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Streamflow Monitoring in the Salmon Falls River

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**Streamflow Monitoring in the
Salmon Falls River
SFY 2005**

Workplan ID: 05-M-2

A Final Report to

The New Hampshire Estuaries Project
University of New Hampshire
Durham, New Hampshire

Submitted by

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New Hampshire Department of Environmental Services
Concord, New Hampshire

January 31, 2006



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INTRODUCTION

Seven major rivers discharge the Great Bay Estuary. Flow from these rivers is used to calculate the nitrogen load delivered to the estuary. The New Hampshire Estuaries Project (NHEP) relies on streamgages operated by the US Geological Survey (USGS) to measure daily streamflow on most of the tributaries. In 2005, funding for the streamgage on the Salmon Falls River (Site No. 01072100) was lost. The NHEP provided temporary funding to continue the operation of this gage for one year while long-term funding was sought. The NHEP contracted with the New Hampshire Department of Environmental Services (DES) for this task. DES used the funding to cover the State portion of the operating costs for the USGS gage. The specific task from the DES-NHEP Memorandum of Agreement was:

Streamgaging Task from the 2005 Memorandum of Agreement between the University of New Hampshire (the NHEP host) and the Department of Environmental Services

DES shall partner with the United States Geological Survey (USGS), as part of the jointly funded Cooperative Streamgaging Network Program, to collect data in the Salmon Falls River at the Milton 3 Ponds Dam in Milton, NH. Routine field visits to monitor the function and accuracy of the data collection equipment will be made by both USGS and DES, with USGS taking the lead role. NHEP funds associated with this task will be used to reimburse the state's 50% cost share of the annual gage cost of \$12,460. Typical gaging costs include staff effort and equipment repair/maintenance. Data to be collected includes: reservoir stage for Milton 3 Ponds, river stage (with corresponding discharge), incremental precipitation and air temperature. All data will be near real-time in nature, as the data logged at the field computer will be transmitted every four (4) hours via geosynchronous satellite transmission to a base station at DES's offices in Concord, NH. Each data type will be sampled and recorded at 15-minute intervals for transmission. Data records and management will be consistent with data management guidelines developed by the USGS as part of its National Streamgaging Program.

Interim reports describing project activity shall be provided to the NHEP June 30, 2005 and September 30, 2005. The Final Report shall be provided to the NHEP by January 31, 2006.

Up to \$6,230 of NHEP funds will be used for this task and will be matched by \$18,690 in non-federal funds. Implementation of this activity is relevant to the NHEP Monitoring Plan. [Workplan reference: 05-M-2].

PROJECT GOALS AND OBJECTIVES

The goal of this project was to provide data for one of the NHEP indicators of estuarine condition: NUT1. This indicator reports on “Annual load of nitrogen to the Great Bay from WWTF and watershed tributaries” (NHEP, 2004).

METHODS

Daily streamflow measurements were made at the Milton 3 Ponds Dam on the Salmon Falls River between July 1, 2004 and June 30, 2005. Figure 1 shows the study area.

Routine field visits to monitor the function and accuracy of the data collection equipment were made by both USGS and DES, with USGS taking the lead role. Visits to the site were made by the USGS at roughly 8-week intervals to check equipment and to perform stream channel ratings to ensure the accuracy of collected data. As the equipment associated with this gaging station is housed inside the gatehouse of DES’s Milton 3-Ponds Dam, DES personnel monitored the function of the gaging system’s components.

As a clarification to the information contained in the Memorandum of Agreement task, the provisions of the cooperative agreement between USGS and DES were related to streamflow and the measurement and reporting of this data was performed at the standards typical of the USGS. All other data collected at the site during the period from July 1, 2004 to June 30, 2005, namely lake elevation, air temperature and precipitation, was at the initiative and responsibility of DES. Further, since this data was solely to aid DES in its operational decisions at the Milton 3-Ponds Dam, it did not receive the same level of quality control as the streamflow data did. Gaps in or the incorrect reporting of data values associated with these parameters was frequent. Therefore, data on these parameters have not been included in this report.

RESULTS

The daily streamflow results at the Milton 3 Ponds Dam between July 1, 2004 and June 30, 2005 are provided in Appendix A. A time series plot of the flow over this period is in Appendix B. The monthly average flows measured in SFY2005 were compared to the average monthly flows at this site from 1968 to 2004 (Figure 2). In general, SFY2005 had higher than average flows in the spring compared to the long-term record. The data will be housed in the USGS NWIS database, which is publicly accessible through the Internet at: <http://nwis.waterdata.usgs.gov/usa/nwis/discharge>. The data can be retrieved by querying for Site Number 01072100.

CONCLUSIONS AND RECOMMENDATIONS

Streamflow data for the Milton 3 Ponds Dam will be used to calculate the nitrogen loading indicator for the 2006 NHEP Water Quality Indicator Report.

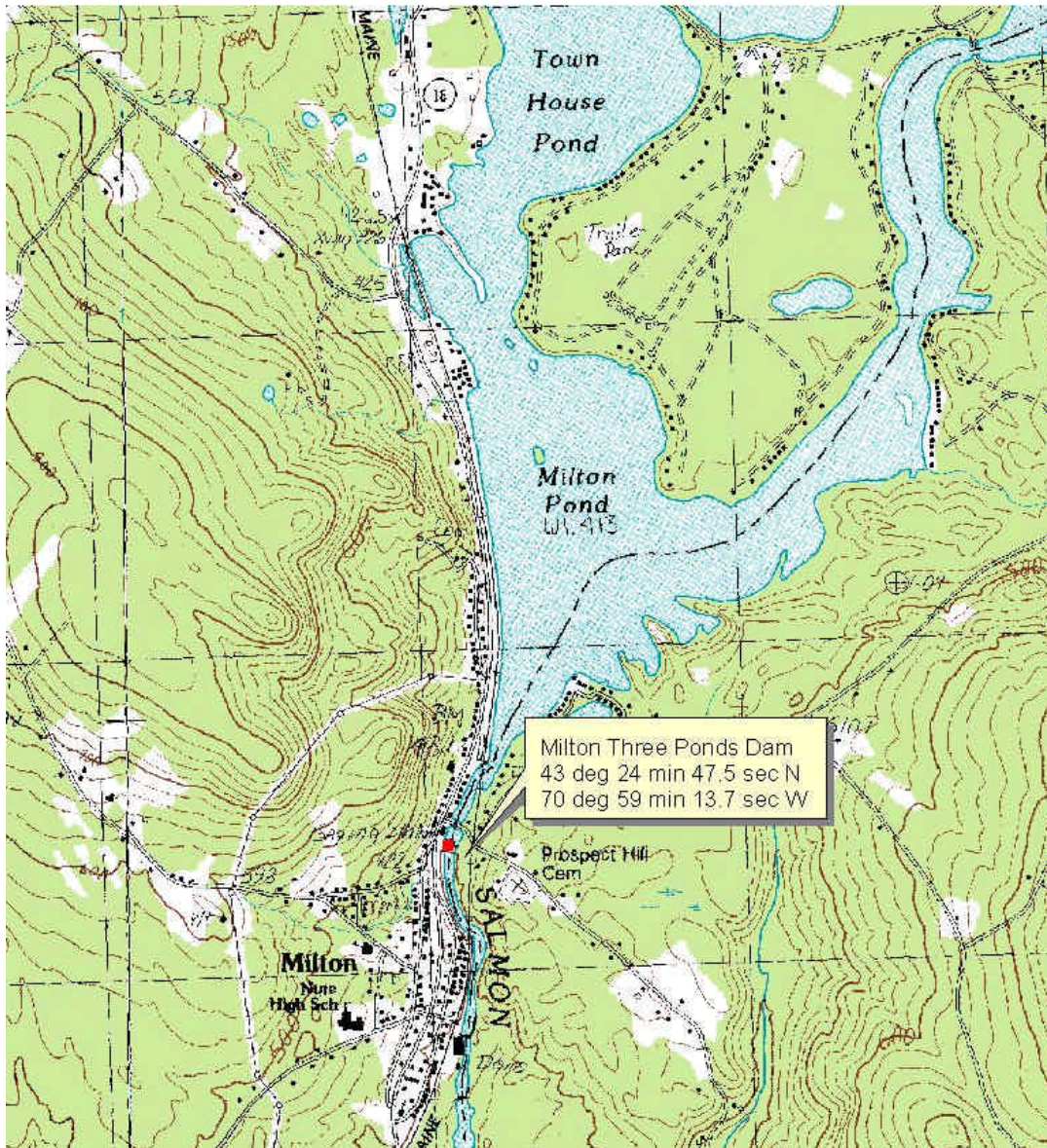
Long-term funding for the Milton 3 Ponds streamgage was not found. The gage is currently operated by the DES Dam Bureau only to provide information for water resource management decisions. For the 2009 indicator report, the streamflow in the Salmon Falls River will have to be estimated based on streamflow in a similar river system.

REFERENCES

NHEP. 2004. New Hampshire Estuaries Project Monitoring Plan. New Hampshire Estuaries Project, Portsmouth, NH.

Figure 1

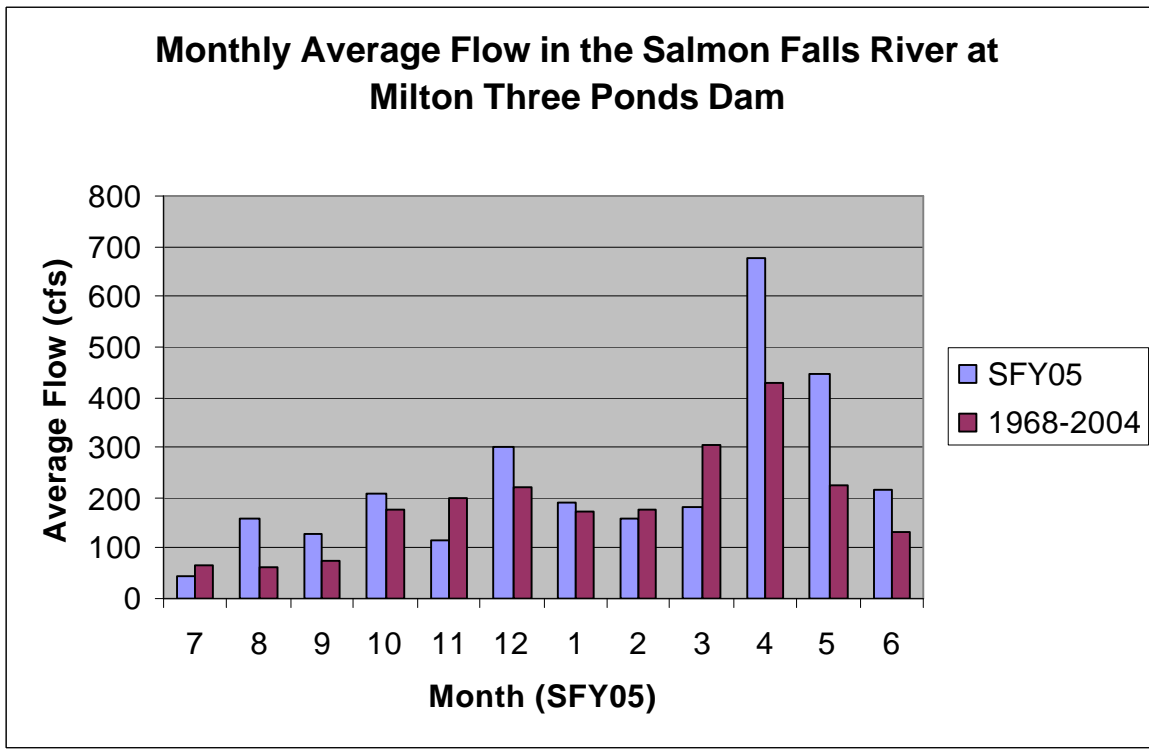
Location of the Milton Three Ponds Dam on the Salmon Falls River



0.5 0 0.5 1 Kilometers



Figure 2



Appendix A: Daily streamflow at the USGS gage on the Salmon Falls River in Milton, NH (01072100)

Date	Station	Flow (cfs)	Comments
07/01/2004	01072100	67	Data from USGS NWIS
07/02/2004	01072100	44	Data from USGS NWIS
07/03/2004	01072100	44	Data from USGS NWIS
07/04/2004	01072100	42	Data from USGS NWIS
07/05/2004	01072100	42	Data from USGS NWIS
07/06/2004	01072100	43	Data from USGS NWIS
07/07/2004	01072100	41	Data from USGS NWIS
07/08/2004	01072100	42	Data from USGS NWIS
07/09/2004	01072100	46	Data from USGS NWIS
07/10/2004	01072100	45	Data from USGS NWIS
07/11/2004	01072100	45	Data from USGS NWIS
07/12/2004	01072100	43	Data from USGS NWIS
07/13/2004	01072100	43	Data from USGS NWIS
07/14/2004	01072100	44	Data from USGS NWIS
07/15/2004	01072100	44	Data from USGS NWIS
07/16/2004	01072100	44	Data from USGS NWIS
07/17/2004	01072100	44	Data from USGS NWIS
07/18/2004	01072100	43	Data from USGS NWIS
07/19/2004	01072100	45	Data from USGS NWIS
07/20/2004	01072100	46	Data from USGS NWIS
07/21/2004	01072100	47	Data from USGS NWIS
07/22/2004	01072100	46	Data from USGS NWIS
07/23/2004	01072100	45	Data from USGS NWIS
07/24/2004	01072100	46	Data from USGS NWIS
07/25/2004	01072100	45	Data from USGS NWIS
07/26/2004	01072100	43	Data from USGS NWIS
07/27/2004	01072100	42	Data from USGS NWIS
07/28/2004	01072100	47	Data from USGS NWIS
07/29/2004	01072100	50	Data from USGS NWIS
07/30/2004	01072100	53	Data from USGS NWIS
07/31/2004	01072100	53	Data from USGS NWIS
08/01/2004	01072100	61	Data from USGS NWIS
08/02/2004	01072100	89	Data from USGS NWIS
08/03/2004	01072100	95	Data from USGS NWIS
08/04/2004	01072100	91	Data from USGS NWIS
08/05/2004	01072100	58	Data from USGS NWIS
08/06/2004	01072100	36	Data from USGS NWIS
08/07/2004	01072100	38	Data from USGS NWIS
08/08/2004	01072100	38	Data from USGS NWIS
08/09/2004	01072100	37	Data from USGS NWIS
08/10/2004	01072100	36	Data from USGS NWIS
08/11/2004	01072100	43	Data from USGS NWIS
08/12/2004	01072100	57	Data from USGS NWIS

08/13/2004	01072100	353	Data from USGS NWIS
08/14/2004	01072100	402	Data from USGS NWIS
08/15/2004	01072100	202	Data from USGS NWIS
08/16/2004	01072100	109	Data from USGS NWIS
08/17/2004	01072100	158	Data from USGS NWIS
08/18/2004	01072100	175	Data from USGS NWIS
08/19/2004	01072100	165	Data from USGS NWIS
08/20/2004	01072100	154	Data from USGS NWIS
08/21/2004	01072100	213	Data from USGS NWIS
08/22/2004	01072100	374	Data from USGS NWIS
08/23/2004	01072100	415	Data from USGS NWIS
08/24/2004	01072100	348	Data from USGS NWIS
08/25/2004	01072100	267	Data from USGS NWIS
08/26/2004	01072100	216	Data from USGS NWIS
08/27/2004	01072100	188	Data from USGS NWIS
08/28/2004	01072100	163	Data from USGS NWIS
08/29/2004	01072100	140	Data from USGS NWIS
08/30/2004	01072100	116	Data from USGS NWIS
08/31/2004	01072100	118	Data from USGS NWIS
09/01/2004	01072100	100	Data from USGS NWIS
09/02/2004	01072100	84	Data from USGS NWIS
09/03/2004	01072100	96	Data from USGS NWIS
09/04/2004	01072100	100	Data from USGS NWIS
09/05/2004	01072100	87	Data from USGS NWIS
09/06/2004	01072100	79	Data from USGS NWIS
09/07/2004	01072100	63	Data from USGS NWIS
09/08/2004	01072100	60	Data from USGS NWIS
09/09/2004	01072100	148	Data from USGS NWIS
09/10/2004	01072100	206	Data from USGS NWIS
09/11/2004	01072100	203	Data from USGS NWIS
09/12/2004	01072100	184	Data from USGS NWIS
09/13/2004	01072100	182	Data from USGS NWIS
09/14/2004	01072100	184	Data from USGS NWIS
09/15/2004	01072100	97	Data from USGS NWIS
09/16/2004	01072100	44	Data from USGS NWIS
09/17/2004	01072100	45	Data from USGS NWIS
09/18/2004	01072100	108	Data from USGS NWIS
09/19/2004	01072100	230	Data from USGS NWIS
09/20/2004	01072100	258	Data from USGS NWIS
09/21/2004	01072100	238	Data from USGS NWIS
09/22/2004	01072100	212	Data from USGS NWIS
09/23/2004	01072100	189	Data from USGS NWIS
09/24/2004	01072100	132	Data from USGS NWIS
09/25/2004	01072100	88	Data from USGS NWIS
09/26/2004	01072100	88	Data from USGS NWIS
09/27/2004	01072100	87	Data from USGS NWIS
09/28/2004	01072100	87	Data from USGS NWIS
09/29/2004	01072100	87	Data from USGS NWIS
09/30/2004	01072100	86	Data from USGS NWIS

10/01/2004	01072100	175	Provisional data
10/02/2004	01072100	196	Provisional data
10/03/2004	01072100	195	Provisional data
10/04/2004	01072100	96	Provisional data
10/05/2004	01072100	44	Provisional data
10/06/2004	01072100	41	Provisional data
10/07/2004	01072100	88	Provisional data
10/08/2004	01072100	163	Provisional data
10/09/2004	01072100	164	Provisional data
10/10/2004	01072100	227	Provisional data
10/11/2004	01072100	192	Provisional data
10/12/2004	01072100	216	Provisional data
10/13/2004	01072100	214	Provisional data
10/14/2004	01072100	222	Provisional data
10/15/2004	01072100	228	Provisional data
10/16/2004	01072100	183	Provisional data
10/17/2004	01072100	210	Provisional data
10/18/2004	01072100	199	Provisional data
10/19/2004	01072100	225	Provisional data
10/20/2004	01072100	239	Provisional data
10/21/2004	01072100	251	Provisional data
10/22/2004	01072100	655	Provisional data
10/23/2004	01072100	242	Provisional data
10/24/2004	01072100	234	Provisional data
10/25/2004	01072100	228	Provisional data
10/26/2004	01072100	230	Provisional data
10/27/2004	01072100	225	Provisional data
10/28/2004	01072100	219	Provisional data
10/29/2004	01072100	216	Provisional data
10/30/2004	01072100	214	Provisional data
10/31/2004	01072100	214	Provisional data
11/01/2004	01072100	211	Provisional data
11/02/2004	01072100	129	Provisional data
11/03/2004	01072100	72	Provisional data
11/04/2004	01072100	68	Provisional data
11/05/2004	01072100	73	Provisional data
11/06/2004	01072100	66	Provisional data
11/07/2004	01072100	90	Provisional data
11/08/2004	01072100	135	Provisional data
11/09/2004	01072100	157	Provisional data
11/10/2004	01072100	154	Provisional data
11/11/2004	01072100	153	Provisional data
11/12/2004	01072100	108	Provisional data
11/13/2004	01072100	82	Provisional data
11/14/2004	01072100	90	Provisional data
11/15/2004	01072100	78	Provisional data
11/16/2004	01072100	81	Provisional data
11/17/2004	01072100	62	Provisional data
11/18/2004	01072100	80	Provisional data

11/19/2004	01072100	94	Provisional data
11/20/2004	01072100	94	Provisional data
11/21/2004	01072100	94	Provisional data
11/22/2004	01072100	75	Provisional data
11/23/2004	01072100	62	Provisional data
11/24/2004	01072100	62	Provisional data
11/25/2004	01072100	58	Provisional data
11/26/2004	01072100	52	Provisional data
11/27/2004	01072100	73	Provisional data
11/28/2004	01072100	69	Provisional data
11/29/2004	01072100	305	Provisional data
11/30/2004	01072100	502	Provisional data
12/01/2004	01072100	487	Provisional data
12/02/2004	01072100	572	Provisional data
12/03/2004	01072100	480	Provisional data
12/04/2004	01072100	437	Provisional data
12/05/2004	01072100	395	Provisional data
12/06/2004	01072100	335	Provisional data
12/07/2004	01072100	222	Provisional data
12/08/2004	01072100	241	Provisional data
12/09/2004	01072100	235	Provisional data
12/10/2004	01072100	191	Provisional data
12/11/2004	01072100	270	Provisional data
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12/24/2004	01072100	310	Provisional data
12/25/2004	01072100	441	Provisional data
12/26/2004	01072100	437	Provisional data
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12/31/2004	01072100	243	Provisional data
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01/02/2005	01072100	213	Provisional data
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01/05/2005	01072100	203	Provisional data
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01/07/2005	01072100	204	Provisional data
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01/09/2005	01072100	227	Provisional data
01/10/2005	01072100	221	Provisional data
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01/12/2005	01072100	204	Provisional data
01/13/2005	01072100	198	Provisional data
01/14/2005	01072100	200	Provisional data
01/15/2005	01072100	203	Provisional data
01/16/2005	01072100	165	Provisional data
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01/20/2005	01072100	223	Provisional data
01/21/2005	01072100	193	Provisional data
01/22/2005	01072100	152	Provisional data
01/23/2005	01072100	155	Provisional data
01/24/2005	01072100	153	Provisional data
01/25/2005	01072100	153	Provisional data
01/26/2005	01072100	153	Provisional data
01/27/2005	01072100	153	Provisional data
01/28/2005	01072100	149	Provisional data
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01/30/2005	01072100	144	Provisional data
01/31/2005	01072100	143	Provisional data
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02/02/2005	01072100	136	Provisional data
02/03/2005	01072100	133	Provisional data
02/04/2005	01072100	134	Provisional data
02/05/2005	01072100	133	Provisional data
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02/08/2005	01072100	129	Provisional data
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02/21/2005	01072100	192	Provisional data
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02/23/2005	01072100	215	Provisional data
02/24/2005	01072100	159	Provisional data

02/25/2005	01072100	133	Provisional data
02/26/2005	01072100	133	Provisional data
02/27/2005	01072100	132	Provisional data
02/28/2005	01072100	130	Provisional data
03/01/2005	01072100	132	Provisional data
03/02/2005	01072100	133	Provisional data
03/03/2005	01072100	132	Provisional data
03/04/2005	01072100	130	Provisional data
03/05/2005	01072100	128	Provisional data
03/06/2005	01072100	127	Provisional data
03/07/2005	01072100	125	Provisional data
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03/11/2005	01072100	130	Provisional data
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03/27/2005	01072100	147	Provisional data
03/28/2005	01072100	189	Provisional data
03/29/2005	01072100	382	Provisional data
03/30/2005	01072100	641	Provisional data
03/31/2005	01072100	785	Provisional data
04/01/2005	01072100	681	Provisional data
04/02/2005	01072100	492	Provisional data
04/03/2005	01072100	1042	Provisional data
04/04/2005	01072100	1680	Provisional data
04/05/2005	01072100	1398	Provisional data
04/06/2005	01072100	906	Provisional data
04/07/2005	01072100	953	Provisional data
04/08/2005	01072100	1022	Provisional data
04/09/2005	01072100	990	Provisional data
04/10/2005	01072100	918	Provisional data
04/11/2005	01072100	686	Provisional data
04/12/2005	01072100	546	Provisional data
04/13/2005	01072100	402	Provisional data
04/14/2005	01072100	428	Provisional data

04/15/2005	01072100	429	Provisional data
04/16/2005	01072100	408	Provisional data
04/17/2005	01072100	398	Provisional data
04/18/2005	01072100	314	Provisional data
04/19/2005	01072100	310	Provisional data
04/20/2005	01072100	255	Provisional data
04/21/2005	01072100	397	Provisional data
04/22/2005	01072100	454	Provisional data
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04/25/2005	01072100	898	Provisional data
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04/27/2005	01072100	552	Provisional data
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05/07/2005	01072100	421	Provisional data
05/08/2005	01072100	443	Provisional data
05/09/2005	01072100	443	Provisional data
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05/11/2005	01072100	244	Provisional data
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05/15/2005	01072100	194	Provisional data
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05/23/2005	01072100	438	Provisional data
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05/25/2005	01072100	1059	Provisional data
05/26/2005	01072100	1121	Provisional data
05/27/2005	01072100	1130	Provisional data
05/28/2005	01072100	817	Provisional data
05/29/2005	01072100	520	Provisional data
05/30/2005	01072100	476	Provisional data
05/31/2005	01072100	493	Provisional data
06/01/2005	01072100	449	Provisional data
06/02/2005	01072100	407	Provisional data

06/03/2005	01072100	260	Provisional data
06/04/2005	01072100	238	Provisional data
06/05/2005	01072100	197	Provisional data
06/06/2005	01072100	211	Provisional data
06/07/2005	01072100	225	Provisional data
06/08/2005	01072100	212	Provisional data
06/09/2005	01072100	172	Provisional data
06/10/2005	01072100	176	Provisional data
06/11/2005	01072100	203	Provisional data
06/12/2005	01072100	207	Provisional data
06/13/2005	01072100	198	Provisional data
06/14/2005	01072100	219	Provisional data
06/15/2005	01072100	283	Provisional data
06/16/2005	01072100	246	Provisional data
06/17/2005	01072100	242	Provisional data
06/18/2005	01072100	268	Provisional data
06/19/2005	01072100	301	Provisional data
06/20/2005	01072100	231	Provisional data
06/21/2005	01072100	210	Provisional data
06/22/2005	01072100	216	Provisional data
06/23/2005	01072100	213	Provisional data
06/24/2005	01072100	198	Provisional data
06/25/2005	01072100	179	Provisional data
06/26/2005	01072100	163	Provisional data
06/27/2005	01072100	103	Provisional data
06/28/2005	01072100	70	Provisional data
06/29/2005	01072100	102	Provisional data
06/30/2005	01072100	138	Provisional data

