

**PART 1: ISCST3 DATA PREPARATION FROM CIMIS
WEATHER STATION DATA**

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1. Introduction

The Industrial Source Complex Short Term Version 3 (ISCST3) model is a steady-state Gaussian plume model which can be used to assess pollutant concentrations from a variety of sources (USEPAab, 1995). The Department of Pesticide Regulation (DPR) utilizes the ISCST3 model in its air program for analyzing fumigant applications (Barry et al., 1996; Fan et al., 2008), determining buffer zones (Barry and Johnson, 2007; Barry 2007), estimating long-term exposures, and for other activities (Ross et al., 1996).

To use the ISCST3 model, the user needs a specially formatted file that contains the following hourly meteorological data:

- Date and Time of hourly record
- Air Temperature
- Wind Direction
- Wind Speed
- Stability Class
- Urban and rural mixing heights

When specific site meteorological data is not available, the Air Program has used data from the California Irrigation Management Information System (CIMIS). CIMIS is an automated meteorological data collection program which collects from stations throughout agricultural areas in California (CIMIS, 2010). CIMIS provides hourly averages of one-minute data collected at a height of 2m for scalar wind speed, vector wind direction, air temperature, standard deviation of horizontal wind direction, net radiation and other meteorological variables. Reported times are always Pacific Standard Time. Stations are generally located in open, agricultural areas on mowed grass pastures.

Processing CIMIS data for use with ISCST3 has been a tedious and idiosyncratic process. Having processed CIMIS data available for use with ISCST3 will facilitate research in mitigation strategies and comparative simulations. Therefore, it was the intent of this project to establish an ISCST3 meteorological input file database and to detail the steps taken to do so.

Additionally, DPR personnel previously used the following DPR created programs to produce ISCST3 meteorological files from downloaded CIMIS data: PREFORM, MAKISC, CIMPRO1V2, and CIMPRO2V2A. Over time, some of the steps required in these programs were unnecessary and time consuming. Thus, a secondary goal of this report was to streamline and document the use of these programs. Part 1, this document, describes the procedures used to create the meteorological database. Part 2, documents the technical aspects of the software set to create the meteorological database.

2. Objectives

The specific objectives for this work were the following:

1. Establish a database of meteorological data for use in ISCST3 modeling for future DPR modeling projects.

2. Document the procedures and software used to process CIMIS meteorological data.
3. Update and streamline the software used for processing CIMIS meteorological data.
4. Establish a set of standardized procedures for collecting and formatting CIMIS meteorological data for ISCST3 modeling.

3. Methods

3.1 Meteorological data

Meteorological data were obtained from the CIMIS weather station network for the 10 California counties with the highest pounds of active ingredient applied in 2008 as documented by California's pesticide use report (DPR, 2008). The highest 10 counties in terms of pounds of active ingredient applied were Fresno, Kern, Tulare, Monterey, Madera, Merced, San Joaquin, Ventura, Kings, and Stanislaus (Table 3.1). The amount applied in the 10 counties represents 71% of the statewide total for 2008.

Table 3.1 Pesticide use report for all active ingredient applications during 2008. Ranking is based on total pounds applied during this year period.

County	Pounds Applied	Rank	CIMIS Stations Selected
Fresno	27,543,587	1	80, 105
Kern	25,441,400	2	125, 146
Tulare	14,310,365	3	86, 182
Monterey	7,893,327	4	89, 113
Madera	7,578,258	5	145
Merced	6,912,082	6	56, 148
San Joaquin	6,754,501	7	70, 166
Ventura	6,437,899	8	156
Kings	6,239,993	9	15, 21
Stanislaus	5,677,506	10	161, 194
Total	114,788,918		

A total of 18 CIMIS weather stations were selected to represent the counties listed in Table 3.1. The original intention was to select two CIMIS weather stations from each county listed in Table 3.1. However, Madera County only had one weather station located within its borders. Two CIMIS weather stations were selected from each of the other 8 California counties listed in Table 3.1. Pesticide use was the original criterion for choosing stations; since then other stations have been added: Tulalake (91, Siskiyou), Gerber (8, Tehama) and Piru (101, Ventura).

A total of 105 whole years of hourly meteorological data (January through December) were downloaded from the CIMIS network website. Appendix 1 shows a summary of missing days for each station. For this report, as previously described elsewhere (Johnson, 2001), a missing day was defined when five or more hours of any of the downloaded variables were missing in one day. Where 4 or fewer hours during a 24 hour period were missing, linear interpolation was used to fill in the missing values in accordance with USEPA recommendations (USEPA, 2000).

Weather stations from the CIMIS network are generally located on irrigated pastures with grass between 10-15 cm tall, and no obstructions within 100 yards. The locations of stations listed in Table 3.1 can be found in Figures 3.1, 3.2 and 3.3.

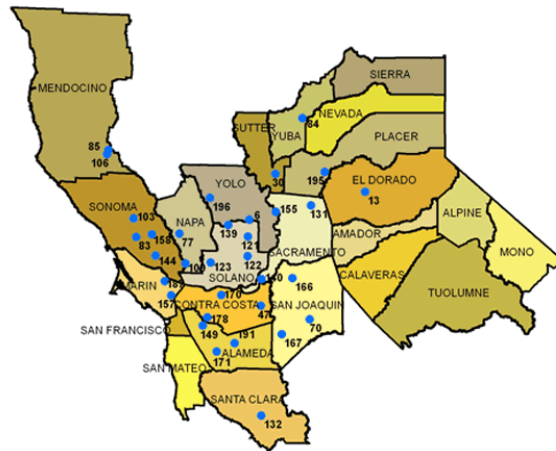


Figure 3.1 Location Map from CIMIS web site to show stations 70 and 166 in San Joaquin County used in this report.

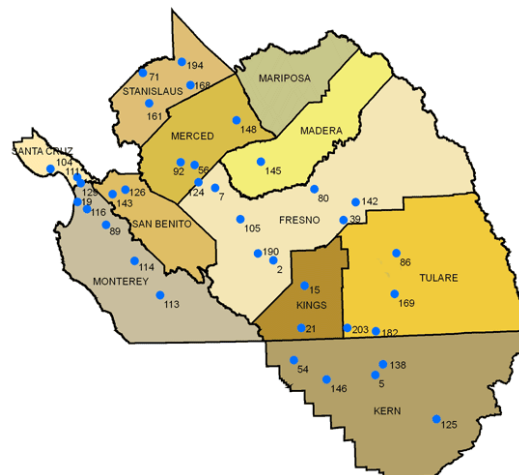


Figure 3.2 Location Map from CIMIS web site to show the following stations used in this report: 80 and 105 (Fresno), 15 and 21 (Kings), 125 and 146 (Kern), 145 (Madera), 56 and 148 (Merced), 89 and 113 (Monterey), 161 and 194 (Stanislaus), 86 and 182 (Tulare).

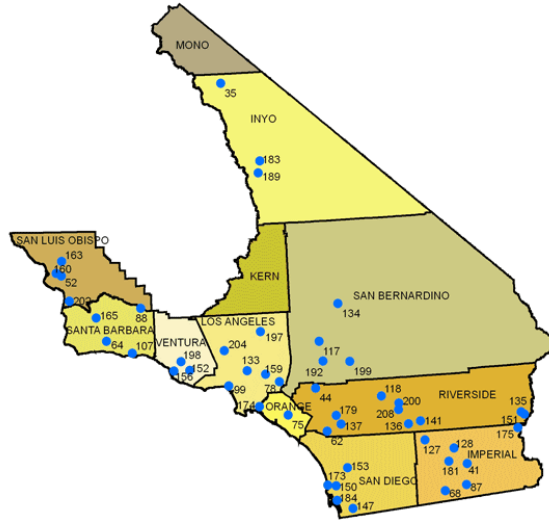


Figure 3.3 Location Map from CIMIS web site to show station 156 in Ventura County.

*Maps taken from CIMIS Network website: <http://wwwcimis.water.ca.gov/cimis/infoStnMap.jsp>

3.2 CIMIS quality control flags

The CIMIS network currently segregates their quality control criteria flags into two main categories: Severe and Informative. Severe flags constitute any missing data (M), sensor malfunction (S), occasions where the data value has no meaning (I), and instances when a quantity was not calculated (N). The Informative category includes a number of flags ranging from Quality test pending (P) to Data far out of historical limits (R). Currently, data flagged with M, S, I, or N, are treated as missing by the CIMIS processing software presented in this report. Further details can be found in Johnson and Vidrio (Part 2 of this document).

Determining whether to include or exclude any R flagged data can be challenging for the program user. Strictly speaking an R value means that the measured value is 3 standard deviations out of historical limits. However, review of selected R flagged data for radiation and temperature, indicated that R flagged values seemed acceptable. However, that was not always the case for wind direction and standard deviation of wind direction. For these categories an R flag occasionally seemed to indicate constant wind direction for several hours, possibly connoting either low wind conditions or a stuck wind direction sensor. These situations can be looked for in the CSS-YY.DET files which contain both the .ISC processed data and pre-processed CIMIS data. Due to this fact, earlier program versions left that decision up to the user, but for the program revision, it was decided as a policy to include R flagged values as acceptable.

3.3 Data Processing

Selected whole year's hourly data was downloaded from the CIMIS meteorological network website (<http://wwwcimis.water.ca.gov/>). The data files downloaded contained solar radiation, net radiation, air temperature, wind speed, wind direction, standard deviation of wind direction, and precipitation. All downloaded data were in English units.

The following naming convention was used for saving downloaded CIMIS meteorological data: CSS-YY.UXT, where C stands for CIMIS, SS refers to the CIMIS station number where the data

was collected (this value could be either a 2 or 3 digit number), YY refers to the last two digits of the year in which the data collection took place, and .UXT refers that the data file is in UNIX format.

The program UNIXORDOSV2 was first run in a Windows® Command Prompt (executable name cmd.exe) window (see Appendix 2) to determine whether the CSS-YY.UXT downloaded CIMIS file was DOS or UNIX formatted. If the program UNIXORDOSV2 returned a “Has normal DOS formatting, there is no need to run UNIX2DOS”, then we simply renamed the CSS-YY.UXT into CSS-YY.DXT. However, if the UNIXORDOSV2 program returned an “Appears to be UNIX formatted, you need to run the UNIX2DOS program on it” message, then the CSS-YY.UXT file is formatted from UNIX to DOS using the program named UNIX2DOS. The resulting file was saved using the following name format: CSS-YY.DXT. (Note: if UNIX2DOS is run on a file that's already in DOS format, the resulting file will be corrupted and make further processing impossible).

The CSS-YY.DXT file was then processed using FIXDASHV2 program. This program corrected for any missing data created format problems. Whenever there is missing data from a CIMIS weather station, the CIMIS program places “--“ where otherwise the missing values would be placed, thereby changing the position of all data to the right of the missing values. The FIXDASHV2 program automatically adds either a “-99” or “-99.0” to replace missing data values. Determining where to add a “-99” or “-99.0” is based on the column in which the missing data values are contained, as Solar Radiation and Net Radiation data are provided by CIMIS as whole numbers, while Air Temperature, Wind Speed, Standard Deviation of Wind Direction, and Precipitation all contain numbers with at least one decimal place. FIXDASHV2 produced a file named CSS-YY.TXT, which was the input file for the next program.

Following editing by FIXDASHV2, the CSS-YY.TXT file was processed using the program PREFORMV2 (see Appendix 2). This program arranged the CSS-YY.TXT file into the correct format needed for the next DPR program and created a new file named CSS-YY.PRE.

The CSS-YY.PRE file was then processed with CIMPRO1V4 (see Appendix 2). This program produced a summary file (CSS-YY.SUM) which listed the missing values and unusable days. The .SUM file is for information purposes only. The user is not required to take any specific action to remedy missing values. The .SUM file can be deleted at the discretion of the user as it is not needed for further processing. The program also produced a file named CSS-YY.DET, which becomes the input for the next DPR program in the process. Briefly, an unusable day is defined as any day with more than 4 hours missing or bad data for a particular sensor.

The CSS-YY.DET file was then processed with CIMPRO2V5 (see Appendix 2). This program processed the CSS-YY.DET file and produced a file where the first part of each record was copied from the CSS-YY.DET file, and the second part was the data in ISCST3-ready format. The output file for this program was named YYCIMSSS.2PC, where YY refers to the last two digits of the data year, CIM refers to CIMIS, and SSS stands for the CIMIS station number (if the station number is only composed of two digits, a 0 was added in front of it for naming purposes).

Finally, the newly created YYCIMSSS.2PC file was processed with MAKISCV2 (see Appendix 2). This program grabbed the last portion of each record in the YYCIMSSS.2PC file and produced a continuous ISCST3 compatible format for the usable days (unusable days were omitted from this file). The output file named YYCIMSSS.ISC is ready to be used in future ISCST3 modeling with the possible exception that missing days (dates) will be skipped.

3.4 Software Revisions

The existing software was originally written for primary use by B. Johnson. In order to make this software easier to use, detailed operational notes were jointly revised. The main software changes were made to give all programs the same form for running and assigning input and output files. This form is *program name input.file output.file*. The technical manual (Part 2) provides greater detail on technical software aspects.

4. Results

4.1 Location of files

To properly store all of the created ISCST3-ready files in a commonly accessible location, a folder named “CIMIS-met-process” was placed on the DPR server’s Air_Emergency_Proj drive. Within the main folder two subdirectory folders named “ISC Files” and “Support Files” (see Figure 4.1) were added to keep all of the formatted ISCST3-ready files and all supplemental files, respectively. Additionally, to keep all of the programs used to format the CIMIS data in one easy to find location, a subfolder named “programs(BJohnson)” was also created. This program folder contains the revised programs UNIX2DOS, UNIXORDOSV2, FIXDASHV2, PREFORMV2, CIMPRO1V4, CIMPRO2V5, and MAKISCV2 as well as the source code contained in each of these programs. The subfolders were all organized by County, Station, and Year.

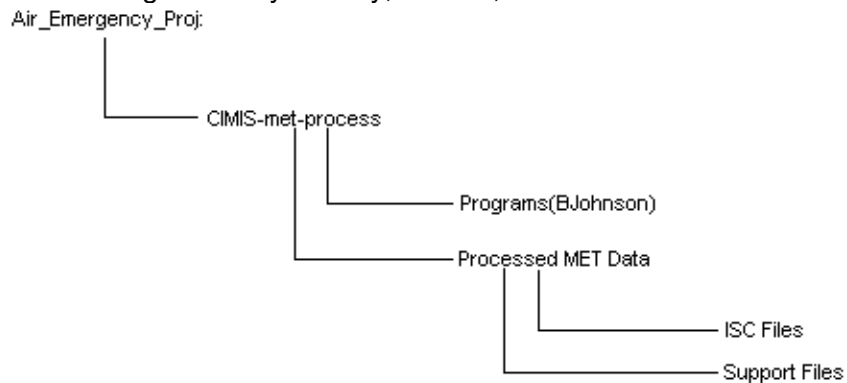


Figure 4.1 Schematic representation of the folder tree where the ISC and Support Files are located in DPR’s Air_Emergency_Proj drive.

4.2 Verification of revised PREFORMV2, CIMPRO1V4, CIMPRO2V5, and MAKISCV2 programs

Meteorological data processed by the original programs were compared to meteorological data processed by the newly modified programs and the output was verified as being the same.

5. Summary

CIMIS meteorological data was obtained for the 10 California counties with the highest active ingredient applied as documented by the 2008 California’s Pesticide Use Report. Using various

DPR created programs (UNIXORDOSV2, FIXDASHV2, PREFORMV2, CIMPRO1V4, CIMPRO2V5, and MAKISCV2), ISCST3-ready files were created. A database containing 105 years of hourly meteorological data was created and the location listed in this report for future modeling use.

Additionally, verification of updated PREFORMV2, CIMPRO1V4, CIMPRO2V5, and MAKISCV2 program versions was performed. Using File Compare, it was determined that the newly updated programs produce identical results as prior program versions while streamlining the process.

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Appendix 1: Summary of missing days for 105 years of CIMIS meteorological data.

Data Year	County	Location	Station No.	Latitude	Longitude	Elevation (ft)	# of missing days	Missing Days Summary File	.ISC Data File
2005	Fresno	Fresno State	80	36°49'15"N / 36.82	119°44'31"W / -119.74	339	0	C80-05.SUM	05CIM080.ISC
2006	Fresno	Fresno State	80	36°49'15"N / 36.82	119°44'31"W / -119.74	339	0	C80-06.SUM	06CIM080.ISC
2007	Fresno	Fresno State	80	36°49'15"N / 36.82	119°44'31"W / -119.74	339	0	C80-07.SUM	07CIM080.ISC
2008	Fresno	Fresno State	80	36°49'15"N / 36.82	119°44'31"W / -119.74	339	0	C80-08.SUM	08CIM080.ISC
2009	Fresno	Fresno State	80	36°49'15"N / 36.82	119°44'31"W / -119.74	339	2	C80-09.SUM	09CIM080.ISC
2005	Fresno	Westlands	105	36°38'00"N / 36.63	120°22'55"W / -120.38	191	3	C105-05.SUM	05CIM105.ISC
2006	Fresno	Westlands	105	36°38'00"N / 36.63	120°22'55"W / -120.38	191	7	C105-06.SUM	06CIM105.ISC
2007	Fresno	Westlands	105	36°38'00"N / 36.63	120°22'55"W / -120.38	191	0	C105-07.SUM	07CIM105.ISC
2008	Fresno	Westlands	105	36°38'00"N / 36.63	120°22'55"W / -120.38	191	1	C105-08.SUM	08CIM105.ISC
2009	Fresno	Westlands	105	36°38'00"N / 36.63	120°22'55"W / -120.38	191	1	C105-09.SUM	09CIM105.ISC
2005	Kern	Arvin/Edison	125	35°12'22"N / 35.21	118°46'40"W / -118.78	500	12	C125-05.SUM	05CIM125.ISC
2006	Kern	Arvin/Edison	125	35°12'22"N / 35.21	118°46'40"W / -118.78	500	1	C125-06.SUM	06CIM125.ISC
2007	Kern	Arvin/Edison	125	35°12'22"N / 35.21	118°46'40"W / -118.78	500	0	C125-07.SUM	07CIM125.ISC
2008	Kern	Arvin/Edison	125	35°12'22"N / 35.21	118°46'40"W / -118.78	500	0	C125-08.SUM	08CIM125.ISC
2009	Kern	Arvin/Edison	125	35°12'22"N / 35.21	118°46'40"W / -118.78	500	1	C125-09.SUM	09CIM125.ISC
2005	Kern	Belridge	146	35°30'19"N / 35.51	119°41'23"W / -119.69	410	0	C146-05.SUM	05CIM146.ISC
2006	Kern	Belridge	146	35°30'19"N / 35.51	119°41'23"W / -119.69	410	0	C146-06.SUM	06CIM146.ISC
2007	Kern	Belridge	146	35°30'19"N / 35.51	119°41'23"W / -119.69	410	0	C146-07.SUM	07CIM146.ISC
2008	Kern	Belridge	146	35°30'19"N / 35.51	119°41'23"W / -119.69	410	0	C146-08.SUM	08CIM146.ISC
2009	Kern	Belridge	146	35°30'19"N / 35.51	119°41'23"W / -119.69	410	1	C146-09.SUM	09CIM146.ISC
2005	Kings	Kettleman	21	35°52'08"N / 35.87	119°53'39"W / -119.89	340	0	C21-05.SUM	05CIM021.ISC
2006	Kings	Kettleman	21	35°52'08"N / 35.87	119°53'39"W / -119.89	340	0	C21-06.SUM	06CIM021.ISC
2007	Kings	Kettleman	21	35°52'08"N / 35.87	119°53'39"W / -119.89	340	0	C21-07.SUM	07CIM021.ISC
2008	Kings	Kettleman	21	35°52'08"N / 35.87	119°53'39"W / -119.89	340	2	C21-08.SUM	08CIM021.ISC
2009	Kings	Kettleman	21	35°52'08"N / 35.87	119°53'39"W / -119.89	340	1	C21-09.SUM	09CIM021.ISC
2005	Kings	Stratford	15	36°09'27"N / 36.16	119°51'00"W / -119.85	193	0	C15-05.SUM	05CIM015.ISC
2006	Kings	Stratford	15	36°09'27"N / 36.16	119°51'00"W / -119.85	193	0	C15-06.SUM	06CIM015.ISC
2007	Kings	Stratford	15	36°09'27"N / 36.16	119°51'00"W / -119.85	193	6	C15-07.SUM	07CIM015.ISC
2008	Kings	Stratford	15	36°09'27"N / 36.16	119°51'00"W / -119.85	193	15	C15-08.SUM	08CIM015.ISC
2009	Kings	Stratford	15	36°09'27"N / 36.16	119°51'00"W / -119.85	193	1	C15-09.SUM	09CIM015.ISC
2005	Madera	Madera	145	37°01'04"N / 37.02	120°11'12"W / -120.19	230	25	C145-05.SUM	05CIM145.ISC
2006	Madera	Madera	145	37°01'04"N / 37.02	120°11'12"W / -120.19	230	11	C145-06.SUM	06CIM145.ISC
2007	Madera	Madera	145	37°01'04"N / 37.02	120°11'12"W / -120.19	230	3	C145-07.SUM	07CIM145.ISC
2008	Madera	Madera	145	37°01'04"N / 37.02	120°11'12"W / -120.19	230	0	C145-08.SUM	08CIM145.ISC
2009	Madera	Madera	145	37°01'04"N / 37.02	120°11'12"W / -120.19	230	4	C145-09.SUM	09CIM145.ISC
2005	Merced	Los Banos	56	37°05'36"N / 37.09	120°45'39"W / -120.76	95	0	C56-05.SUM	05CIM056.ISC
2006	Merced	Los Banos	56	37°05'36"N / 37.09	120°45'39"W / -120.76	95	2	C56-06.SUM	06CIM056.ISC
2007	Merced	Los Banos	56	37°05'36"N / 37.09	120°45'39"W / -120.76	95	5	C56-07.SUM	07CIM056.ISC
2008	Merced	Los Banos	56	37°05'36"N / 37.09	120°45'39"W / -120.76	95	14	C56-08.SUM	08CIM056.ISC
2009	Merced	Los Banos	56	37°05'36"N / 37.09	120°45'39"W / -120.76	95	4	C56-09.SUM	09CIM056.ISC

2005	Merced	Merced	148	37°18'49"N / 37.31	120°23'11"W / -120.39	200	18	C148-05.SUM	05CIM148.ISC
2006	Merced	Merced	148	37°18'49"N / 37.31	120°23'11"W / -120.39	200	8	C148-06.SUM	06CIM148.ISC
2007	Merced	Merced	148	37°18'49"N / 37.31	120°23'11"W / -120.39	200	0	C148-07.SUM	07CIM148.ISC
2008	Merced	Merced	148	37°18'49"N / 37.31	120°23'11"W / -120.39	200	0	C148-08.SUM	08CIM148.ISC
2009	Merced	Merced	148	37°18'49"N / 37.31	120°23'11"W / -120.39	200	1	C148-09.SUM	09CIM148.ISC
2005	Monterey	King City-Oasis	113	36°07'17"N / 36.12	121°05'02"W / -121.08	540	0	C113-05.SUM	05CIM113.ISC
2006	Monterey	King City-Oasis	113	36°07'17"N / 36.12	121°05'02"W / -121.08	540	2	C113-06.SUM	06CIM113.ISC
2007	Monterey	King City-Oasis	113	36°07'17"N / 36.12	121°05'02"W / -121.08	540	0	C113-07.SUM	07CIM113.ISC
2008	Monterey	King City-Oasis	113	36°07'17"N / 36.12	121°05'02"W / -121.08	540	0	C113-08.SUM	08CIM113.ISC
2009	Monterey	King City-Oasis	113	36°07'17"N / 36.12	121°05'02"W / -121.08	540	1	C113-09.SUM	09CIM113.ISC
2005	Monterey	Salinas	89	36°36'36"N / 36.61	121°31'46"W / -121.53	120	0	C89-05.SUM	05CIM089.ISC
2006	Monterey	Salinas	89	36°36'36"N / 36.61	121°31'46"W / -121.53	120	0	C89-06.SUM	06CIM089.ISC
2007	Monterey	Salinas	89	36°36'36"N / 36.61	121°31'46"W / -121.53	120	0	C89-07.SUM	07CIM089.ISC
2008	Monterey	Salinas	89	36°36'36"N / 36.61	121°31'46"W / -121.53	120	6	C89-08.SUM	08CIM089.ISC
2009	Monterey	Salinas	89	36°36'36"N / 36.61	121°31'46"W / -121.53	120	16	C89-09.SUM	09CIM089.ISC
2005	San Joaquin	Lodi West	166	38°07'48"N / 38.13	121°22'57"W / -121.38	25	0	C166-05.SUM	05CIM166.ISC
2006	San Joaquin	Lodi West	166	38°07'48"N / 38.13	121°22'57"W / -121.38	25	4	C166-06.SUM	06CIM166.ISC
2007	San Joaquin	Lodi West	166	38°07'48"N / 38.13	121°22'57"W / -121.38	25	0	C166-07.SUM	07CIM166.ISC
2008	San Joaquin	Lodi West	166	38°07'48"N / 38.13	121°22'57"W / -121.38	25	5	C166-08.SUM	08CIM166.ISC
2009	San Joaquin	Lodi West	166	38°07'48"N / 38.13	121°22'57"W / -121.38	25	38	C166-09.SUM	09CIM166.ISC
2005	San Joaquin	Manteca	70	37°50'05"N / 37.84	121°13'22"W / -121.22	33	0	C70-05.SUM	05CIM070.ISC
2006	San Joaquin	Manteca	70	37°50'05"N / 37.84	121°13'22"W / -121.22	33	1	C70-06.SUM	06CIM070.ISC
2007	San Joaquin	Manteca	70	37°50'05"N / 37.84	121°13'22"W / -121.22	33	0	C70-07.SUM	07CIM070.ISC
2008	San Joaquin	Manteca	70	37°50'05"N / 37.84	121°13'22"W / -121.22	33	0	C70-08.SUM	08CIM070.ISC
2009	San Joaquin	Manteca	70	37°50'05"N / 37.84	121°13'22"W / -121.22	33	1	C70-09.SUM	09CIM070.ISC
2005	Siskiyou	Tulelake	91	41°57'33"N / 41.96	121°28'16"W / -121.47	4035	0	C91-05.SUM	05CIM091.ISC
2006	Siskiyou	Tulelake	91	41°57'33"N / 41.96	121°28'16"W / -121.47	4035	0	C91-06.SUM	06CIM091.ISC
2007	Siskiyou	Tulelake	91	41°57'33"N / 41.96	121°28'16"W / -121.47	4035	0	C91-07.SUM	07CIM091.ISC
2008	Siskiyou	Tulelake	91	41°57'33"N / 41.96	121°28'16"W / -121.47	4035	1	C91-08.SUM	08CIM091.ISC
2009	Siskiyou	Tulelake	91	41°57'33"N / 41.96	121°28'16"W / -121.47	4035	1	C91-09.SUM	09CIM091.ISC
2005	Stanislaus	Oakdale	194	37°43'07"N / 37.72	120°51'03"W / -120.85	165	0	C194-05.SUM	05CIM194.ISC
2006	Stanislaus	Oakdale	194	37°43'07"N / 37.72	120°51'03"W / -120.85	165	9	C194-06.SUM	06CIM194.ISC
2007	Stanislaus	Oakdale	194	37°43'07"N / 37.72	120°51'03"W / -120.85	165	0	C194-07.SUM	07CIM194.ISC
2008	Stanislaus	Oakdale	194	37°43'07"N / 37.72	120°51'03"W / -120.85	165	4	C194-08.SUM	08CIM194.ISC
2009	Stanislaus	Oakdale	194	37°43'07"N / 37.72	120°51'03"W / -120.85	165	1	C194-09.SUM	09CIM194.ISC
2005	Stanislaus	Patterson	161	37°26'24"N / 37.44	121°08'20"W / -121.14	183	0	C161-05.SUM	05CIM161.ISC
2006	Stanislaus	Patterson	161	37°26'24"N / 37.44	121°08'20"W / -121.14	183	4	C161-06.SUM	06CIM161.ISC
2007	Stanislaus	Patterson	161	37°26'24"N / 37.44	121°08'20"W / -121.14	183	0	C161-07.SUM	07CIM161.ISC
2008	Stanislaus	Patterson	161	37°26'24"N / 37.44	121°08'20"W / -121.14	183	0	C161-08.SUM	08CIM161.ISC
2009	Stanislaus	Patterson	161	37°26'24"N / 37.44	121°08'20"W / -121.14	183	1	C161-09.SUM	09CIM161.ISC
2007	Tehama	Gerber	8	40°02'42"N / 40.05	122°09'52"W / -122.16	260	0	C08-07.SUM	07CIM008.ISC
2008	Tehama	Gerber	8	40°02'42"N / 40.05	122°09'52"W / -122.16	260	0	C08-08.SUM	08CIM008.ISC
2009	Tehama	Gerber	8	40°02'42"N / 40.05	122°09'52"W / -122.16	260	1	C08-09.SUM	09CIM008.ISC

2010	Tehama	Gerber	8	40°02'42"N / 40.05	122°09'52"W / -122.16	260	1	C08-10.SUM	10CIM008.ISC
2011	Tehama	Gerber	8	40°02'42"N / 40.05	122°09'52"W / -122.16	260	0	C08-11.SUM	11CIM008.ISC
2005	Tulare	Delano	182	35°49'59"n / 35.83	119°15'21"w / -119.26	300	4	C182-05.SUM	05CIM182.ISC
2006	Tulare	Delano	182	35°49'59"n / 35.83	119°15'21"w / -119.26	300	3	C182-06.SUM	06CIM182.ISC
2007	Tulare	Delano	182	35°49'59"n / 35.83	119°15'21"w / -119.26	300	16	C182-07.SUM	07CIM182.ISC
2008	Tulare	Delano	182	35°49'59"n / 35.83	119°15'21"w / -119.26	300	0	C182-08.SUM	08CIM182.ISC
2009	Tulare	Delano	182	35°49'59"n / 35.83	119°15'21"w / -119.26	300	61	C182-09.SUM	09CIM182.ISC
2005	Tulare	Lindcove	86	36°21'26"N / 36.36	119°03'31"W / -119.06	480	5	C86-05.SUM	05CIM086.ISC
2006	Tulare	Lindcove	86	36°21'26"N / 36.36	119°03'31"W / -119.06	480	17	C86-06.SUM	06CIM086.ISC
2007	Tulare	Lindcove	86	36°21'26"N / 36.36	119°03'31"W / -119.06	480	0	C86-07.SUM	07CIM086.ISC
2008	Tulare	Lindcove	86	36°21'26"N / 36.36	119°03'31"W / -119.06	480	39	C86-08.SUM	08CIM086.ISC
2009	Tulare	Lindcove	86	36°21'26"N / 36.36	119°03'31"W / -119.06	480	1	C86-09.SUM	09CIM086.ISC
2005	Ventura	Oxnard	156	34°14'01"N / 34.23	119°11'49"W / -119.2	48	1	C156-05.SUM	05CIM156.ISC
2006	Ventura	Oxnard	156	34°14'01"N / 34.23	119°11'49"W / -119.2	48	0	C156-06.SUM	06CIM156.ISC
2007	Ventura	Oxnard	156	34°14'01"N / 34.23	119°11'49"W / -119.2	48	0	C156-07.SUM	07CIM156.ISC
2008	Ventura	Oxnard	156	34°14'01"N / 34.23	119°11'49"W / -119.2	48	1	C156-08.SUM	08CIM156.ISC
2009	Ventura	Oxnard	156	34°14'01"N / 34.23	119°11'49"W / -119.2	48	0	C156-09.SUM	09CIM156.ISC
1995	Ventura	Piru	101	34°22'30"N / 34.38	118°47'20"W / -118.79	640	16	C101-95.SUM	95CIM101.ISC
1996	Ventura	Piru	101	34°22'30"N / 34.38	118°47'20"W / -118.79	640	0	C101-96.SUM	96CIM101.ISC
1997	Ventura	Piru	101	34°22'30"N / 34.38	118°47'20"W / -118.79	640	1	C101-97.SUM	97CIM101.ISC
1998	Ventura	Piru	101	34°22'30"N / 34.38	118°47'20"W / -118.79	640	0	C101-98.SUM	98CIM101.ISC
1999	Ventura	Piru	101	34°22'30"N / 34.38	118°47'20"W / -118.79	640	3	C101-99.SUM	99CIM101.ISC

Appendix 2: Recommended procedures and tutorial processing for yearly CIMIS data sets into .ISC files

(Note: SS → Station ID Number; YY → Year)

- 1) Create a directory to process CIMIS files.
- 2) Copy the 7 programs that will be needed to process CIMIS data (UNIX2DOS, UNIXORDOSV2, FIXDASHV2, PREFORMV2, CIMPRO1V4, CIMPRO2V5, and MAKISCV2) from Air_Emergency_Proj:\CIMIS-met-process\programs(BJohnson) to the newly created directory.
- 3) Using a web browser, navigate to the website:
<http://www.cimis.water.ca.gov/cimis/welcome.jsp>.
 - a. Click on the “**CIMIS DATA**” Tab, then click on **Hourly**, **Log on** with your registered user name and password (Figure 3.1).

The screenshot shows the CIMIS website's login page. At the top, there's a header with the California state logo and 'CALIFORNIA THE GOLDEN STATE'. Below that, the 'CALIFORNIA IRRIGATION MANAGEMENT INFORMATION SYSTEM' logo is displayed. A navigation bar contains several tabs: 'WELCOME', 'INFO CENTER', 'CIMIS DATA' (which is highlighted), 'RESOURCE CENTER', 'MY CIMIS', and 'SPATIAL CIMIS'. On the left side, there's a vertical menu with categories: 'Unregistered User' (containing 'Registration', 'Sample Daily Report', 'Sample Monthly Report'), 'Registered User' (containing 'Logon', 'Hourly', 'Daily', 'Daily ETo Variance', 'Monthly', 'Monthly Average ETo'), and 'Quality Control' (containing 'QC Overview'). The main content area is titled 'Logon' and contains a message for unregistered users: 'Please login if you already have a user id and password. If you have not registered yet, [click here](#) to register.' Below this, a red message states: 'Your session has expired or you have not yet logged into the system. Please login.' There are two input fields: 'User Name:' and 'Password:'. At the bottom right, there are 'Submit' and 'Reset' buttons. The Department of Water Resources logo is in the bottom right corner.

Figure 3.1. CIMIS website log on screen.

- b. Select the CIMIS Data Station from the **Station List** box (Figure 3.2a).

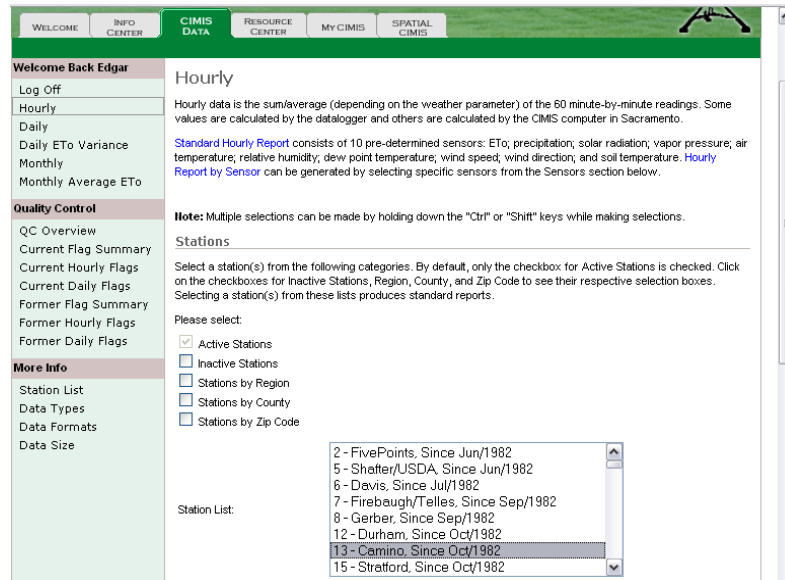


Figure 3.2a. Top portion of CIMIS hourly data website download page.

- c. Choose all of the following sensors from the **Sensor List** box (Figure 3.2b)
 1. Solar radiation
 2. Net radiation
 3. Air temperature
 4. Wind speed
 5. Wind direction
 6. Std Dev of Wind Direction, and
 7. Precipitation
- d. Select **English** from the **Unit drop down box** (Figure 3.2b).
- e. Select the **Start and End dates** for the CIMIS hourly data desired (i.e., January 1, 20XX to December 31, 20XX) (Figure 3.2b).
- f. Select reporting method **CSV without Headers (non-report format)** (Figure 3.2b).
- g. Click on **Submit**.
- h. Select **Save File** from download screen pop-up.

Sensor List:

- 1-Solar Radiation
- 2-Net Radiation
- 3-Soil Temperature @ 15cm
- 4-Air Temperature
- 5-Vapor Pressure

Check the following checkbox to see the sensor list. Selecting a sensor(s) from this list overrides the default standard report format and produces report by sensor. Skip this section if your intention is to generate standard reports.

Select Sensors

Hours

Default: 24 hours.

Check the following checkbox to select hours. Skip this section if you want all 24 hours included in your report.

Select Hours

Units

Select unit.

Unit: English

Date Range

Specify date range. The default setting for date range is the previous 7 days.

Start Date: January 1 2007

End Date: December 31 2007

Reporting Method

Select reporting method. Click [here](#) for details.

- Web Report
- PDF
- CSV with Headers
- CSV without Headers (non-report format)
- XML

Figure 3.2b. Bottom portion of CIMIS hourly data website download page.

- 4) Navigate to location of saved CIMIS file and **Right-Click** on selected file, select **Open with**, then select **Notepad** (Figure 4.1).
 - a. Once file is opened in Notepad, click **File**, click **Save As...** rename the file using the following name format: **CSS-YY.UXT**
 - b. Under **Save as type**, select **All Files**
 - c. Save it to the directory created in Step 1.

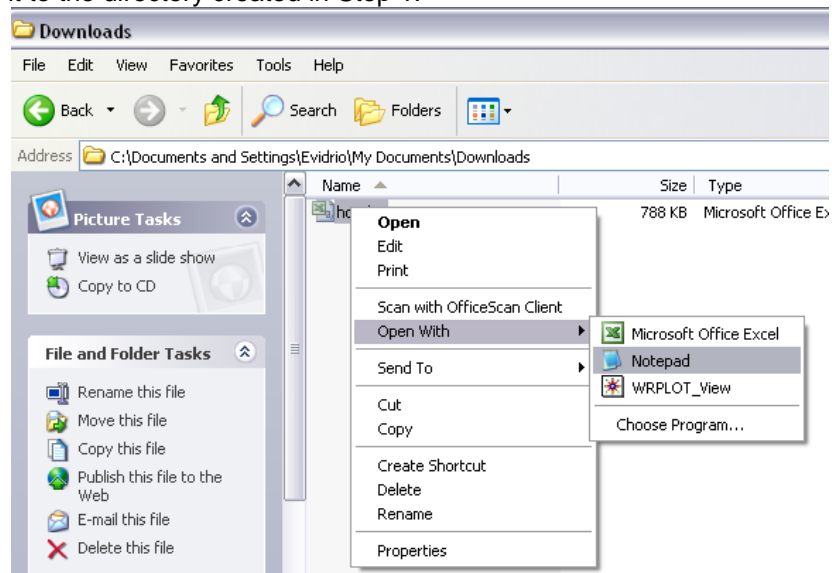


Figure 4.1. Opening of downloaded CIMIS hourly data using Microsoft Notepad.

- 5) Open DOS Command Prompt window by clicking **Start**, point to **Programs**, point to **Accessories**, and click **Command Prompt**.

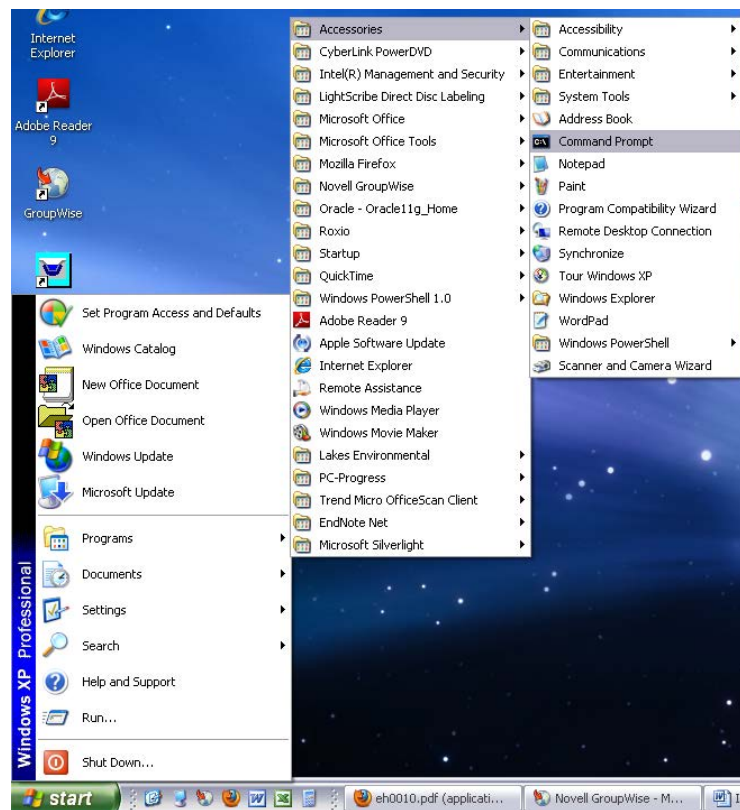


Figure 5.1. Command Prompt program icon location in Windows XP Professional.

- 6) Select the folder directory where the input files are located and where the output data files will be saved by using the following common DOS Commands, depending on where the data files are to be stored:

Sample “DOS” commands (taken from Johnson et al, 2010):

- **CD..** moves up one directory level
- **CD 'subdirectory'** moves down one level to subdirectory
- **DIR** lists the current directory contents
- **DIR *.out** lists all of the files with the 'out' extension
- **TREE** shows the current and subdirectory structure
- **DEL 'filename'** deletes the file called filename
- **COPY 'filename1 filename2'** makes a copy of filename1
- If ISCST3 is in the parent directory, **one level above** where you're currently located, you can run it by typing **...ISCST3.exe**
- **NOTEPAD 'filename'** runs the NOTEPAD text editor on filename
- **MKDIR 'subdirectory'** creates a subdirectory
- **..ISCST3** runs isc when the ISCST3.EXE file is in the parent directory
- **ISCST3** runs isc when you are currently in the directory containing ISCST3.EXE
- **..ISCST3 controlfile.in outputfile.out** runs isc with the control file and puts the output into the output file (there may be additional output files listed in the control file, and there may be additional input files, such as meteorology, that are named in the control file but not shown)

- o **RENAME filename1 filename2** renames filename1 into filename 2
 - o **K:** change to drive K
- 7) Use program “UNIXORDOSV2” to determine if downloaded CIMIS file needs to be converted from UNIX into DOS format
- a. In the Command Prompt window, type “UNIXORDOSV2 CSS-YY.UXT”
 - a) Program gives one of two messages:
 1. Message 1:
THE FILE: CSS-YY.UXT
HAS NORMAL DOS FORMATTING
THERE IS NO NEED TO RUN UNIX2DOS
 2. Message 2:
THE FILE: CSS-YY.UXT
APPEARS TO BE UNIX FORMATTED
YOU NEED TO RUN THE UNIX2DOS PROGRAM ON IT
 - b) **If message 2 is given then proceed to Step 8. If message 1 is given, you simply rename the CSS-YY.UXT file to CSS-YY.DXT and proceed to Step 9 bypassing Step 8.**
 - b. **Note:** the program produces a UORD.TMP summary file; this file is for information purposes and can be deleted at the discretion of the user since this file will not be needed for further processing.
- 8) Type “UNIX2DOS CSS-YY.UXT CSS-YY.DXT” and Press ENTER
- 9) Type “FIXDASHV2 CSS-YY.DXT CSS-YY.TXT” and Press ENTER
- a. **Note:** The program removes the dashes inserted by CIMIS programs whenever missing values are present. The program also arranges the date in the right format for Step 10.

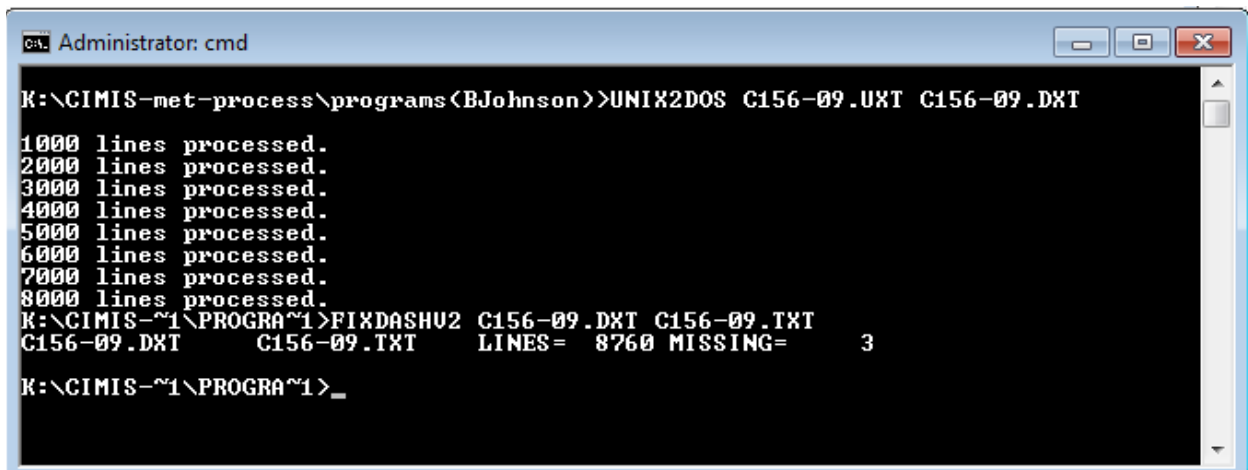


Figure 9.1. Screen shot of UNIX2DOS, converting C156-09 with unix-type records to C156-09.DXT with DOS-type records. Then processing with FIXDASHV2 to reformat lines with missing values, to produce C156.TXT.

- 10) Run PREFORMV2

- a. Type "PREFORMV2 CSS-YY.TXT CSS-YY.Pre" and Press ENTER



```
K:\CIMIS-met-process\programs\BJohnson>preformv2 c105-06.txt c105-06.pre
EOF ON 8760 PROGRAM TERMINATED NORMALLY
K:\CIMIS-met-process\programs\BJohnson>
```

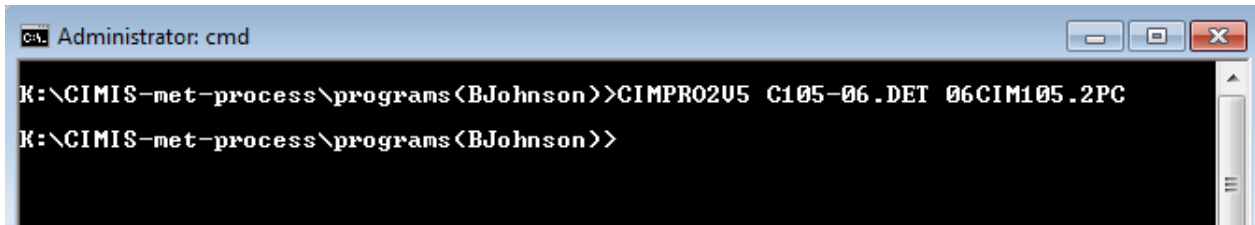
Figure 10.1. PREFORMV2 command and end of run message stating that program terminated normally.

11) Run CIMPRO1V4

- a. Type "CIMPRO1V4 CSS-YY.PRE CSS-YY.DET" and Press ENTER

b. **Notes:**

- a) The program produces a *.SUM file which lists missing values and unusable days and produces a *.DET file which becomes input for the next process. The *.SUM file should be examined before going to the next step.
- b) Infrequently, other types of information and error messages may be listed in the *.SUM file.
- c) Though the *.SUM file is for information purposes and is not used further in processing, it can be handy to keep for references possible problems in the processed data.



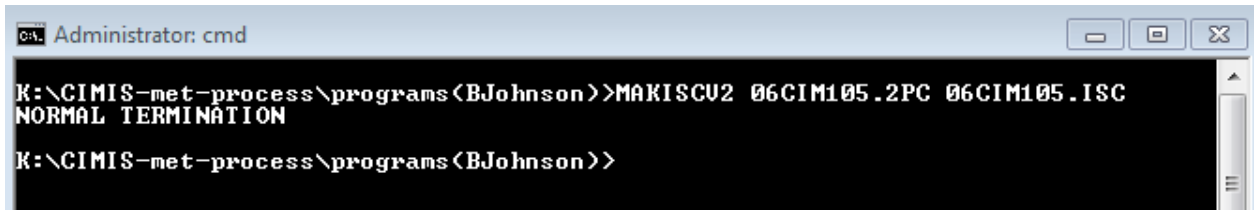
```
C:\> Administrator: cmd
K:\CIMIS-met-process\programs\BJohnson>CIMPRO2V5 C105-06.DET 06CIM105.2PC
K:\CIMIS-met-process\programs\BJohnson>
```

Figure 12.1. Screen shot of CIMPRO2V5 program command.

13) Run MAKISCV2

- a. Type "MAKISCV2 YYCIMSSS.2PC YYCIMSSS.ISC" and Press ENTER

Note: The program grabs the last portion of each record from above and produces a continuous ISC file *for the usable days*. (An unusable day is currently defined as any day with more than 4 consecutive hours missing or bad data. Runs of 4 hours or less are interpolated. Days which were unusable are omitted from the file.



```
C:\> Administrator: cmd
K:\CIMIS-met-process\programs\BJohnson>MAKISCV2 06CIM105.2PC 06CIM105.ISC
NORMAL TERMINATION
K:\CIMIS-met-process\programs\BJohnson>
```

Figure 13.1. Screen shot of MAKISCV2 program output.

Appendix 3: Manual versus CIMPRO2V5 determined stability classifications

Number	File Name	Date	Hour	Manually Calculated Stability	CIMPRO2V5 Calculated Stability
1	08CIM194.2PC	2/21/2008	1	5	5
2	08CIM194.2PC	2/21/2008	2	4	4
3	08CIM194.2PC	2/21/2008	3	4	4
4	08CIM194.2PC	2/21/2008	4	5	5
5	08CIM194.2PC	2/21/2008	5	5	5
6	08CIM194.2PC	2/21/2008	6	4	4
7	08CIM194.2PC	2/21/2008	7	5	5
8	08CIM194.2PC	2/21/2008	8	4	4
9	08CIM194.2PC	2/21/2008	9	3	3
10	08CIM194.2PC	2/21/2008	10	4	4
11	08CIM194.2PC	2/21/2008	11	4	4
12	08CIM194.2PC	2/21/2008	12	4	4
13	08CIM194.2PC	2/21/2008	13	4	4
14	08CIM194.2PC	2/21/2008	14	4	4
15	08CIM194.2PC	2/21/2008	15	4	4
16	08CIM194.2PC	2/21/2008	16	4	4
17	08CIM194.2PC	2/21/2008	17	4	4
18	08CIM194.2PC	2/21/2008	18	5	5
19	08CIM194.2PC	2/21/2008	19	4	4
20	08CIM194.2PC	2/21/2008	20	4	4
21	08CIM194.2PC	2/21/2008	21	4	4
22	08CIM194.2PC	2/21/2008	22	4	4
23	08CIM194.2PC	2/21/2008	23	5	5
24	08CIM194.2PC	2/21/2008	24	6	6
25	06CIM145.2PC	10/23/2006	1	5	5
26	06CIM145.2PC	10/23/2006	2	6	6
27	06CIM145.2PC	10/23/2006	3	6	6
28	06CIM145.2PC	10/23/2006	4	6	6
29	06CIM145.2PC	10/23/2006	5	6	6
30	06CIM145.2PC	10/23/2006	6	6	6
31	06CIM145.2PC	10/23/2006	7	6	6
32	06CIM145.2PC	10/23/2006	8	5	5
33	06CIM145.2PC	10/23/2006	9	4	4
34	06CIM145.2PC	10/23/2006	10	3	3
35	06CIM145.2PC	10/23/2006	11	2	2
36	06CIM145.2PC	10/23/2006	12	1	1
37	06CIM145.2PC	10/23/2006	13	1	1
38	06CIM145.2PC	10/23/2006	14	1	1
39	06CIM145.2PC	10/23/2006	15	1	1
40	06CIM145.2PC	10/23/2006	16	1	1
41	06CIM145.2PC	10/23/2006	17	1	1
42	06CIM145.2PC	10/23/2006	18	2	2
43	06CIM145.2PC	10/23/2006	19	3	3
44	06CIM145.2PC	10/23/2006	20	4	4
45	06CIM145.2PC	10/23/2006	21	5	5
46	06CIM145.2PC	10/23/2006	22	6	6
47	06CIM145.2PC	10/23/2006	23	6	6
48	06CIM145.2PC	10/23/2006	24	6	6
49	08CIM182.2PC	9/28/2008	1	5	5
50	08CIM182.2PC	9/28/2008	2	4	4
51	08CIM182.2PC	9/28/2008	3	4	4
52	08CIM182.2PC	9/28/2008	4	5	5
53	08CIM182.2PC	9/28/2008	5	6	6
54	08CIM182.2PC	9/28/2008	6	6	6

55	08CIM182.2PC	9/28/2008	7	5	5
56	08CIM182.2PC	9/28/2008	8	4	4
57	08CIM182.2PC	9/28/2008	9	3	3
58	08CIM182.2PC	9/28/2008	10	2	2
59	08CIM182.2PC	9/28/2008	11	1	1
60	08CIM182.2PC	9/28/2008	12	1	1
61	08CIM182.2PC	9/28/2008	13	1	1
62	08CIM182.2PC	9/28/2008	14	1	1
63	08CIM182.2PC	9/28/2008	15	1	1
64	08CIM182.2PC	9/28/2008	16	1	1
65	08CIM182.2PC	9/28/2008	17	1	1
66	08CIM182.2PC	9/28/2008	18	2	2
67	08CIM182.2PC	9/28/2008	19	3	3
68	08CIM182.2PC	9/28/2008	20	4	4
69	08CIM182.2PC	9/28/2008	21	5	5
70	08CIM182.2PC	9/28/2008	22	4	4
71	08CIM182.2PC	9/28/2008	23	5	5
72	08CIM182.2PC	9/28/2008	24	6	6