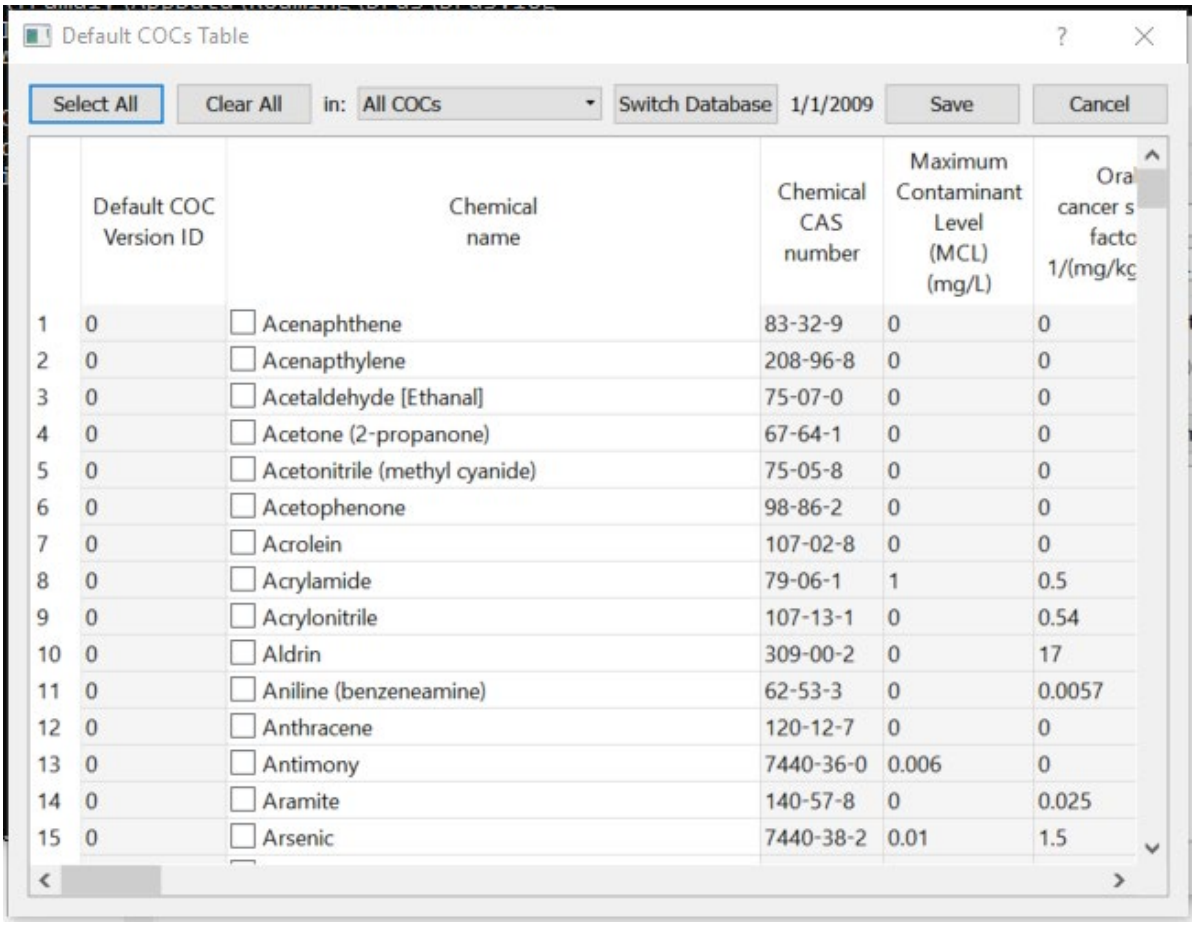
For more detail on Waste Management Unit options, see Section 3.3.2.2 of the DRAS 4 User's Manual.

Step 3: Set up Site COCs in the lower portion of the main window

1. Add COCs from default database:
   Click button "Add COCs", a new dialog containing all default COCs will pop-up. Check the boxes in Column 2 – "Chemical Name" to select COCs for this project. The Default COCs Table can be sorted by any column and there are also drop-down menus allowing you to select COCs by chemical class.

   The default database that opens in the dialog box below is the most recent version despite carrying a 2009 date at the top. This default database is identical to the July 2020 version noted in the "Switch Database" menu.

2. Click button "Save" to add the selected COCs to the main window.

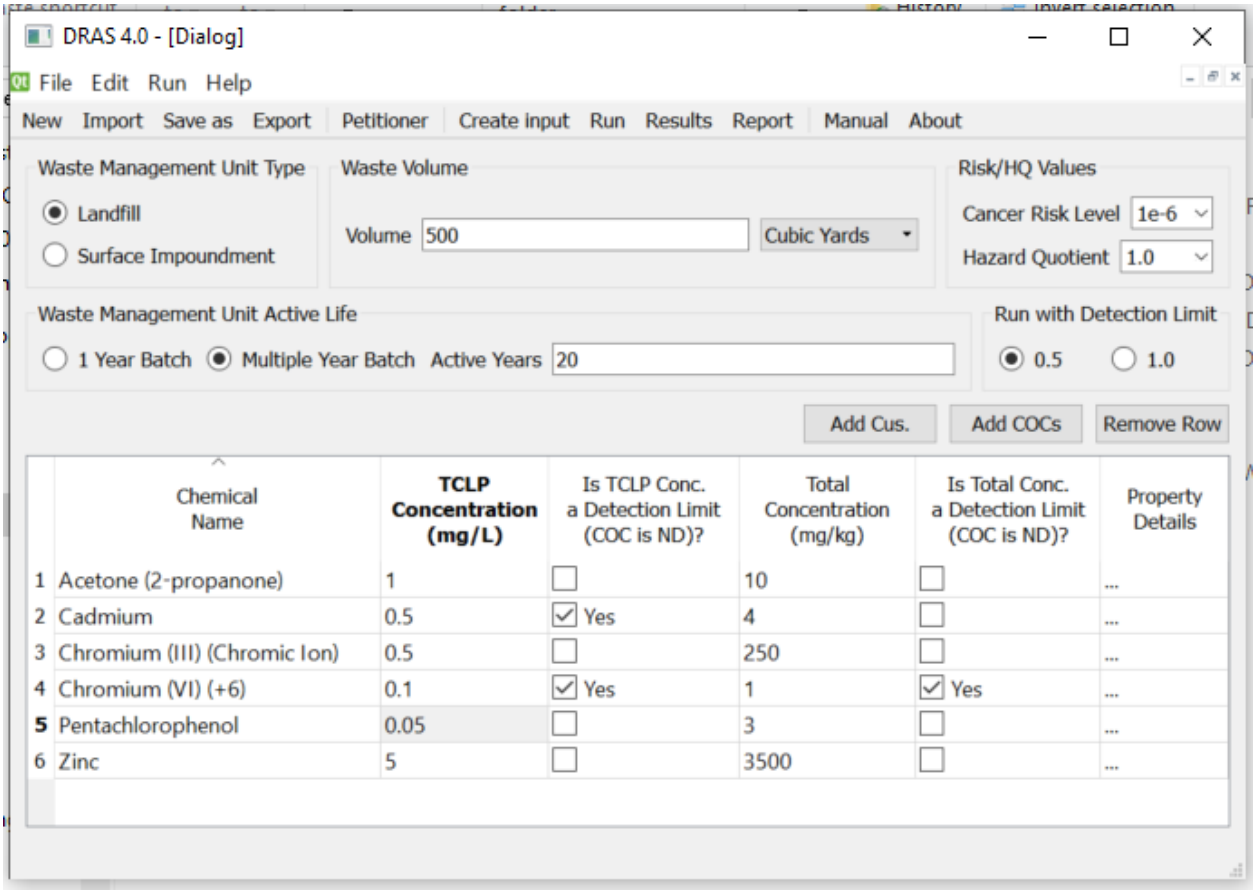


	Default COC Version ID	Chemical name	Chemical CAS number	Maximum Contaminant Level (MCL) (mg/L)	Ora cancer s facto 1/(mg/kg
1	0	Acenaphthene	83-32-9	0	0
2	0	Acenapthylene	208-96-8	0	0
3	0	Acetaldehyde [Ethanal]	75-07-0	0	0
4	0	Acetone (2-propanone)	67-64-1	0	0
5	0	Acetonitrile (methyl cyanide)	75-05-8	0	0
6	0	Acetophenone	98-86-2	0	0
7	0	Acrolein	107-02-8	0	0
8	0	Acrylamide	79-06-1	1	0.5
9	0	Acrylonitrile	107-13-1	0	0.54
10	0	Aldrin	309-00-2	0	17
11	0	Aniline (benzeneamine)	62-53-3	0	0.0057
12	0	Anthracene	120-12-7	0	0
13	0	Antimony	7440-36-0	0.006	0
14	0	Aramite	140-57-8	0	0.025
15	0	Arsenic	7440-38-2	0.01	1.5

For more details on setting up COCs including using older databases stored in DRAS 4, entering concentrations, and modifying individual chemical properties, see Section 3.3.2.3 of the DRAS 4 User's Manual.

For more details on creating or importing customized COCs (COCs not available in the default DRAS 4 database), see Section 3.3.4 of the DRAS 4 User's Manual.

3. Back in the main project window, click each empty table cell to input waste specific COC concentrations. If the COC was not detected and you wish to evaluate the risk and hazard based on the detection limit, enter the detection limit (typically the reporting limit) and check the box in the detection limit column.

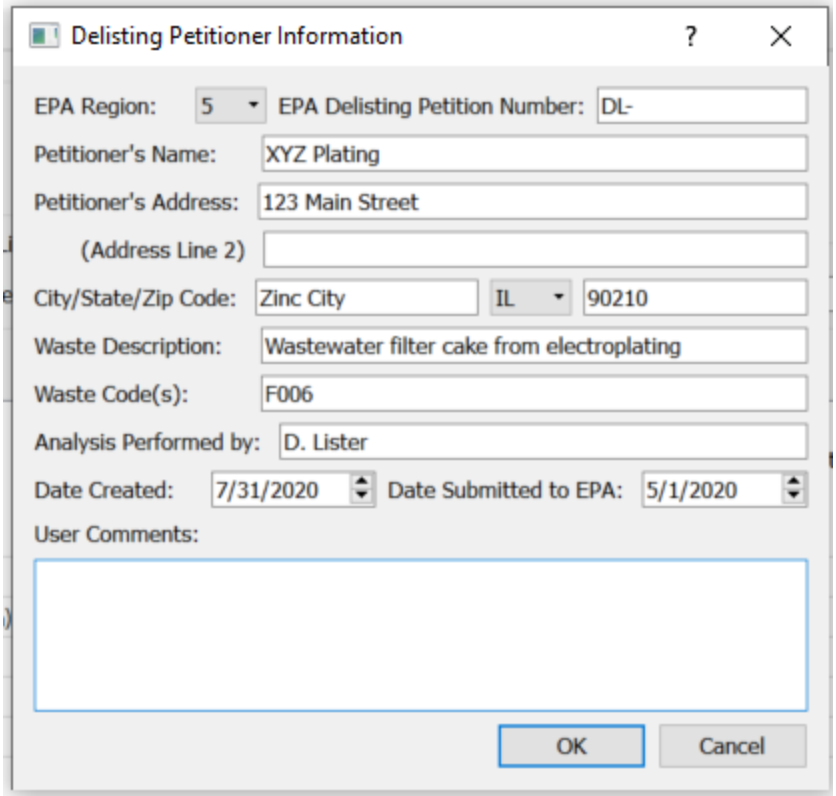


	Chemical Name	TCLP Concentration (mg/L)	Is TCLP Conc. a Detection Limit (COC is ND)?	Total Concentration (mg/kg)	Is Total Conc. a Detection Limit (COC is ND)?	Property Details
1	Acetone (2-propanone)	1	☐	10	☐	...
2	Cadmium	0.5	☑ Yes	4	☐	...
3	Chromium (III) (Chromic Ion)	0.5	☐	250	☐	...
4	Chromium (VI) (+6)	0.1	☑ Yes	1	☑ Yes	...
5	Pentachlorophenol	0.05	☐	3	☐	...
6	Zinc	5	☐	3500	☐	...

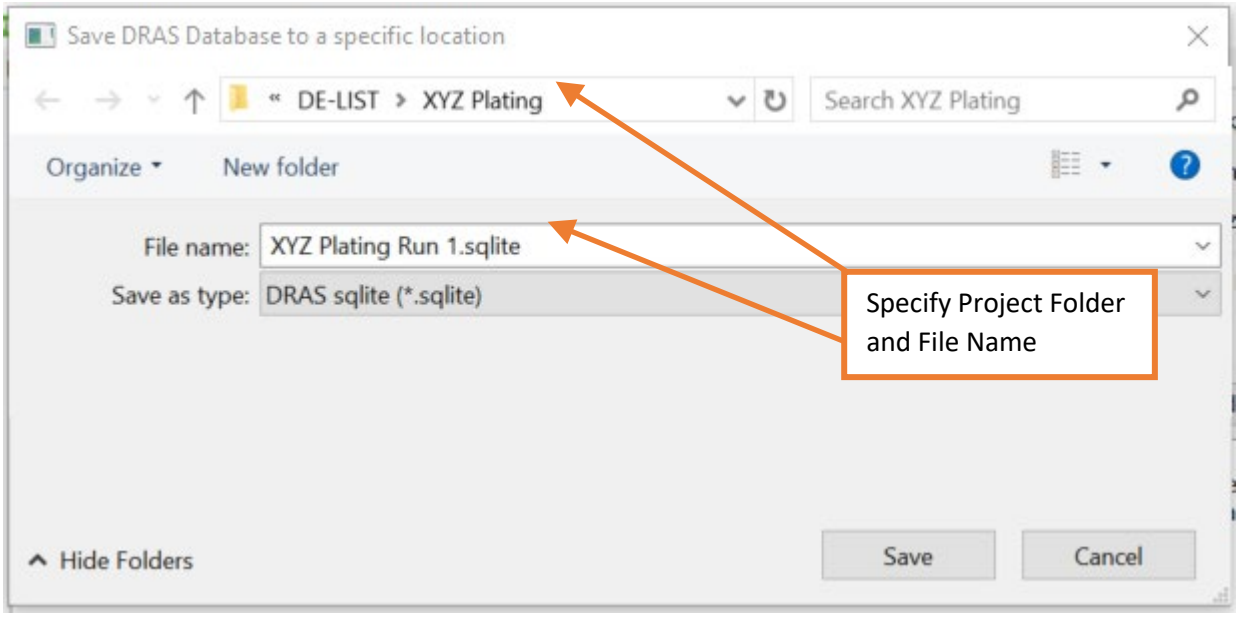
Step 4. (Optional) Click “Petitioner” tab to enter petitioner information.

Although optional, the Petitioner tab is very useful in preparing documentation of the DRAS 4 run for the rulemaking docket. The information entered in this tab will be reproduced on output tables, serving to clearly identify the petitioned waste, the facility, date, and identify of the person performing the analysis.

Click “Ok” to save the information to database.

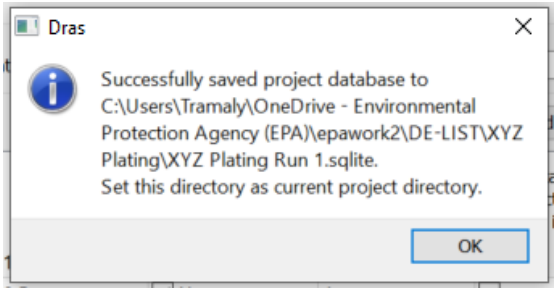


Step 5. Click "Save as" to save the project database to a user specified location.

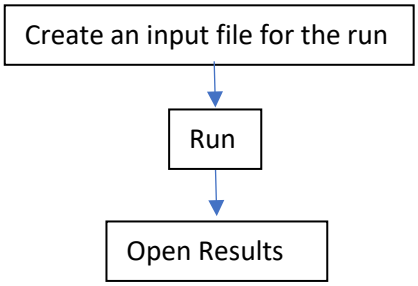


If "Save as" not used, the project database will be saved under a default Windows temporary file location. It is recommended to use "Save as" so that the project can be revisited later. Navigate to a specific location, enter a project database name, and click "OK".

A confirmation message will appear. Click "OK."

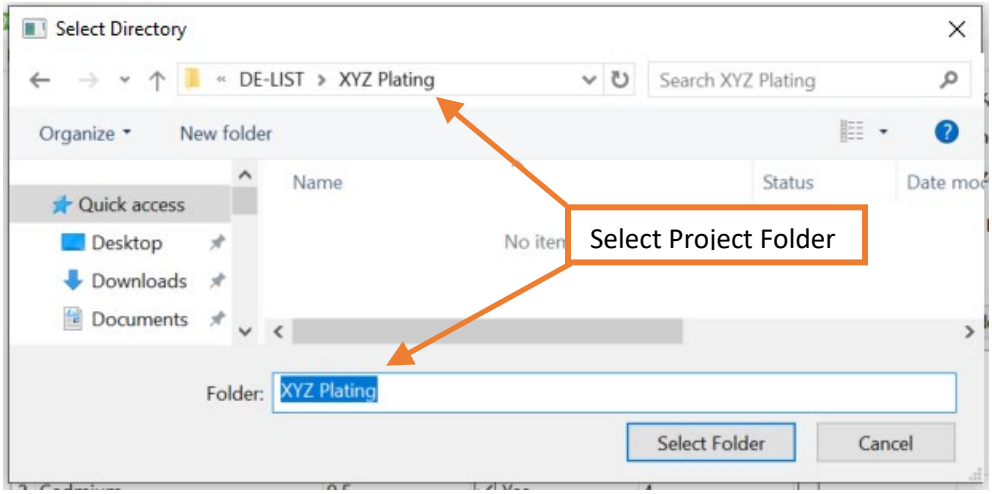


Now that you've entered your waste information and saved the project, you are ready to run DRAS 4 and get results. At this point, the modular nature of DRAS 4's program elements requires that you proceed stepwise through a few similar and repetitive steps (Steps 6-8) necessary to set all of the needed input files, run the model, and view results. Every time you wish to rerun the model, these steps will need to be repeated. The steps are summarized as follows:

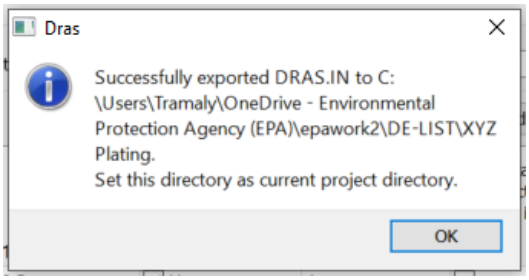


Each of these steps opens a similar dialog box for file-folders. A unique project folder (ideally the folder in which you saved the project database) should be selected. The *Create Input* and *Run* steps produce a confirmation message that you'll need to click "OK" to move on. The *Results* step asks you to select the output file before opening the Results for viewing.

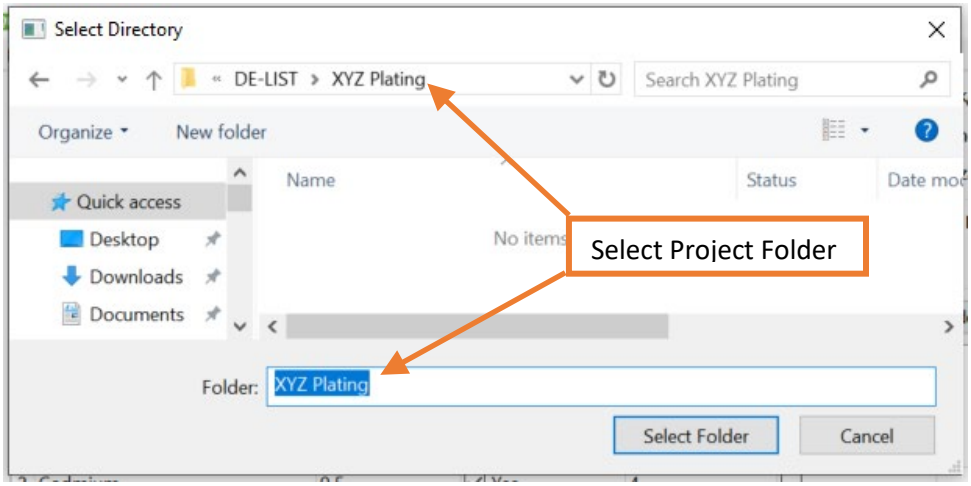
Step 6. Click "Create input" to create input file "DRAS.IN" under the current directory.



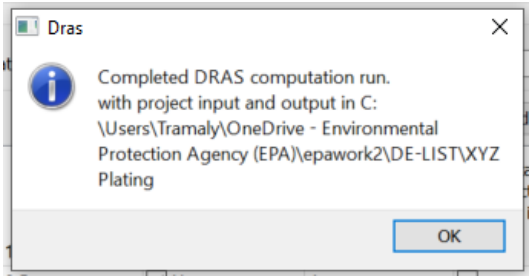
If the project has been saved to a user specified directory in the "Save as" procedure, the current directory will be the user specified directory, otherwise, it is the temporary directory subject to change by user. Click "Select Folder" to save the file "DRAS.IN"



Step 7. Click "Run" to execute the computation engine.

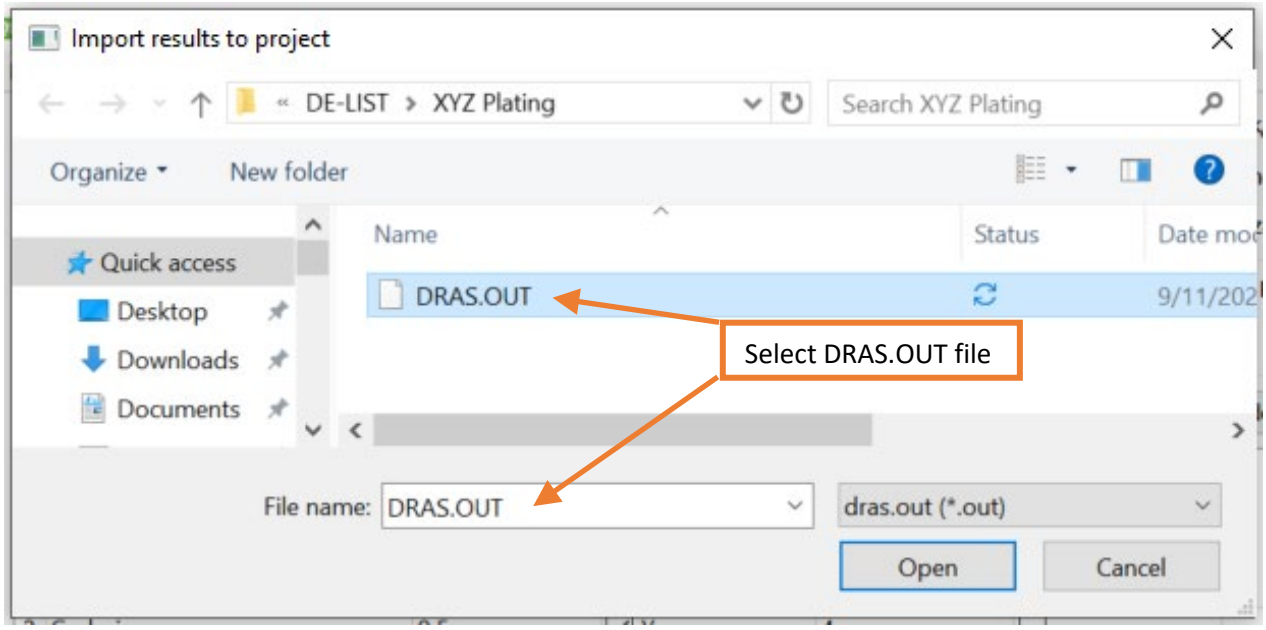


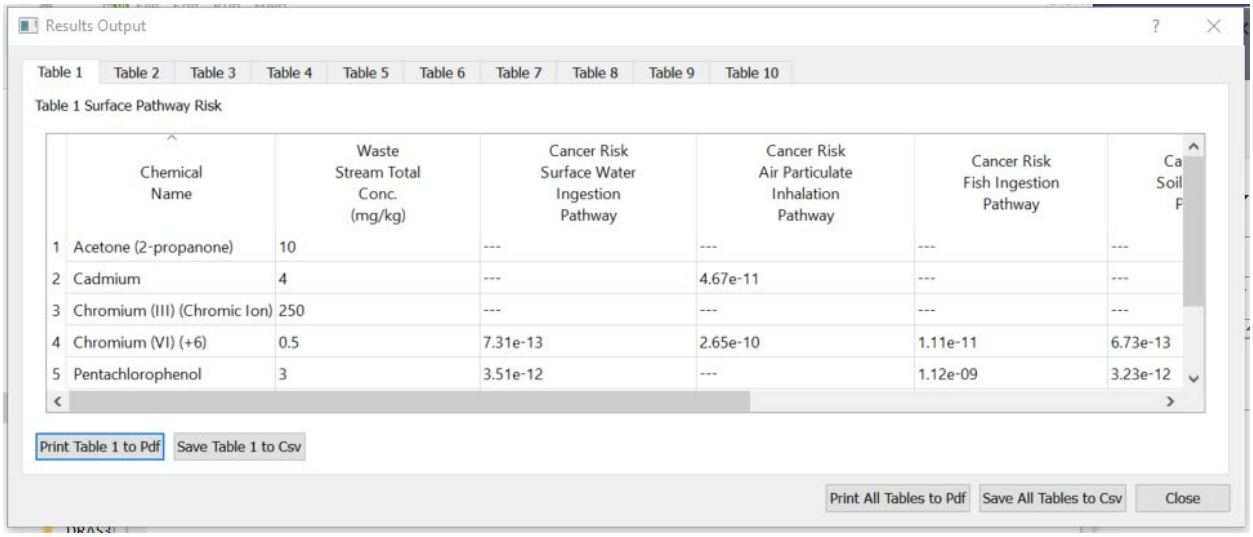
The default working directory is where the "DRAS.IN" was saved in the previous procedure. A user may also navigate to any folder that contains "DRAS.IN" and execute the computation in that directory.



Step 8. Click "Results" to import the results from "DRAS.OUT" under the working directory.

Tables 1-10 will be displayed in a pop-up dialog.





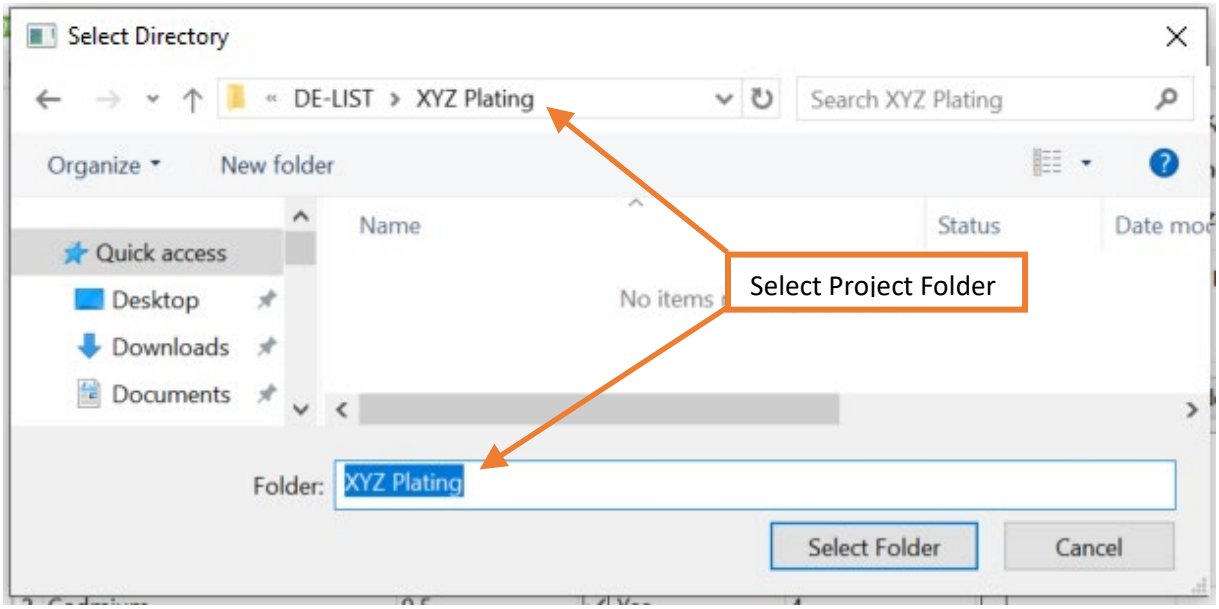
	Chemical Name	Waste Stream Total Conc. (mg/kg)	Cancer Risk Surface Water Ingestion Pathway	Cancer Risk Air Particulate Inhalation Pathway	Cancer Risk Fish Ingestion Pathway	Ca Soil
1	Acetone (2-propanone)	10	---	---	---	---
2	Cadmium	4	---	4.67e-11	---	---
3	Chromium (III) (Chromic Ion)	250	---	---	---	---
4	Chromium (VI) (+6)	0.5	7.31e-13	2.65e-10	1.11e-11	6.73e-13
5	Pentachlorophenol	3	3.51e-12	---	1.12e-09	3.23e-12

Table 3.1 from the DRAS 4 User's Manual summarizes the contents of each output table and is included below for reference.

Table Name	Description
Table 1 - Surface Pathway Risk	*Forward-calculation* of cancer risks due to releases from the surface of the waste management unit. Displays risk by individual pathway (fish ingestion, volatile inhalation, etc.) as well as an aggregate risk by chemical and overall. Risk estimated from concentrations in petitioned waste.
Table 2 - Groundwater Pathway Risk	*Forward-calculation* of cancer risks due to a release to groundwater from the waste management unit. Displays hazard by individual pathway (groundwater ingestion, groundwater inhalation, etc.) as well as an aggregate risk by chemical and overall. Risk estimated from concentrations in petitioned waste.
Table 3 - Surface Pathway Hazard Quotient	*Forward-calculation* of noncancer health effects (hazard) due to releases from the surface of the waste management unit. Displays hazard by individual pathway (fish ingestion, volatile inhalation, etc.) as well as an aggregate risk by chemical and overall. Hazard estimated from concentrations in petitioned waste.
Table 4 - Groundwater Pathway Hazard Quotient	*Forward-calculation* of noncancer health effects (hazard) due to a release to groundwater from the waste management unit. Displays risk by individual pathway (groundwater ingestion, groundwater inhalation, etc.) as well as an aggregate risk by chemical and overall. Hazard estimated from concentrations in petitioned waste.
Table 5 - Maximum Allowable Concentrations for Surface Pathways	*Back-calculation* of maximum allowable concentrations due to releases from the surface of the waste management unit. Displays hazard by individual pathway (fish ingestion, volatile inhalation, etc.). Maximum allowable concentrations estimated based on target risk and hazard criterion set by the regulatory authority. Entered waste concentrations are not used in these calculations. Concentrations will be mg/kg total for landfills and mg/L leachate for surface impoundments.
Table 6 - Maximum Allowable TCLP Concentration Groundwater Pathways	*Back-calculation* of maximum allowable leachate concentrations, in mg/L, from releases to groundwater from the waste management unit. Displays hazard by individual pathway (groundwater ingestion, groundwater inhalation, etc.). Maximum allowable concentrations estimated based on target risk and hazard criterion set by the regulatory authority. Entered waste concentrations are not used in these calculations.
Table 7 - Aggregate Risk and Hazard Quotient Results	*Forward-calculation* of aggregate cancer risk and hazard summed across all pathways and all chemicals. Includes one sum of risk and hazards limited to COCs that were detected and another sum of risk and hazard that includes estimates based on the detection limits for COCs that were not detected. **This table summarizes the overall potential risk from the petitioned waste from COC concentrations in the waste.**
Table 8 - Limiting Pathways	*Back-calculation* of the limiting maximum allowable concentrations based on target risk and hazard criterion set by the regulatory authority. The individual limiting pathway is also identified (groundwater ingestion, air particulate inhalation, etc.). **This table is the most concise summary of maximum allowable concentrations.** Note that for surface impoundments, there will be a maximum allowable leachate concentration in mg/L for both surface and groundwater pathways.
Table 9 - Pathways Exceeding the Delisting Limits	This table is a combination of *forward-* and *back-calculations* from DRAS. Although all COCs are included in the table, COCs with waste concentrations that exceed limiting values are identified when the table also includes the limiting maximum concentration and pathway.
Table 10 - Toxicity Characteristic Soil Saturation and Ecological Values	This table presents comparisons to alternative criteria. The leachate concentration of the petitioned waste is compared to the Toxicity Characteristic Leachate Procedure concentrations from 40 CFR Part 261.24. TCLP leachate concentrations that exceed the regulatory values would remain hazardous regardless of the results of the DRAS model. Total concentrations in the waste that exceed an estimated soil-saturation concentration indicate that some of the assumptions used in this assessment may not apply and the user may need to make additional evaluations of the waste. Predicted surface water concentrations based on a release from the surface of the waste management unit are compared to ambient water quality criteria for protection of aquatic life.

Step 9. Click "Report" to print the results to .pdf and .html formats.

The default report directory is the user specified project directory. The user may also choose to navigate to another folder.



A pop-up window as below will appear when the report is ready.