

# Minne Lusa Basin - Data Gap Analysis Supplement TM

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## Purpose

The purpose of this Technical Memorandum (TM) is to summarize all study data compiled to date, discuss insight that was gained by closing the gaps identified in the *Minne Lusa Data Gap Analysis TM* (February 2007), and identify remaining data gaps that will need to be addressed prior to the completion of the study.

## Data Collection Summary

Numerous documents, files, databases, drawings, memoranda, and the Geographic Information System (GIS) have been reviewed as part of this analysis. A listing of the relevant material which has been reviewed is included in Attachment 1. This attachment has been updated to include data received through August 2007. The Minne Lusa data gaps have been grouped into the following two sections: *Closed Data Gaps* and *Remaining Data Gaps*. No new Data Gaps have been discovered. An RFI will be submitted as needed.

Table 1 provides a comprehensive summary of the identified data gaps, the reason the data gap is significant to the project, the recommended approach for addressing the gap, the status of the data gap, and what information was provided to resolve the data gap.

Table 1 – Minne Lusa Data Gap Status Summary					
Summary of Data Gaps				Status of Data Gap	
Item	Data Gap	Significance	Resolution	Status	Comment
1	Standard layout/Border for Maps, Drawings and Figures	Standardization with other BCs	PMT to provide	Closed	Guidance for conceptual alternative layouts provided via email from Lori Wynn on February 26, 2007
2	Field Data Collection Form	Standardization with other BCs	PMT to provide	Closed	Manhole Inspection Forms provided via email from Rick Nelson on January 02, 2007
3	Gaps in Model Inventory Data (Manhole-rims, depths)	Improvement to InfoWorks model, GIS data and alternative evaluation and development	Field Investigations / Review of as-built drawings	Remaining Data Gap	A portion of the data gaps was filled from the fieldwork. However, many gaps remain. This is because not all the fieldwork requested was approved and not all the approved fieldwork could be completed (manhole which could not be located, was buried, etc.).
	(Pipe-size, material, inverts)				
4	Data on Surface Water Detention Basins	Modeling of stormwater storage capacity and flow attenuation in InfoWorks and alternative evaluation and development	GIS Shape File(s)	Closed	Storz Detention Pond Information provided by Sue Marino on November 29, 2006
5	Land use in the model versus actual	Improve resolution of InfoWorks model parameters	GIS Shape File(s)	Closed	Land Use information included in updated Parcel GIS data provided via ftp from Matt Krumholz on September 11, 2006
6	Impervious Data - Road, Parking and Rooftops	Improve resolution of InfoWorks model pervious/impervious parameters	GIS Shape File(s)	Closed	Pavement Shape File received via ftp from Matt Krumholz September 11, 2006
7	Infrastructure Condition – Sewers, Manholes, Pump Stations, Inlets, Grit Basin	Alternatives evaluation and identifying potential reasons for and resolutions to sewer backup problems	Field Investigations and/or Meeting with City Staff/Sewer Maintenance Database	Remaining Data Gap	While much fieldwork has been completed, little is known about the condition of the Minne Lusa sewers. Condition assessment fieldwork was not conducted on the large sewers in the basin.

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8	Connectivity and Capacity of the Sorenson/Storz Expressway Drainage Project	Correct InfoWorks model and identify any available capacity and alternative evaluation and development	Obtain As-Built drawings from City or State of Nebraska, and possibly fieldwork	Closed	As-built drawings provided
9	Capital Improvements Projects	Improve resolution of InfoWorks model parameters and understanding of the City's future plans for the sewer system	GIS Shape File(s)	Closed	The City has provided GIS Shape File(s) and information through discussions with City staff
10	CH2M Hill's TM No. 13	Understanding of Initial thoughts on CSO Control	PMT to provide	Closed	
11	Geodatabase data dictionary for CSO_Contractors.mdb	Understanding geodatabase fields and use	PMT to provide	Closed	GIS documentation "1999 GIS Data Manual (Advanced).doc" provided by City
12	Previous results from smoke testing near Bridge Street	For model refinement / condition assessment	City to provide	Closed	
13	Location, capacity, and condition of inlets – basin wide	Sewer Backup/Flooding assessment, model refinement, condition assessment, and alternative evaluation and development	City to provide current data / additional field investigations	Remaining Data Gap	Potential field work to be done as part of Phase 2 if storm water modeling is approved.
14	Updated InfoWorks Model	Model needs to represent the Sorenson stormwater project	PMT to provide	Closed	Baseline-01-15-07 noresults.iwc
15	Model Hydrographs	Estimating system flows during alternative controls evaluation	PMT to provide	Closed	Model Hydrographs provided by Perrin Niemann on December 22, 2006

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16	Water Quality of overflows at all CSO points	Alternative evaluation and development	PMT to provide	Closed	Water quality data was provided by the PMT in a document titled <i>Calculation of Weighted Average Concentrations for Omaha CSO Discharges</i> dated December 29, 2006.
17	Water Quality Limits	Alternative evaluation and development	PMT to provide	Closed	Water Quality Limits were provided by the PMT at the technical session conducted on October 13, 2006 and documented in the file: "Water Quality.ppt".
18	Roof Leaders Connectivity	Alternative evaluation and development	Field Investigation	Remaining Data Gap	Investigation to be done pending approval for additional field work.
19	Manholes with low level-of-confidence data sources	For model refinement / condition assessment	Field Investigation	Remaining Data Gap	A portion of the data gaps was filled from the fieldwork. However, many gaps remain. This is because not all the fieldwork requested was approved and not all the approved fieldwork could be completed (manhole which could not be located, was buried, etc.).

## Closed Data Gaps

The following is a list of general data requests from the *Minne Lusa Basin Data Gap Analysis TM* (February 13, 2007) that have been closed.

1. In Appendix A of Protocol No. 3, an "excerpt from TM No. 13" was posted by the PMT to the CSO Program's ftp site. This excerpt provided information on the initial thoughts for CSO controls. These thoughts were communicated through the Protocol documents and at the Chartering Workshop on September 7 and 8, 2006.
2. A list of Capital Improvements Projects was provided.
3. A document titled: *Minne Lusa Outlet – Part C, North Interceptor Sewer No. 2177*, dated May 1965, was provided by the City. The report provides background information on the Mormon Street, Minne Lusa, and Grace Street sewer systems and includes a recommended approach for intercepting sewage with the North Interceptor Sewer

- (NIS) from these combined sewers. Also included in the report are recommendations to design and construct the Minne Lusa Relief Sewer (MLRS). Preliminary design details on both the NIS and the MLRS are provided therein. This document also includes a description of the need for the surge tank, which is located at the junction of the NIS and the MLRS on the south side of Cornish Boulevard in Boyd Park. It is also noted that during periods of heavy rainfall and thus during high flow rates in the MLRS, reverse flow can occur in the NIS. Preliminary drawings are provided outlining the proposed alignments, pipe sizes and slopes.
4. A document titled: *Grit Removal Facilities, Minne Lusa Outlet – Part C, North Interceptor Sewer No. 2177*, dated May 1965, was provided by the City. The report provides background information regarding grit in the North Interceptor and includes recommendations for the Minne Lusa grit facility.
  5. The City does not have specific impervious area mapping. However, street pavement GIS information was provided.
  6. The baseline hydrographs requested in the *Minne Lusa Field Data Collection for Model Refinement TM* (February 2007) were provided by the PMT. The baseline hydrographs were used to estimate system flows and evaluate combined sewer overflow (CSO) controls during alternative development and evaluation.
  7. As-built drawings were requested regarding storm sewers constructed as part of the Sorenson Parkway, the North Freeway, and the Storz Expressway. Many drawings, a report, and calculations were provided by the City with regard to this request. This data covers sewers installed along the Storz Expressway and the Sorenson Parkway from 30<sup>th</sup> Street to 42<sup>nd</sup> Street.
  8. The subcatchments through the Forest Lawn Cemetery, Fontenelle Golf Course, Adams Park, Miller Park, as well as other small parks throughout the basin should be assigned a more accurate land-use value to properly model stormwater runoff. There is currently only one land-use identified in the InfoWorks model (standard road/roof/pervious). The Minne Lusa basin has various areas of land use and development which could be differentiated. The entire Forest Lawn area has been assigned a single subcatchment and point loaded onto the modeled pipes at a single manhole. This results in inaccurate peaks on the system at that point and downstream. A GIS Parcels shapefile has been provided by the City that can be used to assign land-use values to the model.

## Remaining Data Gaps

The following is a list of outstanding data gaps discussed in the *Minne Lusa Data Gap Analysis TM* (February, 13, 2007).

1. Manhole rim elevation and depth as well as pipe invert elevations, material, and diameter are necessary for model refinement. A portion of the data gaps were filled as part of the fieldwork effort. However, many gaps still remain. This is because not all the requested fieldwork was approved and not all the approved fieldwork could be completed (manhole which could not be located, was buried, etc.).

2. Based on a review of the City's GIS and Quarter section mapping, and a cursory field review of several random quarter sections, it appears that there are a significant number of stormwater inlets that are not included in the mapping information. This information is useful in analyzing potential effectiveness of BMPs in source control as well as sewer backup and street flooding issues. The level of effort and detail in analysis of these issues required by the PMT will ultimately determine the necessity of gathering this information and the method(s) by which it should be gathered. Potential field work to investigate stormwater inlets can be preformed as part of Phase 2 if stormwater modeling is approved.
3. In the *Minne Lusa Field Data Collection for Model Refinement TM* (February 2007), 326 manholes were identified to be field inspected. Manholes with low level-of-confidence data sources (indicated by the data flags in the InfoWorks model) were recommended to be field inspected. During the field work phase, approximately 150 of these manholes were inspected yielding high level-of-confidence data. The balance of the information for these manholes remains as a data gap.
4. Roof leader connectivity is recommended for Alternative Evaluation and development. Investigation to be done pending approval for additional field work.
5. The catchments included in the model should be redefined, subdivided and assigned the appropriate contribution acreage taking into account sewer separation projects previously implemented by the City. The catchment area assignments in the model do not address these separation projects. The City estimates that 21% of the Minne Lusa Basin has undergone separation work. Accurately reflecting these separated sewer areas in the model would provide better resolution to identify capacity issues in order to develop sewer backup and street flooding resolutions.
6. In addition to modifying the catchments, it is preferable that the stormwater pipes in the separated sewer areas be added to the model (particularly for the Sorenson sub-basin). The runoff for those areas should then be applied to the stormwater system, which in many cases ties back into the combined system at downstream locations. Inspections at the stormwater system overflow locations and surface water storage locations which discharge back to the combined system should be performed. In addition, the surface storage locations with overflows to the combined system should be included in the model. This is necessary to properly model stormwater runoff attenuation, as well as capacity of the pipe downstream of the separation projects.
7. The InfoWorks model includes mainly sewers which are 24-inches and larger. Many of the locations with sewer backup and street flooding issues are located along these smaller pipes. The model has been proposed by the PMT as one tool for evaluating sewer backup and street flooding issues. In order to fully evaluate these issues with the model, many sewer reaches will need to be added. Model extensions have been proposed by the Minne Lusa Basin Team to provide improved resolution to the model in order identify causes for recorded complaints in GIS. Please refer to the *Minne Lusa Model Review TM*, which provides details on the requested extensions.

## Summary

Many of the data gaps identified in the original data gap analysis have been filled by data provided by the City and PMT. However, some gaps still exist.

## Acronyms / Terms

BC	Basin Consultant
BMP	Best Management Practice
City	City of Omaha
CSO	Combined Sewer Overflow
GIS	Geographical Information System
PMT	Program Management Team
MLRS	Minne Lusa Relief Sewer
NIS	North Interceptor Sewer
RFI	Request for Information
RNC	City Sewer Project
SB	Sewer Backup
SF	Street Flooding
TM	Technical Memorandum

# Attachment No. 1 – Data Received

	Description	File/Format	Date	Revision
1	Aerial Photos - color 10in.	.tif	May 6, 2006	0
2	Aerial Photos - grayscale 2.5in.	.tif	May 6, 2006	0
3	Basin Study area shape file	basin.shp	July 6, 2006	0
5	Description of CSO Inventory	Description_CS0_provided_BCs.pdf	August 14, 2006	0
6	City of Omaha CSO Basin Study (HGM Project No. 76-05)	.shp, .dgn, .dbf, .xls, .apr, .pdf		0
	Drainage	.shp	May 2, 2005	0
	Majors	.shp	May 2, 2005	0
	Parcel	.shp	May 2, 2005	0
	Railroads	.shp	May 2, 2005	0
	Sections	.shp	May 2, 2005	0
	Sewer	.shp	May 2, 2005	0
	Street	.shp	May 2, 2005	0
	Zoning	.shp, .apr	May 2, 2005	0
7	Proposed CSO Study Area	ProposedCSOBasinStudyAreas.pdf	May 6, 2006	0
8	Minne Lusa inventory plan & profile drawings	.pdf, .tif, .xls (709 drawing .tif files)	July 31, 2006	0
10	Minne Lusa inventory CSO drawings -data sheets (4 CSO sites)	.xls, .pdf	July 31, 2006	0
12	NICET Certified logo	image.jpg / image.png	May 6, 2006	0
14	2004 Flow Data	flow and rainfall data .csv files	August 14, 2006	0
15	2005 Flow Data	flow and rainfall data .csv files	August 14, 2006	0
16	Flow Metering Locations	.shp	August 14, 2006	0
17	Stakeholders List and Panel	.pdf	August 14, 2006	0
18	Environment Plan	Environment_CIP.pdf	August 14, 2006	0
19	Transportation CIP Plan	Transportation_CIP.pdf	August 14, 2006	0
20	MAPA_Long_Range_Transportation_Plan	MAPA_Long_Range_Transportation_Plan.pdf	August 14, 2006	0



	Description	File/Format	Date	Revision
21	USGS Plan of Study	USGS Sampling Sites.pdf	August 14, 2006	0
22	MAPA 2004 contour data		May 6, 2006	0
23	Hanging Files Section Maps 1"=100' (sewer plans)	.pdf (851 drawings)	June 6, 2006	0
24	Basin AutoCAD Drawing	BasinOverlay.dwg	May 6, 2006	0
25	Omaha InfoWorks Model	Omaha2005calibration.iwc	July 31, 2006	0
25-1	Omaha InfoWorks Model	Phase2-CorrectedOutlets.iwc	August 22, 2006	1
26	CH2M Hill TM#7	TM7v5.pdf	July 31, 2006	0
27	Pump curves (TM#7 Attachments)	TLS-curves.pdf, Pump Curves.pdf, Monroe-gas.pdf, Monroe-electric.pdf, Monroe- LS.pdf, Misc Curves.pdf, IPLS-curves.pdf, In-Plant LS.pdf, Bridge LS.pdf	July 31, 2006	0
28	Design Storm Simulation Results	2005DesignStorm - 2mo15min.iwc	August 6, 2006	0
28-1	Design Storm Simulation Results	2005rev1DesignStorm - 2mo15min.iwc	August 22, 2006	1
29	Design Storm Simulation Results	2005DesignStorm - 2yr24hr.iwc	August 6, 2006	0
29-1	Design Storm Simulation Results	2005rev1DesignStorm - 2yr24hr.iwc	August 22, 2006	1
30	Design Storm Simulation Results	2005DesignStorm - 3mo1hr.iwc	August 6, 2006	0
30-1	Design Storm Simulation Results	2005rev1DesignStorm - 3mo1hr.iwc	August 22, 2006	1
31	Design Storm Simulation Results	2005DesignStorm - 6mo6hr.iwc	August 6, 2006	0
31-1	Design Storm Simulation Results	2005rev1DesignStorm - 6mo6hr.iwc	August 22, 2006	1
32	Omaha InfoWorks Model, 2005 Calibration (CH2M Hill)	readme.doc	August 6, 2006	0
32-1	Omaha InfoWorks Model, 2005 Calibration (CH2M Hill)	readme_v2.doc	August 22, 2006	1
33	Protocol No 1 Program Overview Rev. 0	.pdf	August 14, 2006	0
34	Protocol No 2 Data & Information Collection & Coordination Rev. 0	.pdf	August 14, 2006	0
35	Protocol No 3 System Characterization Rev. 0	.pdf	August 14, 2006	0

	Description	File/Format	Date	Revision
36	Protocol No.4 Alternatives Development & Evaluation Rev. 0	.pdf	August 14, 2006	0
37	USGS Water Quality Sampling	USGS Sample Sites.shp	August 14, 2006	0
38	Planning Department Information	.tif, .shp & pending_TIF.shp	August 14, 2006	0
39	Planning Department Information Maps	.pdf, .dgn	August 14, 2006	0
40	Work Orders Data Base	.dbf, .pdf	August 29, 2006	0
41	CSO_contractors	.mdb (geodatabase)	May 6, 2006	0
42	MinneLusa_packet	.pdf	September 11, 2006	0
44	All Basin Studies & Reports 7-06	.xls	September 11, 2006	0
45	CH2M Hill Phase I - Final Report	.pdf	September 11, 2006	0
46	CSO Permit	.doc	September 11, 2006	0
47	Interceptor 2005 report all report files	.pdf	September 11, 2006	0
48	Plant NPDES discharge permit	.doc	September 11, 2006	0
49	Stormwater Permit	.doc	September 11, 2006	0
50	GIS Data (Updated & New files)	.shp	September 11, 2006	0
51	GIS Data (Updated & New files)	.shp	September 11, 2006	0
51	Burt-Izard Basin Narrative-TM-Final	.pdf	September 14, 2006	0
52	Program Management Plan	.pdf	September 18, 2006	0
53	Private Program Website User Information	.xls	September 18, 2006	0
54	IS Reference Documents	.doc	September 21, 2006	0
55	Project List	.xls, .doc	September 21, 2006	0
56	Sewer Separation Program History	.xls, .doc	September 21, 2006	0
57	Rain Event Info at Eppley	.xls, .doc	September 21, 2006	0
58	Lift Station Info	.doc	September 21, 2006	0
59	Street Conditions	.xls, .doc, .shp	September 21, 2006	0
60	2006 Flow Data	.pdf, .xls	September 21, 2006	0

	Description	File/Format	Date	Revision
61	Baseline Improvements List from City of Omaha.draftjt1.0 rev1	.doc	September 26, 2006	1
62	RNC Projects Shape File from Eitan Tsabari	.shp	September 29, 2006	0
63	River Stage Information	.pdf, .xls, .bmp	September 29, 2006	0
64	HGM Basin Map drawings and information	.dwg, .shp, raster	October 5, 2006	0
65	Public Web Site Maps	.pdf	October 5, 2006	0
66	Logos	.jpg, .tif	October 5, 2006	0
67	2004 Storm events complaint data	.shp	October 5, 2006	0
68	Pictures Taken 9-5-06 / 9-6-06 Trip (Cary Duchene)	.jpg	September 29, 2006	0
69	Future Separation Projects	E-mail	October 10, 2006	0
70	Sorensen / Storz Separation projects	E-mail	October 10, 2006	0
71	HGM - Copper Creek Basin Sanitary sewer Inflow Source Study	CD	October 13, 2006	0
72	Storz Expressway Gravity Stormwater Drainage System Computations	hardcopy	November 7, 2006	0
73	Interceptor Sewers & Sewage Disposal West Bank of Missouri River	hardcopy	November 7, 2006	0
74	Final Design Narrative Report for Storz Expressway Stormwater Drainage System	hardcopy	November 7, 2006	0
75	Grit Removal Facilities Minne Lusa Outlet - Part C North Interceptor Sewer No. 2177	hardcopy	November 7, 2006	0
76	Grace Street Ditch Enclosure- Design and Analysis Calculations	hardcopy	November 7, 2006	0
77	Grace Street ditch Enclosure Trash Rake Bar Screen	hardcopy	November 7, 2006	0
78	Various Project Plans / As-Built Drawings	CD	November 7, 2006	0
79	TM4 Baseline and STP	E-mail	November 27,2006	0
80	MINNE LUSA RNC-RNCL-OPW	E-mail	November 29,2007	0

	Description	File/Format	Date	Revision
81	Cost Estimating Reference Document Rev 0	.pdf	January 5, 2007	0
82	Costing Tool Spreadsheets	.xls	March 2, 2007	2
83	Baseline and STP Projects GIS Shape File(s)	.shp	November 27, 2006	0
84	RNC Construction Project GIS Shape File(s)	.shp	November 29, 2006	0
85	Storz Detention Pond Info	.xls	November 29, 2006	0
86	Burt-Izard Technology Screening TM	.pdf	December 4, 2006	0
87	Roof Drain Ordinance Memorandum	.pdf	December 7, 2006	0
88	InfoWorks Technical Session	.ppt	December 8, 2006	0
89	InfoWorks 2006 Model File & Hydrographs	.iwm, .zip	December 8, 2006	0
90	Backup Types and Ways to Solve (Eitan Tsabari)	.doc	December 11, 2006	0
91	Remote_Sensing_Imperviousness (Eitan Tsabari)	.doc, .shp	December 11, 2006	0
92	Omaha Stormwater Manual	.pdf	January 4, 2007	0
93	Sewer Separation Control Technology - Cost Estimate Approach and Criteria for Screening and Selection & Figures	.doc, .pdf	January 22, 2007	1
94	MUD and OPPD Capital Improvements Projects	.pdf	November 28, 2006	0
95	In-Basin Alternatives Development Approach	.doc	March 6, 2007	1
96	Cross Basin Alternatives Development Approach	.doc	January 3, 2007	0
97	Manhole Inspection Form	.pdf	January 2, 2007	0
98	October 13 Consultants Brainstorming Meeting Notes	.pdf	January 3, 2007	0
99	Decision Model Basic_rev3	.xls	January 18, 2007	1
100	Burt Izard I&I Study Plan Draft	.doc	January 15, 2007	0
101	Acquisition Cost.msg	E-mail	January 12, 2007	0
102	Utility Crossings.msg	E-mail	January 12, 2007	0
103	2007 01 10 - Public Questionnaire	.doc	January 10, 2007	0

	Description	File/Format	Date	Revision
104	Summary for InfoWorks Technical Session 20061206	.pdf	January 16, 2007	0
105	Burt Izard_Draft Data Gap Analysis Supplement TM	.doc	January 11, 2007	0
106	Burt Izard_Flow Metering and water quality Sampling Request TM	.doc	January 11, 2007	0
107	Baseline Model Results / hydrographs	.iwc, .csv, .xls	December 20, 2006	0
108	01-15-2007 Run Model / hydrographs	.iwc, .csv, .xls	January 16, 2007	0
109	Inflow Curves - Power Point Presentation	.ppt	February 13, 2007	1
110	TM-Calculation of Weighted Average Concentrations for CSO Discharge	.pdf	January 22, 2007	0
111	Local Landmarks - NRLIST - 2020 List	.doc	January 5, 2007	0
112	Local Historic Districts - GIS files	.shp	January 5, 2007	0
113	National Registry - GIS files	.shp	January 5, 2007	0
114	Criteria Eval Scales Development_01_16_07 rev2	.doc	January 18, 2007	0
115	City's Published Map with updated GIS data (sewer, basemap, contours, and aerials)	.mdb (geodatabase), .sid, .shp, .pmf	February 6, 2007	0
116	2007 01 31 - Level of Control.xls	.xls, .pdf	February 2, 2007	0
117	1yr - 24hr Design Storm - InfoWorks file	.red	February 13, 2007	0
118	Existing In-Basin Ponding & Storage TM 2 / BI Sample	.pdf	February 14, 2007	0
119	BI Sewer Backup Exist Cond TM - Draft 02-12-2007	.pdf	February 14, 2007	0
120	Sample Drawing Border and Legend	.pdf		0
121	CB-3 Percent Capture for Cross Basin Alternatives	.xls	March 6, 2007	0
122	Alternative Evaluation TM	.doc	March 6, 2007	0
123	Protocol No 5 - InfoNet Database Management	.pdf	March 29, 2007	1
124	Omaha CSO Flags_BC.csv	.csv	March 29, 2007	0

	<b>Description</b>	<b>File/Format</b>	<b>Date</b>	<b>Revision</b>
125	Manhole Survey	.zip	March 29, 2007	0
126	Manhole Survey Details	.zip	March 29, 2007	0
127	Incoming-Outgoing_Pipes	.zip	March 29, 2007	0
128	Manhole Survey_ML	.zip	March 29, 2007	0
133	Cole Creek Rain Gauge Data - For Reference	.csv	July 16, 2007	0
134	ML - Flow Monitoring Data - First Submittal	.xls	July 23, 2007	0
135	Updated RNC Projects Shape File from Eitan Tsabari	.shp	July 30, 2007	0
137	Cole Creek Rain Gauge Data - For Reference	.xls	July 31, 2007	0
138	Alert Data - 03-07 thru 08-07 (rainfall data)	.xls	August 17, 2007	0