Appendix M

Basic Instructions for Exporting HARP Risk Results And Importing Them Into GIS

Using ArcView-ArcMap and Spatial Analyst

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Prerequisites: Must own ArcGIS 8.x software (ArcMap) for Steps A-C, and Spatial Analyst Extension for Step D. Microsoft Access database software is strongly recommended also.

A. Exporting Risk Data By Receptor From HARP.

1. **Run HARP Risk with UTMs**: Run the desired risk analysis from the HARP risk window, for example 70-year adult resident, cancer, derived. Be sure to check the box for **"Include UTMs".** Also check the box for **"Include UTM zone**".

   NOTE: If your analysis was in a region that crosses 2 UTM zones (zone 10 and 11), you must check the box for "Include UTM zone" and after running the export, you will also have to separate the two UTM zones' data into 2 separate files.

2. **EXPORT ALL DETAILS**: When you have run your desired risk analysis report in HARP, choose the HARP pulldown (from the Risk window) for Export | Export All Details. Accept the default location (C:\HARP\Projects\….) or browse to another folder -- remember what you have chosen.

3. **File Explorer**: Using Windows File Explorer, navigate to the folder where you just exported the HARP files.

   NOTE: Be sure you see a Rep_xxx.txt file that corresponds to the most recent risk analysis run you just did and want to export. For example, the 70-year resident, Derived(OEHHA) risk, for all receptors, with UTMs included, is called by default: Rep_Can_70yr_DerAdj_AllRec_AllSrc_AllCh_ByRec_Site_UTM.txt. If this is the risk analysis you want to export to GIS, this report should be the most recently run "Rep_xxx.txt" report in your folder.

4. **RISK.CSV File:** In your folder, find the file called RISK.CSV. Double-click the file to open it in Excel.

You should see columns for the receptor ID, receptor type (e.g. Grid), Cancer Risk (if you calculated it), Chronic Hazard Index (if calculated), Acute Hazard Index by screening method (if calculated), Acute Hazard Index by full maximum hourly method (if you calculated it), UTM East coordinate (in meters), UTM Northing coordinate (meters), and UTM zone (if chosen).
Verify that this RISK.CSV file has the desired risk or HI values that you want to import into GIS.

** NOTE: A value of -1.00 E+00 in the risk or HI columns means you did not run the analysis to compute that type of risk or HI.

5. **Format Cleanup**: You need to do a bit of tidying-up for this file's headers to work well in the next step. You may wish to make a copy of the file with a slightly different name so you have a backup.
   a. Delete the first row which contains the header line: File: C:\HARP.....
   b. Merge the column headers into a single line (row): combine the 2-line headers, e.g., Cancer (above), and Risk (below) onto a single line and delete the extra line.

Save your changes to Microsoft Excel format (.XLS). (Be sure your cursor is positioned in one of the cells, and no rows or columns are highlighted when you do the Save).

B. Converting Comma-Delimited or Excel Risk File into a Table Format Accepted by GIS.

DECISION: You have 2 choices for saving the risk file to a GIS-ready format**. If you have Microsoft Access, it is generally simplest to use Option 1.** If you do not have Microsoft Access, use Option 2.

OPTION 1: Save to a Microsoft Access table for ArcView to use.
[If you have Microsoft Access, this is the simplest option.]

1. Close Excel if you have the RISK.CSV or RISK.XLS file still open.
2. Start Microsoft Access and create a new, blank database. Give it a name and location of your choosing.
3. Choose File | Get External Data | Import. Browse to the folder where your RISK.XLS file is. Change the "Files of type" pulldown to Microsoft Excel Files (.xls). You should see your RISK.XLS file. Choose it and click Import.
4. Check the box for "First Row Contains Column Headings. (Your data should look parsed correctly into columns.) Click Next.
5. Choose In a New Table, then Next.
6. Choose that the Receptor field will be Indexed, as "Yes (No Duplicates)". Click Next.
7. Choose the radio button "Choose my own primary key". Receptor should pop into the window. (If it doesn't, choose it from the pulldown.) Click Next. [You could let Access create a primary key if you'd prefer.]
8. Accept the default table name (or choose your own). Click Finish.
9. Once Access has finished importing the data, you can double click the table name and verify that it contains your data, parsed into the correct fields.
10. Close Access. (You must **not** have Access open to this table when you try to open it from ArcView.)

OPTION 2: Save to a dBase IV (.dbf) table for ArcView to use. AVOID IF POSSIBLE. [If you do not have Microsoft Access, you may have to use this option, but it can be tricky. Follow all steps.]

1. Have the RISK.XLS file open from completing step A5.
2. Saving from Excel to .dbf format is quirky, so you need to set all format and width formatting options explicitly in Excel before saving to the .dbf format, as follows.
3. Within Excel, hold down the Cntl key and select the column headers for Receptor ID, UTME, UTMN, and UTMzone (if included). Right click, and choose Format Cells. Choose Number. Set the number of Decimal Places to 0 (zero). Click OK.
4. With these columns still selected, Right click again. Choose Column Width. Enter a width that is at least 20% more than what Excel implies. I suggest 20 for these columns
5. Now click a cell to de-select everything.
6. Holding down the Cntl key, select the column headers for Cancer, Chronic, and both Acute columns. Right click, choose Format Cells. Choose Number, 11 decimal places. Click OK.
7. Right click the selected columns again. Choose Column width. Enter 25.
8. Now click to position your cursor in cell A1. Nothing should be highlighted/selected.
9. Choose File | Save to save the edited .XLS file. (Or use Save As and keep .XLS).
10. Now choose File | Save As. Change the "Save as Type" pulldown to "DBF 4 (dBASE IV) (*.dbf)".
11. Click Yes to the warning about keeping this format despite incompatible features.
12. Now click the upper right X square to CLOSE the file and close Excel.
13. Click Yes to the warning "Do you want to save the changes...".
14. Save it AGAIN to the .dbf (should be the default shown).
15. Click Yes at the warning to replace the existing file.
16. Click Yes at the warning about keeping this format despite incompatible features.
17. Now, at last, you should have a "GIS-safe" .dbf file.

NOTE: For future reference, GIS cannot accept any “formula” cells in .dbf files. If you ever have any in a file, first Convert to Values in Excel, then save the .dbf file.

C. Bring the Risk Table into ArcGIS 8.x using ArcMap.

NOTE: It is fastest and safest to put all files you will use in a GIS project *on your hard drive*, not a network.

1. **Start ArcMap** from Start | Programs | ArcGIS, with a blank map.
2. **Establish the Map Projection**: If you have a reference shape file layer, such as a county boundary or streets layer, available *in the same Projection and Datum as your HARP data*, you can add this to your ArcMap map document first. Do not add a layer that is in any other Projection/Datum.

   NOTE: Add only a layer that is in the **same projection as your HARP data**, which by default is UTM, NAD83 and in the correct UTM zone – either UTM zone 10 for northern and western California, or UTM zone 11 for southern and eastern California. (If you wish to switch to a different projection later, this can be done in a later step, and is described in step 4. below.)

3. **Open the HARP risk data table.** Now you are ready to add your HARP risk results data. Open your table using the appropriate Option below.

   OPTION 1: If you used a **Microsoft Access** format in section B, do the following.

   (a) Use the Tools | Add XY Data menu option.

   (b) Browse to the .mdb and then to the table you created in it.

   [NOTE: You may need to use the "Connect to Folder" icon to be able to see your data folder, if you have never connected to that folder with ArcMap before.]

   (c) Set the X Field to the UTME, and the Y Field to the UTMN and click OK

   (d) An "Events" layer is added to your map. (If the check box is not checked, turn it on to see the layer on the map.)

   OPTION 2: If you used a .dbf format in section B, do the following.

   (a) Use the Tools | Add XY Data menu option.

   (b) Browse to the .dbf file you created.

   [NOTE: You may need to use the "Connect to Folder" icon to be able to see your data folder, if you have never connected to that folder with ArcMap before.

   (c) Set the X Field to the UTME, and the Y Field to the UTMN and click OK.

   (d) An "Events" layer is added to your map. (If the check box is not checked, turn it on to see the layer on the map.)

   INFORMATIONAL NOTES:

   NOTE: For GIS, you should always know the Projection and Datum of your data. HARP v.17 and later produces output that, by default, is in the UTM Projection, with a Datum of NAD83 (North American Datum 1983). UTM zone 10 covers the northern and western part of California; UTM zone 11 covers the southern and eastern part.

NOTE: For GIS maps, UTM coordinates must be expressed in meters (not kilometers). HARP outputs in meters. (But if you ever use direct CEIDARS data, it would be in kilometers and needs to be converted to meters.)

NOTE: The View | Data Frame Properties, under the Coordinate System tab should have either no projection set ("Unknown") if you have no reference layer, or "UTM zone 10" or "UTM zone 11" (whichever is appropriate for your data), if you brought in a UTM-based reference layer.

4. Export the X,Y Points to a Shape File, To Allow You To Do Analysis and To Switch to Different Projections.

The "Events" layer of raw X,Y points is not yet a true GIS shapefile. Because of that, ArcMap would be unable to re-project it to a new coordinate system on-the-fly. If you need to re-project the data to something other than UTM, you should convert the "Events" layer to a shapefile. To do so, simply Right click the "Events" layer name in the list of map layers, choose "Data" then "Export Data". Choose the options to export "All features" and the button for "Use the same coordinate system as the data frame". Use the browse dialog to select a folder and give it a filename of your choosing. You can either create a stand-alone shapefile (using the .shp file extension) or save it as a personal geodatabase layer within your Access .mdb database if you have been using Access. When prompted, add the layer to the map. Now you have a true GIS-aware layer, with the known UTM projection of the map's data frame. (For example, if you looked at the shapefile files with File Explorer or My Computer, you would see this shapefile has .prj file, which is the definition file for the projection in which the data are stored).

At this point, you could change the map's data frame projection, and your new layer will be re-projected on-the-fly as well. ArcMap will reproject your map and any shapefiles in it (but not "Events" like the raw X,Y points) into the new map coordinate system. (However, see the exception below regarding datums.) You can again use the export method to save the shapefile: Right click, use Data, Export Data, and save using "Use the same coordinate system as the data frame" to save a new copy of the shapefile in your new map projection, if desired.

NOTE: This method in ArcMap cannot be used to switch between **datums**, e.g., from NAD27 to NAD83. ArcMap cannot convert datums correctly using the "on-the-fly" method. If you need to convert to a different datum than HARP uses (which is NAD83), then you must use the "ArcToolbox" to do the datum conversion, e.g., using the NADCON conversion method. Contact ARB for additional instructions if you need assistance with this ArcToolbox approach for datum conversion.

NOTE: You can import a desired coordinate system from an existing shapefile (or personal geodatabase layer) on your hard drive. Click **View | Data Frame Properties | Coordinate System**. Click on the **Import** button on the right side of the screen. Browse to a shape file that has the coordinate system you wish to apply to the map you are working on. Click **Add**.

Click OK. ArcMap will re-project your map and any shapefiles in it (but not "Events" like the raw X,Y points) using the new coordinate system.

5. **Symbolize the Receptor Points on the Map**: You should see each Receptor location appear as a point on the map. The left pane of the map window (Table of Contents) should show a new entry for the Risk points layer.

-- If you use the "Identify" tool on any one of the points on the map pane on the right, you should see the corresponding risk values at the point.

-- To do a quick symbolization that produces larger size dots for larger risk values:

(a) Right Click the risk layer name in the Table of Contents layer list and choose **Properties**.

(b) Choose the **Symbology** tab.

(c) Click to expand the **Quantities** tree entry. Choose **Proportional Symbols.**

(d) Set the **Value** field to the CancerRisk field (or whatever you named that column in your spreadsheet/mdb).

(e) If you don't like the default color, double click the small "Minimum Value" button with the small colored dot.

(f) Click ok.

(g) You should see different sized dots on the map depending on the risk.

NOTE: To see a sample of a map of the HARP demo data in ArcGIS using proportional symbology, click on the image file **HARPProportnlSymbls.jpg** included with this attachment .

NOTE: The Spatial Analyst Extension software is required for the following steps.

D. Using the Spatial Analyst Extension to Interpolate Surface and Compute Contour Lines.

1. **License:** Be sure you have a license available for the Spatial Analyst Extension. To do this, Start | Programs | ArcGIS | Desktop Administrator | Availability. You should see Spatial Analyst.
2. **Turn on the Extension:** Now turn it on in ArcMap, using the Tools | Extensions menu, and click the checkbox for the Spatial Analyst extension.
3. **View Toolbar:** You must also turn on the toolbar for Spatial Analyst. To do this, from the ArcMap map window, pulldown View | Toolbars and turn on the Spatial Analyst toolbar.
4. **Analysis Mask:** If you want the spatial analyst data cut to match the boundaries of another shape file, use the analysis mask. For example, if you are working with San Diego County and you don't want the analysis layer to go beyond the county boundaries, use the county layer as a cookie cutter.

a. From the Spatial Analyst menu pull down on the main map window, choose **Options**.

b. Next to **Analysis Mask** browse to the layer you wish to use as the mask (i.e. San Diego County). This shape file layer must already be loaded into your ArcMap document (step C2). Keep other defaults.

c. Click on the **Extent** tab at the top of the Options window. How far out do you want the new layer to go? If you want the new layer to go out to the edges of the existing layer then click on the drop down arrow next to **Analysis extent** and browse to the existing layer (i.e. San Diego County).

d. Click on the **Cell Size** tab at the top of the Options window. Keep the defaults.

e. Click OK.

5. **Interpolate the surface:** Be sure you have the risk layer selected in the table of contents. From the Spatial Analyst menu pull down on the main map window, choose **Interpolate to Raster**.

6. There are several options that could be used. I suggest starting with **Inverse Distance Weighting. (IDW)** You can also try Simple Kriging.

7. Set the Z value to the field CancerRisk. The other defaults are probably fine. I suggest you save it to a file using the browse dialog (bottom of the window) instead of just a temporary file. Turn on the new layer to see the colored surface.

8. **Contour lines**: Highlight/select the surface grid layer in the table of contents. From the Spatial Analyst menu pull down, choose Surface Analysis | Contour.

9. You may have to experiment to get contours you like. I suggest you try deleting one "zero" from the default. Click OK.

10. Save the output file.

11. You should see the risk contours. These should look similar (but not necessarily identical) to those generated by HARP when you ran the contour option in HARP.

NOTE: To see a sample of a map of the HARP demo data in ArcGIS using the Interpolate, IDW, and contours, click on the image file **HARPSpatAnContours.jpg** included with this attachment

E. Special Considerations.

NOTE: The above steps are designed to map one type of risk (e.g. 70-year resident, cancer) at all receptors. The steps assumed the risk was the total risk from all sources combined. You can choose to run the risk analysis in HARP that is By Source or By Chemical. The export .CSV file formats will be more complex, and you will probably have to split the file into several components to import each separately.

NOTE: HARP can run the PMI report to provide the "Top 100" (or however many you specify) receptors. This is also an option for export and import into GIS.