Model City TSDR Facility
Groundwater Extraction Systems
Operation and Maintenance Manual

Prepared by

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100 - INTRODUCTION

110 Purpose of Manual

The purpose of this Groundwater Extraction Systems (GWES) Operation and Maintenance (O&M) Manual is to establish standard operating procedures for all of the GWES. This manual may be changed as necessary to conform with current operations.

120 Background/Permit Conditions

CWM Chemical Services, LLC (CWM) completed a RCRA Facility Investigation (RFI) at the Model City Facility in 1993. As part of the RFI, several areas on site were delineated for Interim Corrective Measures (ICM) by the New York State Department of Environmental Conservation (NYSDEC). By letter dated February 11, 1991, Mr. Paul Eismann of the NYSDEC, explained that "Interim measures are authorized when immediate action precludes normal permit processes and, consequently, neither Part 373 nor Part 201 permitting is applicable to the subject measure." ICM at the Model City facility were established at the following locations (see Section 130 for description):

- Former West Drum Area
- Process Area Phases I and II
- Former Lagoons Area
- Area south of SLF-3
- BW02S Area
- P1202S Area
- PCB Warehouse Area

NYSDEC issued a major permit modification to CWM's Sitewide Part 373 Permit on February 13, 2001, to designate the ICM as the Final Corrective Measures for these areas. Schedule 1 of Module I and Exhibit B (Supplement to Module II) of the current Sitewide Part 373 Permit #9-2934-00022/00097 establishes the framework for Corrective Action Monitoring for the GWES Areas and requires that sampling locations and frequencies be specified in the O&M Manual. All revisions to the O&M Manual must be approved by the NYSDEC.

Schedule 1 of Module I and Exhibit B (Supplement to Module II) of the permit requires the following:

1. All GWES must be operated and maintained as specified in the O&M Manual.

2. CWM must submit to the agefncies, a quarterly report of the GWES operating data, in April, July, October, and January of each year (within 30 days of the end of the quarter).

130 System Description

131 Former West Drum Area

The West Drum Area (WDA) GWES consists of two extraction trenches. One trench, approximately 715 feet in length, is installed along the western and northern boundary of the former WDA. A second trench, approximately 180 feet in length, is installed directly west of former Lagoons 6 and 7. These trenches are designed to intercept and recover contaminated groundwater migrating from the former WDA and Lagoons Area and to intercept Dense Non-Aqueous Phase Liquids (DNAPL) which might otherwise migrate across the well alignment. Seven aqueous extraction sumps, AQ01 through AQ07, are installed in the trench. Pumps at these sumps are controlled by automatic pump level controls. Water is transferred to a surge tank (T-8002) and pumped to a storage tank (T-8001) from which it is transferred by tank truck or through aboveground piping to the on-site Aqueous Wastewater Treatment (AWT) facility for treatment. Also installed in these trenches are nineteen (19) DNAPL sumps, designated DS01 through DS19. The DNAPL sumps were placed at low spots in the surface of the glaciolacustrine clay where the DNAPL is most likely to collect. If significant quantities of DNAPL are identified at a DNAPL sump at some point in the future, a system will be developed for the removal of this material. There are three downgradient groundwater wells used to facilitate the monitoring of this system.

132 Process Area

The Process Area GWES, Phase I and II, consists of two extraction trenches and a number of extraction wells. One trench, approximately 335 feet long, runs west to east, adjacent to the south side of Lagoons 1 and 2, just north of the process area. The second trench, approximately 100 feet long, runs east to west, adjacent to the south side of Lagoon 5 and north of the Aqueous Wastewater Treatment Building. Three aqueous extraction sumps, designated AQ08, AQ09, and AQ10, and four DNAPL sumps, designated as DS20 through DS23, are installed in the 335 foot trench. Two aqueous extraction sumps, designated AQ11 and AQ12, and one DNAPL sump (DS26) are installed in the 100 foot trench. In addition, five extraction wells, designated EW08, EW09, EW11, EW12, and EW14, and two dual purpose aqueous/DNAPL extraction wells, designated as EW10/DS24 and EW13/DS25, are located between the two trenches at a 20-30 foot spacing in the area between Lagoon 5 and the tank farm. Pumps at the AQ sumps and EW wells, controlled by automatic pump level controls, transfer water to a surge tank (T-8002). As described above, water from the surge tank is subsequently pumped to a storage tank (T-8001). Water from the storage tank is transported by tank truck or through aboveground piping to the on-site AWT facility for treatment. DNAPL pumps are installed in EW10 and EW13 for automatic timer controlled

pumping to a storage tank (T-8008) where the liquid is periodically removed by tank truck for on-site oil/water separation and subsequent off-site incineration of the DNAPL.

The Process Area GWES Phase III, which consists of an extraction trench, was installed in 2012. The trench is approximately 240 feet long, runs west to east, southeast of Lagoons 1 and 2. One aqueous extraction sumps, designated AQ15 is installed in the 240 foot trench. A pump at the AQ sump, controlled by automatic pump level controls, transfers water to a storage tank (T-8010). Water from T-8010 is subsequently transported by tank truck to the on-site AWT facility for treatment.

The Process Area GWES Phase IV, which consists of two groundwater extraction wells, designated as EW17 and EW18, located in the alley between the Transformer Decommissioning (T.O.) Building and the site Laboratory, was installed in 2012. Pumps at these wells, controlled by automatic internal pump level controls, pump water to a storage tank (T-8009). Water from T-8009 is subsequently transported by tank truck to the on-site AWT facility for treatment.

133 Former Lagoons Area

The Lagoons Area Groundwater Interceptor Trench (LAGWIT) System was installed in 1997 to supplement and expand upon the previous extraction well system located north of former Lagoon 5. The LAGWIT began operation in 1998. The system consists of an extraction trench that extends approximately 1600 feet along the west, north and east sides of the former Lagoons Area, from the northern end of the WDA trench to the eastern end of the Process Area trench. Two groundwater extraction sumps, designated as AQ13W and AQ14E, are located at the west and east ends of the trench, respectively. Pumps at these sumps, controlled by automatic pump level controls, transfer water to surge tank T-8002 through aboveground piping that is also used to transfer groundwater from the WDA and Process Area systems. Water from the surge tank is pumped to storage tank T-8001 and subsequently transported by tank truck or through aboveground piping to the on-site AWT facility for treatment. In addition, three DNAPL sumps are installed in the Lagoons Area trench, designated as DS27 through DS29. The DNAPL sumps were placed at low spots in the surface of the glaciolacustrine clay where the DNAPL is most likely to collect. If significant quantities of DNAPL are identified at a DNAPL sump at some point in the future, a system will be developed for the removal of this material. There are nine downgradient groundwater wells used to facilitate the monitoring of this system.

134 Area South of SLF-3

This GWES consists of two groundwater extraction wells, designated as EW06 and EW07. Pumps at these wells, controlled by automatic pump level controls, pump water to a storage tank designated as T-8004. Water from T-8004 is subsequently transported by tank truck to

the on-site AWT facility for treatment. There is one downgradient groundwater well used to facilitate the monitoring of this system.

135 BW02S and P1202S Areas

The GWES in these two areas utilize existing groundwater monitoring wells as extraction wells. Wells BW02S and TW27S constitute the extraction well system at the BW02S Area which is located at the southern most end of MacArthur Street, near the perimeter fence south of SLF-10. Piezometer P1202S and well TW25S constitute the extraction well system at the P1202S area which is located just east of SLF-12. Positive air displacement pumps with internal level control floats at these wells pump groundwater to storage tanks, T-8005 for the BW02S Area and T-8006 for the P1202S Area. Water from these storage tanks is subsequently transported by tank truck to the on-site AWT facility for treatment.

136 PCB Warehouse Area

A GWES is installed south of the PCB warehouse which consists of two groundwater extraction wells, designated as EW15 and EW16. Pumps at these wells, controlled by automatic internal pump level controls, pump water to a storage tank (T-8007). Water from T-8007 is subsequently transported by tank truck to the on-site AWT facility for treatment.

137 Performance Piezometers

In addition to area groundwater monitoring wells, Performance Piezometers (PP) have been installed to measure local groundwater elevations in the GWES areas to verify the hydraulic effectiveness of the system. The configuration of the PP installed in each area is described below:

- The WDA has two sets of nine PP located at 2, 5, 10, and 25 feet from the center piezometer. These performance piezometers are located in line and perpendicular to the trench at the centerline and on either side of the centerline.

- The Lagoons area includes four PP. One PP is located in the trench at Station 800, i.e., approximately 800 feet from the western end of the trench. The other three PP are located at Stations 400, 800 and 1200, approximately 10 feet north of the trench, between the trench and a groundwater monitoring well.

- The area south of SLF-3 has one set of four PP located at 2, 5, 10 and 25 feet from the extraction well EW07.

- The Process Area Phase I system has one set of seven PP located at 5, 10, and 20 feet from the center piezometer. The Process Area Phase II system has one set of three

PP located at 7.5, 15, and 30 feet from EW09. The Process Area III system has one set of five PP located 10 and 20 feet from the center piezometer.

- The BW02S system has one set of four PP, with three PP located at 7.5, 15, and 25 feet north of extraction well TW27S, and one PP located 32 feet south of TW27S.

- The P1202S system has one set of four PP, with three PP located at 7.5, 15, and 25 feet north of extraction well P1202S, and one PP located 32 feet south of P1202S.

- The PCB warehouse area has one set of three PP located 7.5, 15 and 25 feet east of EW16.

200 - OPERATION

210 Pump Control Strategy

The main control panel for each GWES is located at the Aqueous Wastewater Treatment Building control room, except the PA III, PA IV, BW02S, P1202S and PCB Warehouse area systems which are located at each system location. Tank buildings at each GWES contain circuit breakers which may be used for power disconnection during maintenance activities.

All aqueous sumps operate automatically. The water level in each aqueous sump is maintained between prescribed elevations by a water level control device which activates and deactivates the pump based on water level in the sump. The system is designed to maintain a preset distance below the static groundwater condition at each sump. A high and low alarm setting has also been established for each sump.

211 Normal Operation (Automatic)

The system is normally run in an automatic mode, with all aqueous sump switches in the auto position. In this mode, the pumps are turned on and off based on sump water elevations. An automatic override to the normal pump run sequence will occur if a high level condition exists in the aqueous receiving tank, e.g., T-8001, T-8002, etc. The WDA, Lagoons, SLF-3 and Process Area control systems will not allow operation during cold temperatures to prevent the pipelines from freezing.

212 Hand Operations (Maintenance)

The pump can also be operated manually at the well head provided that there is sufficient liquid available to be pumped. The hand position is used for maintenance/trouble shooting and/or inspection activities.

213 Pump Off

If the automatic temperature override is not functioning (i.e. maintenance) the system may be manually switched to off. This is noted as part of the quarterly report.

214 Operation Procedures

1. The GWES must be operated on a continuous basis except as noted below. If the entire system is inoperable (down) for a period of more than three (3) days consecutively or five (5) days in a thirty (30) day period, CWM shall notify the Department. The notification must include a plan for restoring system operation as quickly as possible.
2. Visual inspections of all above ground piping, tanks and containment systems for evidence of leaks will be performed in accordance with the facility Inspection Program, Attachment F of the Sitewide Part 373 Permit.
3. All collection tanks are equipped with high level controls which automatically shut down their system upon activation. High level alarms for collection tanks T-8001, T-8002 and T-8004 are indicated on the AWT computer. Within 8 hours of noting this alarm, these tanks will be either emptied by forced pumping to AWT (T-8001), emptied by forced pumping/vacuuming (T-8002) or emptied by vacuum tanker (T-8004). High level alarms for collection tanks T-8005, T-8006, T-8007, T-8008, T-8009, and T-8010 are located near the tank and are inspected daily. If the tank high level alarm is on, the status will be noted as unacceptable and AWT will be notified to empty the tank by vacuum tanker.
4. Pumps in the GWES at the West Drum Area, Process Areas I and II, and Area South of SLF-3 are equipped with elapsed time indicators to monitor operating times. The elapsed time meters on each pump will be checked each week unless the system is shutdown as specified below. Readings exceeding 80 hours in a one week period will be investigated and appropriate actions taken where necessary (reset pump, write maintenance work order). Spring thaw conditions or heavy precipitation may result in higher than usual run times during which no action need be taken.
5. All systems except Process Area IV may be shut down from November 1 through April 15 of each year to prevent freezing and subsequent damage to the aboveground piping. Overall performance of the GWES will be unaffected by this temporary cold weather shut down period due to the local hydraulic gradient, very slow groundwater movement and ability of the system to reestablish the radius of influence upon restarting. These cold weather down times need not be reported as described above, but must be summarized in the Quarterly Reports on the system.

220 Sample Collection and Analysis

i. One sample point from each of the following locations shown below will be sampled annually on a rotating basis for the Site Specific indicator parameters (27 VOCs) by Method 8260, Organic Priority Pollutants (Semi-volatiles by method 8270, PCBs by method 8082 and pesticides by method 8081) and Priority Pollutant Metals (i.e., antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, zinc):

System	Sample Point ID
West Drum Area	AQ02, AQ05, AQ07
Process Area I and II	AQ09, AQ12, EW12
Area South of SLF-3	EW06, EW07
Lagoons Area	AQ13W, AQ14E

The following wells will be sampled for the Site Specific indicator parameters (27 VOCs) by Method 8260:

System	Sample Point ID	Frequency
West Drum Area	TW19S, WDA01S, WDA01D	Semiannual
Process Area III	R202S	Semiannual
P1202S Area	TW26S	Semiannual
BW02S Area	BW02D	Annual
Area South of SLF-3	W302S	Annual
Lagoons Area	TW11S, TW30D, LMS01S, LMS01D, LMS02S, LMS02D, LMS03S, LMS03D, LMS04S	Semiannual

The tanks listed below are sampled semiannually, i.e., approximately one week after systems start up in the Spring and within one week of shut-down in the Fall, for the Site Specific indicator parameters (27 VOC) compounds by Method 8260:

System	Tank ID
BW02S Area	T-8005
P1202S Area	T-8006
PCB Warehouse Area	T-8007
Process Area III	T-8010
Process Area IV	T-8009 (Annually only)

Refer to the Groundwater Sampling and Analysis Plan (GWSAP) and Exhibit F of Schedule 1 of Module I (Supplement to Module VI) of the Part 373 Permit for details on these procedures.

230 Groundwater Elevation Measurements and DNAPL Sump Checks

Groundwater elevation measurements are taken during each quarter of the operational period from the shallow groundwater monitoring wells and piezometers at the GWES in the West Drum Area, Process Area I, II, and III, Lagoons Area and Area South of SLF-3 (See Attachment 1). For the GWES at BW02S, P1202S and the PCB Warehouse Area, groundwater elevation measurements will be taken approximately one week after systems startup and prior to systems shutdown. For the GWES at Process Area IV, groundwater elevation measurements will be taken during the site-wide water level measurement event. In conjunction with the groundwater level measurements, DNAPL sumps are also checked for the presence of non-aqueous material. DNAPL has been detected if any liquid non-aqueous matter remains on the water level measuring device.

240 Recordkeeping

Data collection and Recordkeeping will be performed on an ongoing basis. All measurements are to be taken and recorded on the report form. An indication should also be made if a DNAPL was detected or not detected. Sample record sheets are included (see Attachment 1).

300 - MAINTENANCE

310 Periodic Inspection/Maintenance

The following procedures are to be followed:

- If the daily visual inspections indicate a leak or an unsatisfactory condition that could lead to a leak, an Environmental work order will be issued. If leaking, the system will be shut down immediately. Required repairs will be completed prior to restarting the system.
- If the elapsed time meters indicate pumping operations exceeding 80 hours per week during the normal operating season, the system will be investigated and appropriate actions taken (reset pump, write maintenance work order).
- Notify the Environmental Management Department (EMD) within 24 hours of becoming aware of complete system failure, i.e., the entire system is down. An allowance for down time for general maintenance and trouble shooting will be provided. Significant downtime (i.e., pump or system) in excess of 48 hours should be reported to the EMD.

320 Annual Inspection

The electronic control and alarm system will be checked annually. Procedures are detailed in the manufacturer's literature and are performed by the site Maintenance Department. Each system will be checked to verify it is functioning as designed, achieving expected pump run times and showing agreement between manual and computer generated groundwater elevation measurements. Adjustments will be made as necessary to correct any identified problems.

330 Routine Maintenance

Routine maintenance procedures are to be followed as needed, e.g., transfer pump maintenance, clean out plug inspection, etc.

400 - SAFETY

410 General Safety

All Model City Health and Safety Policies and Procedures are applicable. These references can be requested by the employees at any time. Copies are located in CWM’s Health & Safety Manual.

ATTACHMENT 1

GROUNDWATER ELEVATION DATA SHEETS

GROUNDWATER EXTRACTION SYSTEM SEMIANNUAL GROUNDWATER ELEVATIONS

BW02S AREA

SAMPLE POINT	DATE COLLECTED	SAMPLE POINT ELEVATION (ft, msl)	DEPTH TO GROUNDWATER (ft)	GROUNDWATER ELEVATION (ft, msl)
EXTRACTION WELLS				
TW27S		322.97		
BW02S		322.56		
PERFORMANCE PIEZOMETERS				
BWP01S		322.81		
BWP02S		323.06		
BWP03S		322.95		
BWP04S		323.27		

GROUNDWATER EXTRACTION SYSTEM SEMIANNUAL GROUNDWATER ELEVATIONS

P1202S AREA

SAMPLE POINT	DATE COLLECTED	SAMPLE POINT ELEVATION (ft, msl)	DEPTH TO GROUNDWATER (ft)	GROUNDWATER ELEVATION (ft, msl)
EXTRACTION WELLS				
TW25S		316.36		
P1202S		317.60		
PERFORMANCE PIEZOMETERS				
P1203S		318.66		
P1204S		318.58		
P1205S		318.51		
P1206S		318.89		

GROUNDWATER EXTRACTION SYSTEM SEMIANNUAL GROUNDWATER ELEVATIONS

PCB WAREHOUSE AREA

SAMPLE POINT	DATE COLLECTED	SAMPLE POINT ELEVATION (ft, msl)	DEPTH TO GROUNDWATER (ft)	GROUNDWATER ELEVATION (ft, msl)
EXTRACTION WELLS				
EW15		321.42		
EW16		321.44		
PERFORMANCE PIEZOMETERS				
PE01S		321.74		
PE02S		321.48		
PE03S		321.74		

GROUNDWATER EXTRACTION SYSTEM QUARTERLY GROUNDWATER ELEVATIONS

FORMER LAGOONS AREA

SAMPLE POINT	DATE COLLECTED	SAMPLE POINT ELEVATION (ft, msl)	DEPTH TO GROUNDWATER (ft)	GROUNDWATER ELEVATION (ft, msl)
GROUNDWATER MONITORING WELLS				
LMS01S		323.50		
LMS02S		319.82		
LMS03S		317.13		
LMS04S		321.88		
TW11S		319.30		
AQUEOUS SUMPS				
AQ13W		321.30		
AQ14E		321.38		
PERFORMANCE PIEZOMETERS				
PLM101		324.29		
PLM201		320.63		
PLM202		320.52		
PLM301		317.86		

SAMPLE POINT	DATE COLLECTED	DNAPL PRESENT? (Y OR N) (1)	SAMPLE POINT ELEVATION (ft, msl)	DEPTH TO GROUNDWATER (ft)	GROUNDWATER ELEVATION (ft, msl)
DNAPL SUMPS					
DS27			320.97		
DS28			322.40		
DS29			322.21		

Note: In accordance with the Groundwater Extraction System Operations & Maintenance Manual, DNAPL Sumps (DS), only, are checked for the presence of Dense Non-Aqueous Phase Liquid (DNAPL).

GROUNDWATER EXTRACTION SYSTEM QUARTERLY GROUNDWATER ELEVATIONS

PROCESS AREA – PHASES I AND II

SAMPLE POINT	DATE COLLECTED	DNAPL PRESENT ? (Y OR N) (1)	SAMPLE POINT ELEVATION (ft, msl)	DEPTH TO GROUNDWATER (ft)	GROUNDWATER ELEVATION (ft, msl)
AQUEOUS SUMPS					
AQ08			323.63		
AQ09			323.02		
AQ10			321.31		
AQ11			323.55		
AQ12			323.37		
DNAPL SUMPS					
DS20			323.25		
DS21			322.05		
DS22			321.60		
DS23			321.14		
DS26			323.49		
EXTRACTION WELLS & EXTRACTION/DNAPL COMBINATION WELLS					
EW08			323.75		
EW09			323.04		
EW10/DS24			322.86		
EW11			322.49		
EW12			322.16		
EW13/DS25			321.96		
EW14			321.76		
PERFORMANCE PIEZOMETERS					
PCN03			325.20		
PCN02			324.71		
PCN01			322.16		
PC			322.38		
PCS01			322.62		
PCS02			322.65		
PCS03			322.33		
PDN01			323.80		
PDN02			328.13		
PDN03			330.79		
LD91			324.40		
LD92			321.60		

Note:

(1) In accordance with the Groundwater Extraction System Operations & Maintenance Manual, DNAPL Sumps (DS), only, are checked for the presence of Dense Non-Aqueous Phase Liquid (DNAPL).

GROUNDWATER EXTRACTION SYSTEM QUARTERLY GROUNDWATER ELEVATIONS

PROCESS AREA – PHASES III AND IV

SAMPLE POINT	DATE COLLECTED	DNAPL PRESENT ? (Y OR N) (1)	SAMPLE POINT ELEVATION (ft, msl)	DEPTH TO GROUNDWATER (ft)	GROUNDWATER ELEVATION (ft, msl)
GROUNDWATER MONITORING WELLS					
R202S			320.61		
AQUEOUS SUMPS					
AQ15			323.95		
EXTRACTION WELLS & EXTRACTION/DNAPL COMBINATION WELLS					
EW17			321.94		
EW18			322.04		
PERFORMANCE PIEZOMETERS					
PFN02			321.39		
PFN01			321.52		
PF			322.32		
PFS01			322.91		
PFS02			322.95		

Note:

(1) AQ15, EW17, and EW18, only, are checked for the presence of Dense Non-Aqueous Phase Liquid (DNAPL) as a Best Management Practice (BMP).

GROUNDWATER EXTRACTION SYSTEM QUARTERLY GROUNDWATER ELEVATIONS

SLF-3 AREA

SAMPLE POINT	DATE COLLECTED	SAMPLE POINT ELEVATION (ft, msl)	DEPTH TO GROUNDWATER (ft)	GROUNDWATER ELEVATION (ft, msl)
GROUNDWATER MONITORING WELLS				
W302S		320.84		
W303S		320.75		
EXTRACTION WELLS				
EW06		321.51		
EW07		321.71		
PERFORMANCE PIEZOMETERS				
PEW701		321.51		
PEW702		321.34		
PEW703		321.00		
PEW704		321.45		

GROUNDWATER EXTRACTION SYSTEM QUARTERLY GROUNDWATER ELEVATIONS

FORMER WEST DRUM AREA (Sheet 1 of 2)

SAMPLE POINT	DATE COLLECTED	SAMPLE POINT ELEVATION (ft, msl)	DEPTH TO GROUNDWATER (ft)	GROUNDWATER ELEVATION (ft, msl)
GROUNDWATER MONITORING WELLS				
TW16S		319.85		
TW17S		317.68		
TW18S		318.75		
WDA01S		318.88		
AQUEOUS SUMPS				
AQ01		319.98		
AQ02		319.54		
AQ03		318.39		
AQ04		318.40		
AQ05		318.55		
AQ06		319.78		
AQ07		319.26		
PERFORMANCE PIEZOMETERS				
PAN04		319.09		
PAN03		318.75		
PAN02		318.60		
PAN01		318.54		
PA		318.54		
PAS01		318.55		
PAS02		318.57		
PAS03		318.67		
PAS04		319.09		
PBN04		318.69		
PBN03		318.40		
PBN02		318.44		
PBN01		318.35		
PB		318.34		
PBS01		318.31		
PBS02		318.34		
PBS03		318.36		
PBS04		317.85		

GROUNDWATER EXTRACTION SYSTEM QUARTERLY GROUNDWATER ELEVATIONS

FORMER WEST DRUM AREA (Sheet 2 of 2)

SAMPLE POINT	DATE COLLECTED	DNAPL PRESENT? (Y OR N)	SAMPLE POINT ELEVATION (ft, msl)	DEPTH TO GROUNDWATER (ft)	GROUNDWATER ELEVATION (ft, msl)
DNAPL SUMPS					
DS01			318.67		
DS02			318.77		
DS03			318.72		
DS04			319.19		
DS05			318.46		
DS06			319.20		
DS07			318.71		
DS08			320.72		
DS09			318.18		
DS10			317.45		
DS11			317.86		
DS12			317.03		
DS13			317.57		
DS14			317.22		
DS15			318.10		
DS16			318.16		
DS17			318.84		
DS18			318.90		
DS19			318.38		