TINKER AFB RCRA PERMIT

ATTACHMENT 6 - CONCEPTUAL SITE MODEL (CSM)

(Attached on CD)

Author: Tinker AFB

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Conceptual Site Model

Tinker Air Base, Oklahoma

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Acronyms and Abbreviations

AF	Air Force
AFB	Air Force Base
AFCEC	Air Force Civil Engineer Center
AFR	Air Force Regulation
AOC	Area of Concern
AWACS	Air Warning and Control System
B3001	Building 3001
BTEX	Benzene, Toluene, Ethyl benzene and Xylene
CAO	Corrective Action Objective
CAS	Corrective Action Strategy
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CGMU	Contaminated Groundwater Management Unit
CHOT	Consolidated-Hands-On-Training
CMS	Corrective Measures Study
COA	Central Oklahoma Aquifer
COCs	Contaminants of Concern
Cr	Chromium
CRP	Compliance Restoration Program
CVOC	Chlorinated Volatile Organic Compound
CSM	Conceptual Site Model
DCA	1,2-Dichloroethane
DCE	Cis-1,2-Dichloroethene
DERP	Defense Environmental Restoration Program
DoD	Department of Defense
DMM	Discarded Military Munitions
DQOs	Data Quality Objectives
EISB	Enhanced In Situ Bioremediation
ERPIMS	Environmental Restoration Program Information Management System
EVO	Emulsified Vegetable Oil
FFA	Federal Facilities Agreement
FPF	Fuel Purge Facility
FTA	Fire Training Area
FTMF	Fuel Truck Maintenance Facility
GTS	Geostatistical Temporal/Spatial
GWMU	Groundwater Management Unit
GWMSU	Groundwater Management Sub-Unit
HRS	Hazard Ranking System

HSWA	Hazardous and Solid Waste Amendments
IC	Institutional Control
ICM	Interim Corrective Measure
IRP	Installation Restoration Program
JETC	Jet Engine Test Cells
LUC	Land Use Control
LSZ	Lower Saturated Zone
LLSZ	Lower-Lower Saturated Zone
LTM	Long-Term Monitoring
MAAC	Maximum Ambient Air Concentration
MC	Munitions Constituents
MCL	Maximum Contaminant Level
MEK	Methyl Ethyl Ketone
MMRP	Military Munitions Response Program
MNA	Monitored Natural Attenuation
NCP	National Contingency Plan
NDL	North Drain Line
NFA	No Further Action
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
OCC	Oklahoma Corporation Commission
ODEQ	Oklahoma Department of Environmental Quality
OSDH	Oklahoma Department of Health
OU	Operable Unit
OWRB	Oklahoma Water Resources Board
PCBs	Polychlorinated Biphenyls
PCE	Perchloroethene (also tetrachloroethene)
PDD	Positive Differential Displacement
POC	Point of Compliance
POL	Petroleum, Oil, Lubricants
PRB	Permeable Reactive Barrier
PZ	Producing Zone
P & T	Pump and Treat
QAPPs	Quality Assurance Project Plans
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
RIP	Remedy in Place
SAP	Sampling and Analysis Plan

SARA	Superfund Amendments and Reauthorization Act
SB	Statement of Basis
SDL	South Drain Line
SOP	Standard Operating Procedure
SVOCs	Semi-Volatile Organic Compounds
SWMU	Solid Waste Management Unit
SWTP	Sanitary Wastewater Treatment Plant
TAC	Toxic Air Contaminant
TAC	Tinker Aerospace Complex
TCE	Trichloroethene
TCLP	Toxicity Leaching Characteristic Procedure
TVA	Tinker View Acres
UFP-QAPP	Uniform Federal Policy for Quality Assurance Project Plans
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
USZ	Upper Saturated Zone
UXO	Unexploded Ordnance
VC	Vinyl Chloride
VEP	Vacuum Enhanced Pumping
VI	Vapor Intrusion
VOCs	Volatile Organic Compounds
WBZ	Water Bearing Zone
WSW	Water Supply Well

1.0 INTRODUCTION

This document presents the most current conceptual site model (CSM) for Tinker Air Force Base, Oklahoma. It is the product of over twenty-five years of environmental restoration investigation and clean-up efforts applied to remediating soil and groundwater contamination both on base as well as any off-base contamination attributable to Tinker activities. In addition to long-term soil and groundwater issues, vapor intrusion has more recently been investigated and is being addressed.

Tinker AFB is located in central Oklahoma, approximately five miles southeast of downtown Oklahoma City. Tinker AFB is situated on a relatively flat expense of grassland. The Base currently occupies approximately 4,277 acres of semi-improved and unimproved grounds that are used for the airfield, golf course, housing area, offices, shops, and other uses characteristic of military installations. It is bounded on the west by Sooner Road, on the east by Douglas Boulevard, on the north by Interstate 40, and on the south by Southeast 74th Street (Figure 1-1). The surrounding area is a mixture of commercial and residential properties. Communities located in the immediate vicinity of the Base include Midwest City to the north, Del City to the west and Oklahoma City to the south and east.

Tinker AFB's mission is dedicated to providing worldwide technical logistics support to Air Force aerospace weapon systems, equipment, and commodity items, and encompasses a myriad of responsibilities. The logistics center manages or maintains the B-1B, B-2, B-52, E-3, and the C/KC-135 series aircraft. It performs annual depot-level maintenance on more than 120 aircraft and overhauls and maintains more than 1,100 engines from 11 major commands, as well as the Army, Navy, and numerous foreign countries. The center also manages various missile systems. Tinker AFB also accommodates a large family of associate organizations representing several major commands. Two large Air Combat Command support units add to the complex mission of the Base. Tinker AFB is the home operating base for the 552nd Air Control Wing flying the E-3 Sentry, and the Air Force Reserve's 507th Air Refueling Wing. Tinker AFB is also home of the Navy's E-6A Strategic Communications Wing One.

Tinker AFB has been and remains a major industrial complex for overhauling, modifying, and repairing military aircraft, aircraft engines, and accessory items. Base operations began in 1942 and certain activities employing hazardous materials resulted in the generation of hazardous wastes. These wastes have included spent organic solvents, waste oils, waste paint strippers and sludge, electroplating wastewater and sludge, alkaline cleaners, acids, jet fuels, and radium paints. Wastes that currently are generated are managed at two permitted hazardous waste storage facilities. However, prior to enactment of the Resource Conservation and Recovery Act of 1976 (RCRA), industrial wastes were discharged into unlined landfills and waste pits, streams, sewers, and ponds. Past releases from these areas and from underground storage tanks (USTs) have occurred, resulting in soil, groundwater, and surface water contamination. Additional information about the Base environmental restoration process and surrounding communities can be found in the 2010 Community Relations Plan, currently being updated.

On July 1, 1991, EPA issued a RCRA Hazardous Waste Management Permit to Tinker AFB (the permit was re-issued on August 12, 2002 and a new permit renewal application is currently awaiting approval). The permit included a list of solid waste management units (SWMUs) and areas of concern (AOCs) and required Tinker AFB to notify EPA of any additional units or areas that were subsequently identified. Tinker AFB was also required to perform RCRA facility investigations (RFIs) at each of these sites to determine whether releases had occurred and, if so, whether corrective actions were warranted. During the subsequent RFIs, soil and groundwater were characterized at each site. These investigations not only identified groundwater contamination associated with activities at the SWMU under investigation, but also identified impacts to groundwater that were apparently not associated with activities at any identified SWMU or AOC.

During the implementation of the initial (Phase I) RFIs at SWMUs and AOCs at the Base, Tinker AFB recognized the inefficiency of investigating groundwater impacts utilizing a unit by unit approach. As a result, Tinker recommended to EPA that groundwater be treated as a separate unit and be investigated on a basewide scale. This Basewide approach was designed to define the nature and extent of groundwater contamination beneath Tinker AFB, excluding the groundwater contamination found in the northeast portion of the Base which is being addressed under CERCLA authority. In July

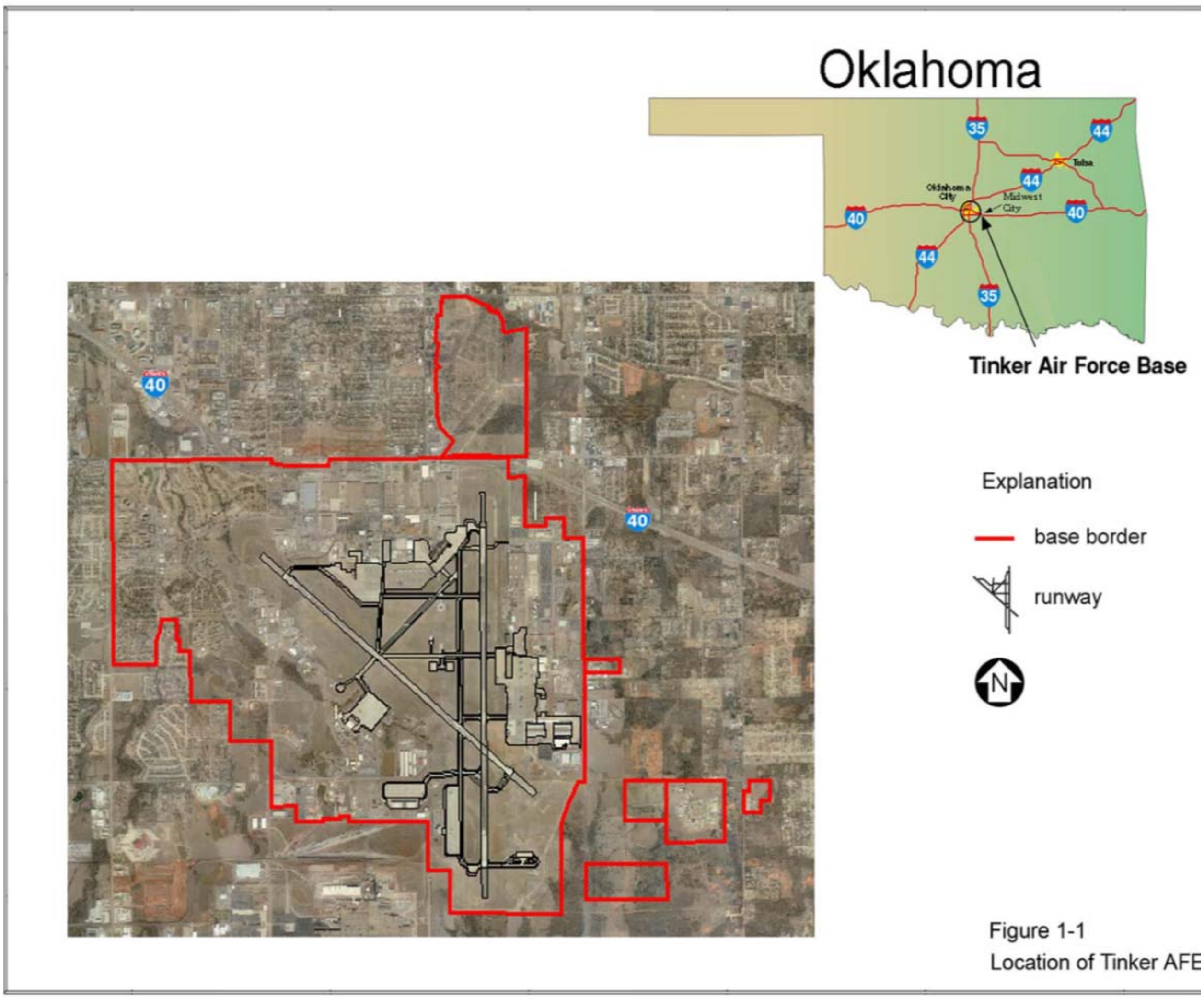

Figure 1-1 Tinker AFB Location Map

1994, Tinker AFB and EPA agreed that the most efficient way to investigate groundwater impacts would be a Phase II RFI that focused on determining the full extent of groundwater contamination from RCRA units and other, unknown, sources. As part of the basewide groundwater investigation, it was decided that the groundwater contaminant plumes could be more efficiently investigated and addressed as separate groundwater IRP sites. Four contaminated groundwater management units (CGMUs), and identified as Air Force Installation Restoration Program (IRP) sites, were established:

- CG037, contaminated groundwater in the northwest quadrant of the Base;
- CG038, contaminated groundwater in the southwest quadrant of the Base;
- CG039, contaminated groundwater in the southeast quadrant of the Base;
- CG040, contaminated groundwater in an area located east of the main Base.

Many of the SWMUs and AOCs at Tinker AFB are in close proximity to one another, resulting in difficulty in linking detected groundwater contaminants to specific contaminant sources. During the Phase II RFI, and to provide a framework for discussion of groundwater contamination from RCRA units and other sources within the relatively large project area, the Base was further divided into Groundwater Management Units (GWMUs) and subunits (GWMSUs). GWMUs provide the most efficient way to evaluate groundwater by grouping together adjacent SWMUs, AOCs, and other sources that may have contributed to a general area of groundwater contamination, or "plume." Within these areas, it was anticipated that it would be convenient to treat similar nearby plumes as a GWMU. Data from the GWMUs has been coordinated with CERCLA data available in the NE Quadrant (NPL site) to provide continuity in potentiometric and isopleth maps.

The IRP or CGMU sites only approximately coincide with the groundwater management units (GWMUs) designated during the Phase II Non-NPL Basewide Groundwater RFI (IT 1997), or any other RCRA SWMU. Figure 1-2 shows the location of the four groundwater IRP sites Contaminated Groundwater Site 037 (CG037), Contaminated Groundwater Site 038 (CG038), Contaminated Groundwater Site 039 (CG039), and Contaminated Groundwater Site 040 (CG040) established in 1996 as well as the NPL Site. It also shows GWMUs 1, 2, 3, 4, and 5 established later in 1996 along with GWMSUs. The GWMUs were selected based on contaminant distribution and extent and are used primarily as a management tool.

Due to the large size of the Base, multiple contaminant sites, and complex hydrogeology, no single conceptual site diagram would be able to encompass specific site information. Therefore, a Conceptual Site Mode) (CSM) diagram for each of the four Groundwater Contaminated Management Units (CGMUs) has been included; these four units cover the majority of the Base investigated and remediated under RCRA authority. The four diagrams include CG037, CG038, CG039, and CG040. Groundwater management units and associated contamination are described in Section 7.0 of this CSM. Note that the CSM diagram for CG037 is a draft version as it is currently undergoing an update. A diagram for the NPL (northeast quadrant) is also included.

1.1 Corrective Action Statement

Corrective action is a requirement under the 1976 Resource Conservation and Recovery Act (RCRA) that facilities that treat, store, or dispose of hazardous wastes investigate and clean up hazardous releases to soil, groundwater, surface water, and air. Congress passed the Hazardous and Solid Waste Amendments in 1984, which granted the Environmental Protection Agency (EPA) authority to require corrective action at permitted and non-permitted treatment, disposal, and disposal facilities. Tinker Air Force Base (Tinker

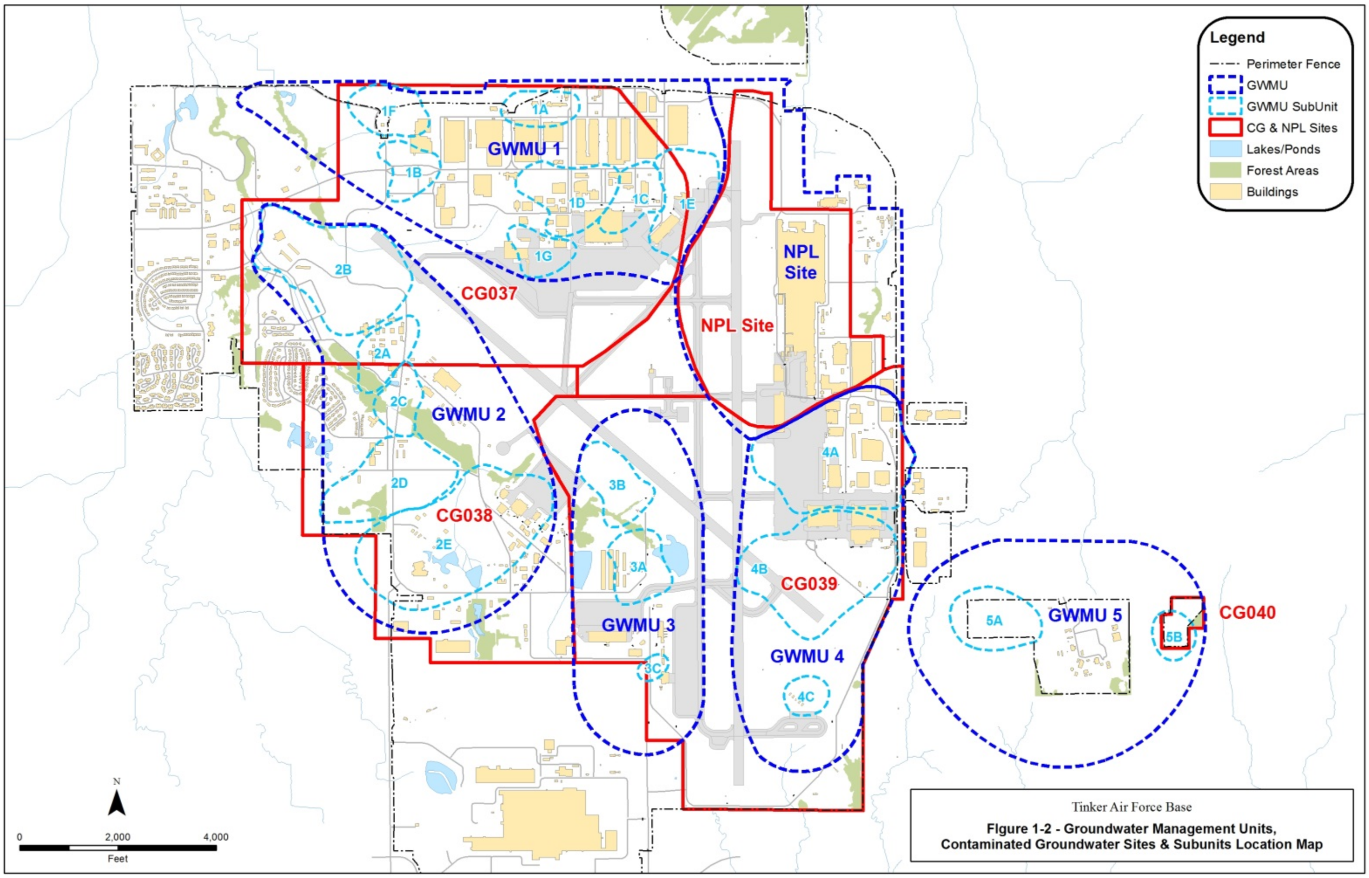

Figure 1-2 Contaminated Groundwater, NPL & Groundwater Management Units

AFB) is one such permitted facility and therefore corrective action at release sites is required. Wastes that currently are generated are managed at two permitted hazardous waste storage facilities. However, prior to enactment of the Resource Conservation and Recovery Act of 1976 (RCRA), industrial wastes were discharged into unlined landfills and waste pits, streams, sewers, and ponds. Past releases from these areas and from underground storage tanks (USTs) have occurred, resulting in soil, groundwater, and surface water contamination. Corrective action is principally implemented through RCRA permits and orders. On July 1, 1991, OSDH (now ODEQ) and USEPA Region 6 issued the RCRA Part B Hazardous Waste Management Permit (No.OK1571724391), which formally authorized Tinker AFB to operate as a hazardous waste storage facility.

The Tinker Air Force Base (Tinker AFB) remediation strategy, as executed under the Air Force Environmental Restoration Program (ERP) is consistent with the corrective action requirements set out in the U.S. EPA *Region 6 Corrective Action Strategy (CAS)* dated February 2015. This serves as notice to the State of Oklahoma Department of Environmental Quality of Tinker Air Force Base's intent to continue to conduct corrective action using the CAS.

Corrective Action at Tinker AFB will be performed in accordance with the 2015 United States Environmental Protection Agency (USEPA) Region 6 Corrective Action Strategy (CAS) guideline (February 2015), that has been approved and adopted by the ODEQ Land Protection Division. The proposed CAS for Tinker AFB will be a holistic approach to all of the solid waste management units (SWMUs), areas of concern (AOCs), and other recognized release areas. The CAS will be conducted in accordance with

§ 264.90 and 264.101, ensuring that the requirements of a corrective action program are implemented and maintained. The emphasis will be on streamlining the process of corrective action to achieve results that satisfy all of the stakeholders. The ultimate goal of corrective action at the Base is to ensure groundwater MCLs for all constituents at the installation boundary, site source goals with agreement reached with regulatory agencies for alternate standards as appropriate for foreseeable land use.

1.2 Data Quality Objectives

The Data Quality Objective (DQO) Process is used to establish performance or acceptance criteria, which serve as the basis for designing a plan for collecting data of sufficient quality and quantity to support the goals of a study. Current groundwater corrective action objectives for Tinker AFB are outlined below.

a. To ensure that in the future contaminants do not migrate off-site at levels above their respective drinking water MCL.

b. To monitor and provide sampling analytical data that reports the concentrations of COCs in groundwater collected from performance wells, at each groundwater management unit or other named RCRA site.

c. To mitigate potential indoor air exposure in buildings located over existing groundwater plumes for which there is the potential for vapor intrusion and contamination of indoor air from volatile contaminants.

d. To remove or treat source material in groundwater to the extent practicable to reduce potential for future migration beyond the installation perimeter and enhance the attainment of performance metrics. The goal includes removal or treatment of surface/subsurface sources in soils to the extent practicable since soil sources could subsequently migrate to groundwater.

e. To maintain existing on-site institutional and land use controls that protect workers from contact with contaminated groundwater and soils. Restricted access to the base by the general public, required digging permit approval for any excavation below six inches, and appropriate fencing are examples of existing institutional controls.

Current remediation activities and planned remedial actions are designed to meet the objectives listed above. Continuing efforts to remediate groundwater contamination satisfy the groundwater protection intent of regulations stated in 40 CFR 264.90 and 40 CFR 264.101. Tinker AFB will continue both the present groundwater monitoring program and the present groundwater remediation program and will submit to the ODEQ all status reports detailing progress and changes in the program.

The Corrective Action Objective for all sites and all media is to remediate media exceeding site-specific risk based criteria based performance standards, for each site.

- Achieve No Further Action status at Industrial Risk Level Standards for those sites achieving Long Term (site) Management and compliance at the installation boundary.
- Achieve Site Closeout status at Residential Risk Level Standards for those sites being closed, below MCLs (groundwater) throughout the contamination plume.

1.3 Conceptual Model Development

A Tinker Air Force Base (TAFB) conceptual site model was first published in a US Army Corps of Engineers) USACE) report in 1991. However, review of site reports by the Tinker geologist between 1991 and 1993 identified significant deficiencies and errors with the published model, including a general failure by the USACE and their contractors to integrate information at individual contaminated sites into a holistic basewide conceptual model, which led to incorrect interpretations of Base hydrogeology. In 1993, it was decided that data from all sites needed to be incorporated into an integrated basewide model in order to generate a framework for the entire Base. The initial version of the new holistic CSM was developed in 1994 by Base personnel; this initial model has been continually tested and updated since that time with the help of various contractors. As the CSM evolved, it has been shared with all environmental contractors working at Tinker and is used as a basic template for all work at environmental sites on Base.

The interpretation of Base hydrogeology in this CSM has incorporated published State (Oklahoma Water Resources Board, Oklahoma State Geological Survey) and Federal (US Geological Survey) information as well as reports published by the Association of Oklahoma Governments (ACOG) and by academia. Aerial photos (which cover a time span from when the base was first developed in the early 1940s to the present) as well as historical documents housed in the Base History Office, have also been reviewed. Geophysical and lithologic data from wells has been incorporated, including geotechnical and groundwater information. Approximately 100 hydrogeological cross sections have been developed and digitized for the Base; Figure 1-3 is a cross section index map. These sections allow for a basic understanding of how individual contaminated sites might relate to each other and provide a pseudo three-dimensional overview of hydrogeology at the Base. Cross section data has also been compared to regional published groundwater information to ensure that the Base conceptual model fits well with regional data. Local surface water features, flow meter data, pump test data and man-made features have also been incorporated into the model. In addition, the Base geologist has been involved with a State mandated study of the Central Oklahoma Aquifer, the primary groundwater source in the area at and surrounding the Base to ensure the Base CSM matches the regional understanding of the groundwater in the area and because the Base has a vested interest in understanding future water use, withdrawal allocations, and potential environmental impacts since much of the Base water supply is from this aquifer.

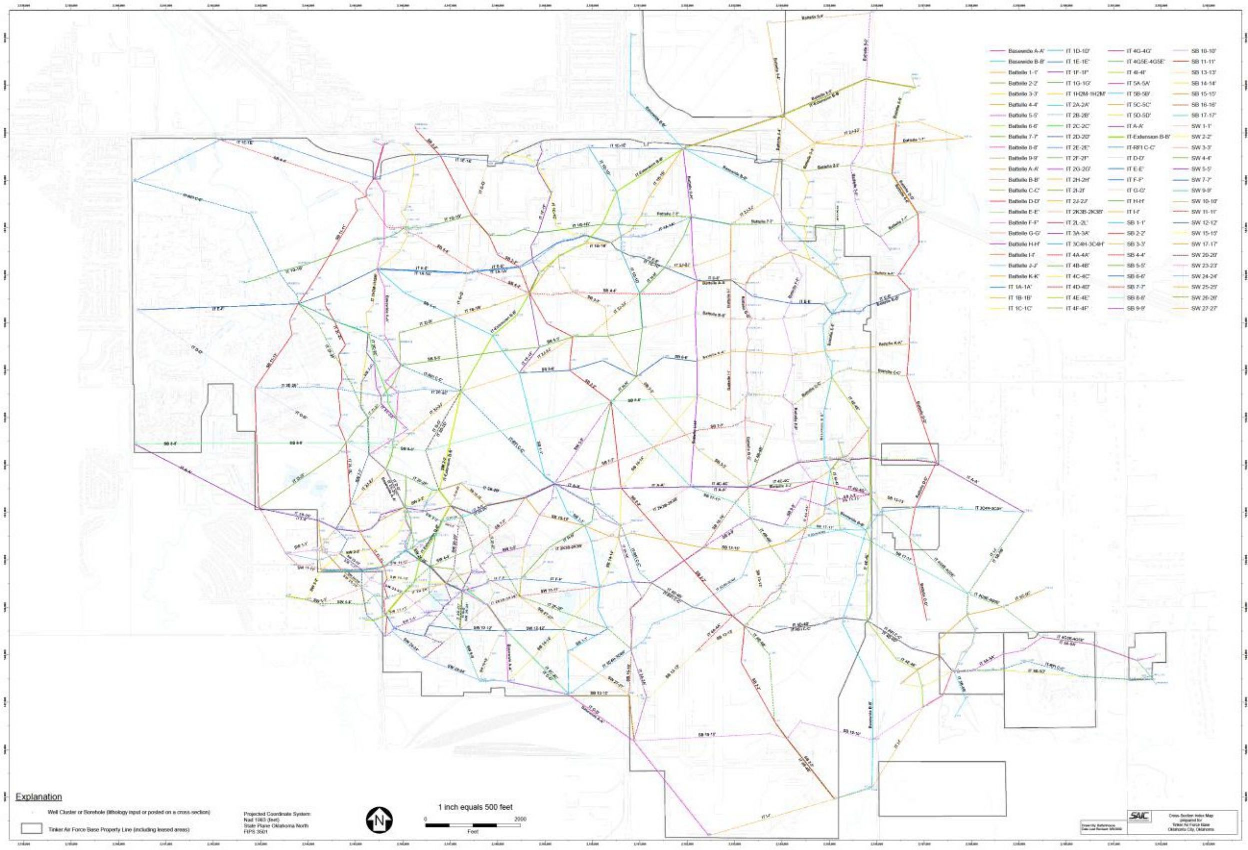

Figure 1-3 Cross Section Index Map

2.0 GEOLOGIC FRAMEWORK

Tinker AFB is situated atop a sedimentary rock column composed of marine and terrestrial strata ranging in age from Cambrian to Permian, which overlies a Precambrian igneous basement Outcropping units consist of Quaternary-age very poorly sorted and unconsolidated-to-partially consolidated alluvium and terrace deposits locally present in and near present-day stream valleys, and Permian-age fluvial-deltaic strata consisting of layered and consolidated to partially consolidated rock material. Permian units, the primary water-bearing strata, tend to be lenticular in nature; interfingering sandstones and mudstones form complex pathways for groundwater movement. The major lithologic units in the area of the Base are relatively flat lying and have a dip of about 0.0076 ft/ft (or 40 ft/mile) to the west-southwest.

Tinker AFB is located within a moderately active tectonic area. A major fault zone associated with the Nemaha Ridge and found along the eastern flank of the Oklahoma Anticline is located west of the Base. Recent investigations have suggested that a limited expression of this fault zone may lie immediately west of the Base boundary and possibly extends onto the western- most portions of the Base. Note that recent increased seismic activity (faulting) has been occurring in the surrounding area, possibly due to injection of fluid drilling wastes in nearby injection wells, although no impacts have been detected at Tinker AFB.

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2.1 Stratigraphy

Quaternary-age deposits near Tinker AFB consist of unconsolidated weathered bedrock, fill material, windblown sand, and interfingering lenses of sand, slit, clay, and gravel of fluvial origin (SAIC 2011). Terrace deposits are exposed where stream valleys have downcut through older strata and have left the terraces topographically above present-day deposits. Alluvial sediment ranges in thickness from less than 1 ft to nearly 20 ft.

Subsurface (bedrock) geologic units that crop out at Tinker AFB include the Hennessey Group and the Garber Sandstone. A generalized geologic column is provided as Figure 1-4. These are also identified on the two hydrogeologic cross-sections included with this permit renewal application, IT Extension B-B' and IT RFI C-C', discussed later. The Wellington Formation, which does not outcrop at Tinker AFB, underlies the Garber Sandstone at the site. These bedrock units were deposited during the Permian age (230 to 280 million years ago) and are typical redbed deposits formed during that period. The units are composed of a conformable sequence of sandstones, siltstones, and mudstones. The Hennessey Group includes reddish-brown mudstone, with a few lenticular beds of very fine grained sandstone or siltstone. Individual beds are lenticular and vary in thickness over short horizontal distances. The Hennessey Group is absent in the northern and the northeast and eastern portions of the Base due to erosion but is present at the surface across a large part of the Base as a thin veneer. It thickens to around 70 ft thick in the southwestern portion of the Base. The up-dip edge of the Hennessey Group is shown, and labeled, on the March 2015 HWBZ potentiometric surface map by an orange hatched line trending east of and across the northeast corner the Base. Although generally considered to be a confining unit, the Hennessey is locally saturated and can yield groundwater (typically a few gallons a minute or less) and near surface desiccation features where the unit is less than 30 feet thick allow both recharge to this unit as well as allowing groundwater to migrate to underlying saturated zones.

The Garber Sandstone and the Wellington Formation have similar lithologies. In central Oklahoma, these units consist of lenticular beds of fine-grained, cross-bedded sandstone interbedded with siltstone and mudstone. Both of these formations were deposited in a fluvial- deltaic environment at the margin of a broad Permian basin located to the west. A Permian delta is reported to have existed generally in the vicinity of Oklahoma County. Because the units are lithologically similar and devoid of fossils or key beds, the Garber Sandstone and the Wellington Formation are difficult to distinguish; informally they are known as the Garber-Wellington. Together, these two units are approximately 1,000 to 1,200 ft thick at Tinker AFB.

Correlation of geologic units is difficult due to the discontinuous nature of the sandstone and shale beds. However, cross-sections demonstrate that two stratigraphic intervals can be correlated over large sections of the base in the conceptual model. These intervals are represented on geologic cross-sections IT Extension B-B' and IT RFI C-C', included as Figures 1-5 and 1-6 respectively; these provide base-wide subsurface views of geologic strata and aquifer zones and how they interrelate. The two included cross sections are located in pockets at the end of this document. The first correlatable interval (USZ/LSZ aquitard) is marked by the base of the Hennessey Group and the first sandstone at the top of the Garber Sandstone. This interval is mappable over the entire Base. The second interval (LSZ/PZ aquitard) consists of a shale zone within the Garber Sandstone which in places is comprised of a single shale layer and in other places of multiple shale layers. This interval is more continuous than other shale intervals and in cross-sections appears mappable over a large part of the base. It is extrapolated under the central portion of Tinker where little well control exists. Stratigraphic correlations were also supported, and tested, by incorporating water level data. A set of nearly 100 cross sections was generated over time, hydrogeologically 'tied', and correlations tested each time new wells are installed. A map presenting the location of these digitized sections is also included in the *Task Order Final Report 2007 Basewide Environmental Groundwater Sampling and Water Level Measurements* Report, August 2009. The report includes all cross sections in a .pdf format.

The surficial geology of the north section of the Base is dominated by the Garber Sandstone, which crops out across a broad area of Oklahoma County. Generally, a thin layer of soil and/or alluvium up to 20 ft thick covers the Garber Sandstone. To the south, the Garber Sandstone is overlain by outcropping strata of the Hennessey Group, including the Kingman Siltstone and the Fairmont Shale. Subsurface data acquired during geotechnical investigations and monitoring well installations confirm the presence of these units.

2.2 Depositional Environment

The Permian-age strata presently exposed at the surface in central Oklahoma were deposited along a low-lying, north-south oriented coastline. Land features included meandering to braided, sediment-laden streams that flowed generally westward from highlands to the east (ancestral Ozarks). Sand dunes were common, as were cut-off stream segments that rapidly evaporated. The climate was arid and the vegetation was sparse. Offshore, the sea was shallow and deepened very gradually to the west, and the shoreline position varied over a wide range. Isolated evaporitic basins frequently formed as the shoreline shifted. This depositional environment resulted in an interfingering collage of fluvial and windblown sands, clays, shallow marine mudstones, and evaporite deposits. The overloaded streams and evaporitic basins acted as sumps for heavy metals such as iron, chromium, lead, and barium. Oxidation of iron in the arid climate resulted in the reddish color now seen in many of the sediments. Erosion and chemical weathering of granitic rocks from the highlands resulted in extensive clay deposits. Evaporite minerals, such as anhydrite ($CaSO4$), barite ($BaSO4$), and gypsum ($CaSO4 \bullet 2H2O$), are common.

Around Tinker AFB, the Hennessey Group consists predominately of red mudstones with thin (i.e., less than 10 ft in thickness) lenticular beds of very fine-grained sandstone and siltstone. The contact between the Hennessey Group and the underlying Garber Sandstone is often difficult to distinguish; thin remnants of the Hennessey Group appear to be present in the central, eastern, and northeastern parts of the Base.

The Hennessey Group was deposited in a tidal flat environment cut by shallow, narrow channels. In outcrops, "mudball" conglomerates, burrow surfaces, and desiccation cracks are recognizable. By contrast, the Garber Sandstone and much of the Wellington Formation at Tinker AFB consist mostly of an irregularly interbedded system of lenticular sandstones, siltstones, and mudstones deposited either in meandering streams in the upper reaches of a delta or in a braided stream environment. Correlation of

System	Series	Unit	Thickness (ft)	Description and Distribution	Water-Bearing Properties
QUATERNARY	PLEISTOCENE AND RECENT	Alluvium	0–70	Unconsolidated and interfingering lenses of sand, silt, clay, and gravel in the floodplains and channels of streams	Moderately permeable. Yields small to moderate quantities of water in valleys of larger streams. Water is very hard, but suitable for most uses, unless contaminated by industrial wastes or oil field brines
		Terrace deposits	0–100	Unconsolidated and interfingering lenses of sand, silt, and clay that occur at one or more levels above the floodplains of the principal streams	Moderately permeable. Locally above the water table and not saturated. Where deposits have sufficient saturated thickness, they are capable of yielding moderate quantities of water to wells. Water is moderately hard but less mineralized than water in other aquifers. Suitable for most uses unless contaminated by oil field brines
PERMIAN	LOWER PERMIAN	Hennessey Group (includes Kingman Siltstone and Fairmont Shale)	700	Deep-red clay shale containing thin beds of red sandstone and white or greenish bands of sandy or limey shale. Forms relatively flat to gently rolling, grass-covered prairie	Poorly permeable. Yields meager quantities of very hard, moderately to highly mineralized water to shallow domestic and stock wells. In places, water contains large amounts of sulfate
		Garber Sandstone	500?	Deep-red clay to reddish-orange, massive and cross-bedded fine-grained sandstone interbedded and interfingered with red shale and siltstone	Poorly to moderately permeable. Important source of groundwater in Cleveland and Oklahoma counties. Yields small to moderate quantities of water to deep wells; heavily pumped for industrial and municipal uses in the Norman and Midwest City areas. Water from shallow wells is hard to very hard; water from deep wells is moderately hard to soft. Lower part contains water too salty for domestic and most industrial uses
		Wellington Formation	500?	Deep-red to reddish-orange massive and cross-bedded fine-grained sandstone interbedded with red, purple, maroon, and gray shale. Base of formation not exposed in the area	

FIGURE 1-4

MAJOR GEOLOGIC UNITS IN THE VICINITY OF TINKER AIR FORCE BASE, OKLAHOMA (SAIC 2011, MODIFIED FROM WOOD AND BURTON 1968, PROJECT MANAGEMENT PLAN FOR 2011 BRIDGE BASEWIDE ENVIRONMENTAL SAMPLING AND WATER LEVEL MEASUREMENTS, TINKER AIR FORCE BASE, OKLAHOMA)

individual units and identification of the contact between the two formations are difficult due to the lack of key marker beds. As a result, the units are commonly referred to as the Garber-Wellington. Garber- Wellington outcrop units north of the Base exhibit many small to medium channels with cut-and-fill geometries consistent with a stream setting. Sandstones are typically cross-bedded.

Individual beds range in thickness from a few inches to approximately 50 ft and appear massive, but thicker units are often formed from a series of “stacked” thinner beds. Geophysical and lithologic well logs indicate that from 65 to 75% of the Garber Sandstone unit at Tinker AFB well is composed of sandstone. The percentage of sandstone decreases to the north, south, and west of the Base.

These sandstones are typically fine to very fine-grained, friable, and poorly cemented. However, where sandstone is cemented by red muds or by secondary carbonate or iron cements, local thin “hard” intervals exist along disconformities at the base of sandstone beds. Mudstones are described as ranging from clayey to sandy, are generally discontinuous, and range in thickness from a few inches to approximately 40 ft. The regional and local hydrogeology for Tinker AFB has been described in previous investigations for the northeast quadrant of the Base and in numerous reports completed by federal and state agencies. Regional hydrogeologic conditions are summarized below, followed by a more detailed description of local hydrogeologic conditions.

3.0 HYDROGEOLOGY

3.1 Regional Hydrogeology

Ground water hydrology of the Tinker Air Force Base - Oklahoma City area has been reported by various authors, including Jacobsen and Reed (1949), Wood and Burton (1968), Bingham and Moore (1975), Bedinger and Sniegocki (1976) and Wickersham (1979). Additional information has been obtained from interviews with officials of the Oklahoma Water Resources Board, the District Office, U.S. Geological Survey Water Resources Division, and the Association of Central Oklahoma Governments (ACOG).

The most important source of potable groundwater in the Oklahoma City metropolitan area is the Central Oklahoma Aquifer (COA) System. Two of the primary water-bearing units of this system include the Garber Sandstone and the Wellington Formation. Together, they are commonly referred to as the Garber-Wellington Aquifer and are considered to form a single aquifer because the units were deposited under similar conditions and because many of the best producing wells are completed in this zone. Tinker AFB obtains much of its water from this source while local municipalities (Oklahoma City, Del City, Midwest City) have switched primarily to surface water sources. The Base water supply wells (WSWs) are screened or perforated at depths of 200 to 750 ft below ground surface (BGS).

Regional groundwater flow in the Central Oklahoma Aquifer is generally west to east. Structural features, such as the Oklahoma City Anticline located roughly 1.5 miles west of the Base, and regional dip, control regional groundwater flow. In addition, regional groundwater flow is influenced by discharge points such as the Deep Fork River, the Canadian River, and water supply wells.

Recharge of the Garber-Wellington Aquifer is accomplished principally by percolation of surface waters crossing the area of outcrop and by rainfall infiltration in this same area. Because most of Tinker Air Force Base is located in an aquifer outcrop area the base is considered to be situated in a recharge zone (Havens, 1981); the Garber Sandstone outcrops across a significant portion of Tinker AFB, or is overlain by only a thin veneer of the Hennessey Group, and therefore much of Tinker AFB occurs within the recharge area.

According to Wood and Burton (1968) and Wickersham (1979), the quality of ground water derived from the Garber-Wellington Aquifer is generally good, although wide variations in the concentrations of some constituents are known to occur. Wells drilled to excessive depths may encounter a saline zone, generally greater than 900 feet below ground surface. Wells drilled to such depths or those accidentally encountering the saline zone are either grouted over the lowest screens or may be abandoned.

3.2 Local Hydrogeology

Four primary hydrostratigraphic units have been defined at Tinker AFB, including the Hennessey Water Bearing Zone (HWBZ), the Upper Saturated Zone (USZ), the Lower Saturated Zone (LSZ) and the Producing Zone (PZ). This terminology is colloquial to Tinker and reflects various hydrostratigraphic units delineated at the Base. In general, a hydrostratigraphic unit can be defined as a part of a body of rock that forms a distinct hydrologic unit with respect to the flow of groundwater. The following text discusses each of these zones, including the PZ. The USZ, LSZ, and LLSZ potentiometric maps include isopleth contours for TCE in each zone. No plumes are included on the HWBZ figure since there is no mapped contamination in that zone.

The Hennessey Group at Tinker AFB does not have a recognized aquifer but some saturation, identified as the Hennessey Water Bearing Zone (HWBZ) does exist. The HWBZ is absent in the northeastern portion of the Base where the Hennessey strata are thin. Three aquifer zones (in descending order) have been identified for the Garber Sandstone and Wellington Formation (Garber-Wellington Aquifer) under Tinker AFB; these zones are part of the regional Garber-Wellington Aquifer. The zones include the Upper Saturated Zone (USZ), the Lower Saturated Zone (LSZ), and the Producing Zone (PZ). The LSZ has been subdivided into an upper and lower (Lower-Lower Saturated Zone) to address a significant downward component of groundwater flow in the LSZ, which is noted within the aquifer under Tinker AFB. The magnitude of this vertical flow component varies across the Base and is much less under the western one-third of Tinker AFB where the overlying Hennessey Group is thicker. The HWBZ is present in the southwestern portion of Tinker AFB where the Hennessey Group thickens and becomes locally saturated with groundwater. The hydraulic conductivity is low; hydraulic conductivity (slug) test data indicate it is generally less than 0.5 ft/day. The HWBZ is not considered a significant source of drinking water. The unit receives recharge from precipitation where it is exposed at the surface, at localized areas where sandstone outcrops at the surface and in locations of desiccation cracks with higher conductivity. Water levels in wells completed in the HWBZ show significant variation seasonally (as much as 10 feet has been documented) depending on the amount of rainfall, unlike in USZ and LSZ wells where water levels generally fluctuate a few feet at most under unstressed conditions.

Generally, groundwater in this unit flows toward lower topographical elevations. In some areas, potentiometric lows mapped in the HWBZ are coincident with potentiometric highs on the USZ surface and suggest that vertical downward flow paths exist between the two zones. Downward vertical flow (and possibly lateral flow) and communication with the USZ are enhanced by the presence of desiccation cracks where the Hennessey Group is 30 ft or less in thickness. The estimated 20 foot isopach thickness is presented by a red dashed line on the Hennessey Group potentiometric map; this line represents the approximate limit of saturation (HWBZ) within this geologic unit. Locally however, where the Hennessey is less than 20 feet thick, some thin, perched saturated zones may exist.

The USZ is the uppermost saturated zone of the Garber-Wellington Aquifer and is delineated from the LSZ by a basal aquitard. The USZ is approximately 50 ft thick, measured from the base of the overlying

Hennessey Group to the base of the underlying aquitard, except where portions have been removed by erosion along down-cutting streams such as Crutcho Creek. The saturated portion typically ranges from less than 1 ft to 20 ft thick, and truncates along a line extending from near the Base boundary at CG040 a westward toward Douglas Boulevard north of SE 59th Street, north along Douglas Blvd, to just west of West Soldier Creek in the northeast part of the Base, looping through the old Kimsey Addition located north of Building 3001, and turning northwestward around the north end of Runway 17/35 (Figure 1-9). Truncation of the saturated zone is primarily due to westward geologic dip and stream erosion. Desiccation cracks are also present in the USZ where it is exposed at the surface. Vertical contaminant transport from surface spills may impact deeper portions of the USZ more quickly due to the presence of desiccation cracks. Open desiccation cracks would provide relatively little resistance to water and contaminant infiltration, and movement through the desiccation cracks in the unsaturated USZ could be rapid.

The USZ has a large areal extent and occurs throughout Tinker AFB except in a small part of the northeast quadrant and east of the Base where Soldier Creek has eroded the Garber Sandstone to a point below the basal aquitard. Over much of the Base, the USZ occurs under unconfined conditions. In some areas, such as where fractures in the overlying Hennessey Group extend at depth, it may also be semi-confined. An orange line on the USZ potentiometric surface map, reflects the approximate up-dip extent of saturation in this zone. The extent of saturation has been confirmed by monitor well drilling as well as by comparing the elevation of several surface water bodies east of the Base to groundwater elevations in USZ wells located near them.

The USZ becomes confined in the farthest southwestern corner of the Base and to the west of the Base where it is locally confined by the overlying Hennessey Group. The depth to the top of the USZ potentiometric surface ranges from near the land surface in the northeastern portion of the Base where streams have cut deep enough (portions of Crutcho Creek and Kuhlman Creek) to 70 ft BGS in the southwestern portion of the Base. Hydraulic conductivity test data yield values that range from 0.04 to 6.7 ft/day.

Groundwater flow in the USZ under Tinker AFB is generally to the west or southwest due to geologic dip. However, local variations in flow direction exist on the western part of the Base, due either to structural features related to the Oklahoma City Anticline or to the presence of Crutcho Creek, and on the eastern part of the Base due to a leaky aquitard at the base of the USZ or man-made features. Locally, surface discharge of USZ groundwater occurs where creeks have eroded into the top of the Garber Sandstone, such as to Crutcho and Kuhlman Creeks in the northwest part of the Base, but most shallow groundwater leaves Tinker AFB as groundwater in the aquifer flowing southwestward. Eastward shallow groundwater flow off of the Oklahoma City Anticline is identified west of Crutcho Creek and locally at the eastern edge of the Base due to local groundwater mounding under Building 3001.

Numerous mudstone layers, which act as local aquitards, exist within the Garber-Wellington Aquifer saturated units. Most do not extend over great distances; a 1993 *Geostatistical Analysis of Geologic Heterogeneities* report indicates that sandstone and shale (mudstone) strata can be reasonably well correlated in the northeast quadrant over distances of only 500 to 1000 feet in the horizontal plane. However, two mudstone layers occur on a semi-regional basis under Tinker AFB; these are more laterally continuous and actually function as semi-regional aquitards. The uppermost aquitard occurs between the USZ and LSZ and is referred to as the USZ/LSZ aquitard. The second aquitard occurs between the LSZ and PZ and is referred to as the PZ aquitard. These aquitards, however, do not consist of a single continuous mudstone unit. Instead, they are zones composed of interbedded mudstones and fine sandstones and siltstones with a higher proportion of clay relative to sand. They are recognized by significant groundwater pressure head differences (up to 70 ft of head difference across the PZ aquitard for example) at well cluster locations where wells are screened above and below the aquitard layers.

The USZ/LSZ aquitard is composed of overlapping discontinuous mudstone lenses with interbedded thin sand lenses. This aquitard interval varies in thickness from less than 10 ft to greater than 25 ft. A vadose zone exists under the eastern third of Tinker AFB between the base of the USZ/LSZ aquitard and the saturated portion of the LSZ. This vadose zone is roughly 10 to 20 ft thick in the northeastern portion of the Base, but thins to the west and is no longer present west of north- south runway (Runway 17/35) where the LSZ potentiometric surface intersects the aquitard. Head differences of up to 6 ft occur between the USZ and LSZ at the western Base boundary and up to 40 ft on the east side of the Base. The USZ/LSZ aquitard outcrops between 15 and 20 ft above the creek along the west bank of Soldier Creek just south of the IWTP. Based on the distribution of chemical contaminants, the USZ/LSZ aquitard is believed locally to allow some hydraulic communication between the USZ and the LSZ through natural and man-made discontinuities.

The next deeper zone in the Garber-Wellington Aquifer is the LSZ. This saturated interval is approximately 150 ft thick. However, as previously noted, this zone is sub-divided into the LSZ and the LLSZ for modeling and discussion purposes based on the recognition of a vertical component of the flow gradient. Generally, the LSZ consists of the upper third of the section, while the LLSZ is considered, when included, as the lower two-thirds. The LSZ directly underlies the USZ/LSZ aquitard and exists under all of Tinker AFB. Hydraulic conductivity test data show the hydraulic conductivity of the LSZ ranges from 0.25 to 8.7 ft/day. Flow is generally to the west and southwest under the Base but, as with the USZ, local variations exist under the west portion of Tinker AFB due to structural features related to the Oklahoma City Anticline. In addition, a groundwater ridge exists just east of the Base in this aquifer zone, which causes LSZ groundwater at CG040 to flow eastward under the east portion of that site. Just east and north of Tinker AFB, changes in recharge and interaction with Soldier Creek create variable flow directions. Recharge to the LSZ occurs primarily by precipitation where units outcrop just east of the Base and locally by the downward movement of groundwater through the USZ/LSZ aquitard where the USZ overlies it and discontinuities in the aquitard occur.

Groundwater in the LLSZ generally flows in the same direction as groundwater in the LSZ at any given location on Tinker AFB. Recharge to the LLSZ is by downward leakage from the LSZ and by lateral inflow of groundwater from the area east of the Base. A pumping test was conducted at well cluster 1-91PW in the northeastern corner of the Base in November 1994 as part of the IWTP/Soldier Creek Groundwater OUs RI. The hydraulic conductivity values calculated from the pumping test ranged from 0.78 to 15.6 ft/day. The results from the pumping test indicate that the LLSZ is interconnected with the LSZ. Additional pump tests to evaluate interaction between the HWBZ, the USZ, and the LSZ have been conducted at the Landfill 6 area and near landfill 2 and 4.

The PZ aquitard occurs at the base of the LSZ (LLSZ) and hydraulically separates the LSZ from the underlying PZ. The isolation of the PZ from the LLSZ is demonstrated by head differences of up to 70 ft across the unit. This aquitard appears to be similar to the USZ/LSZ aquitard, being formed by a series of overlapping mudstones with interbedded more permeable sandstone/siltstone lenses. Well log data suggest that the PZ aquitard is present beneath the entire Base. The aquitard appears to be at least 30 ft thick; however, studies suggest that this aquitard may be up to 80 ft thick locally.

The PZ lies below the PZ aquitard and extends downward approximately another 500 to 600 ft. At around 700 to 800 ft BGS, the PZ grades progressively into saline water, which forms the lower limit of potable water. A physical boundary between the PZ and underlying units (i.e., the Chase, Council Grove, and Admire Formations) occurs somewhat deeper. The natural flow direction in the PZ is difficult to identify due to the influence of water supply wells (WSW) and limited data coverage but is most likely to the west. Data supplied by Wood and Burton (1968) from the Nichols Hills area to the west of the Base and results of the U. S. Army Corps of Engineers pump test involving former Tinker WSW-14, WSW-15, and WSW-16, originally located just east of Building 3001, suggest that there is little vertical communication between the PZ and shallower zones. Several shallow wells in the LSZ were monitored during the pump test and none of the wells exhibited any measurable drawdown. An average hydraulic conductivity of approximately 5 ft/day has been calculated for the Garber-Wellington sandstones and from production well data in the Oklahoma City area. A total of 34 Tinker AFB WSWs have been completed in the PZ; twelve have since been plugged, and one new well (#34) was recently placed in operation. Twenty-one of the wells are currently operational, although this number varies over time. A map of existing and plugged Base water supply wells is presented as Figure 1-7.

Shallow aquifers exist temporarily in zones of alluvium that border streams, or where sandy residual soils overly bedrock at shallow depths. Soil aquifers are typically recharged directly by precipitation, gradually running dry seasonally as base flow to local streams and recharging of underlying rock aquifers deplete limited supplies. The significance of shallow aquifers is that they may facilitate the contamination of important lower aquifers or surface waters by generation and mobilization of wastes. Shallow aquifers may not facilitate the detection of developing ground-water contamination problems because of their localized nature and ephemeral character.

The hydrogeologic conceptual model of Tinker Air Force Base integrates geologic and hydrologic data from across the base. Such a conceptual model involves a comprehensive review of available data, including those from direct measurement sources (borings, water level measurements, pump/slug tests, stream studies) as well as indirect sources (aerial photographs, topographic maps, published reports). The hydrogeologic system at Tinker is complex, but the model provides both an approximation of depth to water and an estimated direction of groundwater movement and is therefore useful as a basis for designing field investigations. As information is derived from investigations the model is continually updated and refined.

The aquifer zones in the conceptual model are hydraulically connected, although sometimes only to a very local or limited extent, either directly as in the west part of the base or indirectly through leakage and/or recharge/discharge patterns related to local streams. Because Tinker is located in a recharge zone for the Central Oklahoma Aquifer both horizontal and vertical (downward) components of groundwater flow exist. Measured potentiometric levels from well clusters with screens and filter packs placed at varying depths within the lower saturated zone show that hydraulic heads decrease with depth and that the magnitude of the vertical component of flow varies with location. This is particularly important to recognize where data from these wells is being used to generate potentiometric contour maps.

Current (March 2015) potentiometric surface maps of the HWBZ, the USZ, the LSZ, and the LLSZ have been generated using over 1,200 existing monitoring wells and piezometers on Tinker AFB. Maps are presented as Figures 1-8 through 1-11; these maps are included in pockets at the end of this CSM document. These maps are revised each time that a Basewide Sampling and Water Level Measurements

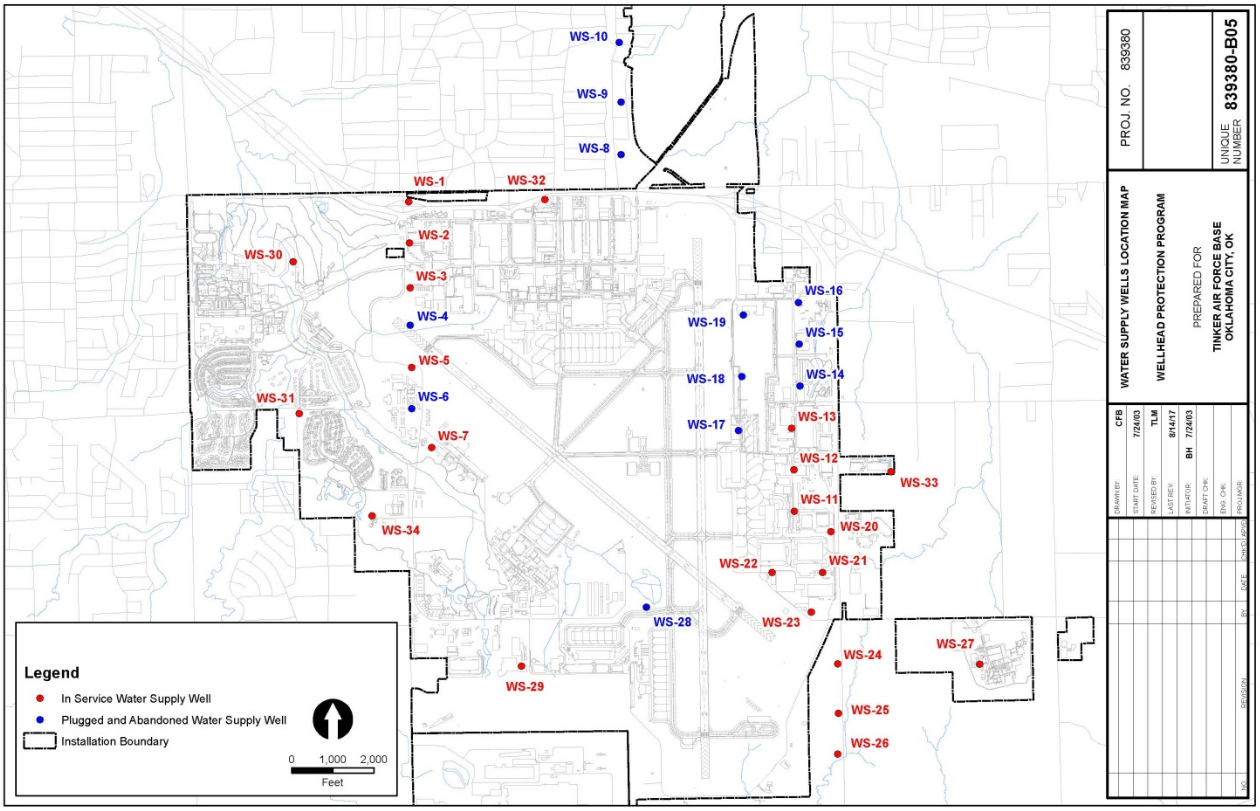


Figure 1-7 Tinker AFB Water Supply Wells

event is completed; maps can be compared over the years to help understand annual (and in some cases seasonal) variations in water levels in the different saturated zones. A PZ potentiometric map is not included since available well coverage in that zone is limited.

Although the variability in the geology and the recharge system at Tinker makes it difficult to predict local flow paths, Central Oklahoma Aquifer water table data taken from the 1992 U.S.G.S. Hydrologic Atlas shows that regional groundwater flow under Tinker varies from west/northwest to southwest depending on location. This is supported by contoured potentiometric data from base monitoring wells that show groundwater movement in the upper aquifer zones generally follows regional dip. On a simplified basis, evaluation of flow in each zone measured normal to potentiometric contours suggests that flow gradients range from 10 to 30 feet per mile. However, because flow in the near surface portions of the aquifer at Tinker are strongly influenced by topography, local stream base-levels, complex subsurface geology, location in a recharge area, and proximity to water supply wells, both direction and magnitude of groundwater movement is highly variable. The interaction of these factors not only influences regional flow but gives rise to complicated local, often transient, flow patterns at individual sites. Several examples demonstrate this variability. Historical water level data around Crutcho Creek indicates that groundwater flow in that area is predominantly to the southwest. However, during high flow conditions bank recharge occurs and shallow local flow patterns close to the creek may be reversed. This pattern is probably in effect at other streams as well. In the northeast quadrant of the base several factors contribute to groundwater "mounding" in the USZ and to formation of a groundwater high in the LSZ. This leads to radial or semi-radial groundwater flow at shallow depths. Finally, in the northeast part of the base where sufficient data exists, comparison of potentiometric contours from successively deeper levels in the LSZ suggests that groundwater flow directions may change with depth, gradually turning from west/southwest to northwest. This change in regional flow is attributed either to effects of pumping from local private water wells tapping the LSZ interval or domestic municipal water supply wells that possibly do the same and/or to the presence of the Deep Fork River located to the north. This river, along with the Canadian River south of Tinker, has been demonstrated by the U.S.G.S. to act as a major discharge point for regional ground water in Central Oklahoma.

4.0 SURFACE WATER BODIES

4.1 Streams/Creeks

The northern half of Tinker AFB is dissected by several tributaries of the North Canadian River; similarly, the southeastern part of the Base is dissected by tributaries of the Little River. A drainage divide crosses the southern part of the Base, separating these two drainage basins. Crutcho Creek, whose main branch originates off base to the southwest, is joined by two tributaries as it flows northward to the North Canadian River. Kuhlman Creek, which originates on Tinker, joins Crutcho Creek just north of the Tinker AFB property boundary, whereas Soldier Creek joins Crutcho Creek several miles north of the Base. Elm Creek and its tributaries is in the southeastern corner of Tinker AFB and drains south to Stanley Draper Lake and eventually to the Little River. Portions of Crutcho Creek and Kuhlman Creek are gaining streams and are perennial due to recharge from ground water. Surface water runoff channeled through ditches and diversion structures is the principal source of water to the numerous unnamed ephemeral streams that drain other portions of the Base. The main branch of Soldier Creek is an important surface water feature located east of Tinker AFB. The creek drains northward and has two main tributaries that drain from the Base: East Soldier Creek and West Soldier Creek. East Soldier Creek originates north of Building 3705 and flows northward on the east side of Building 3001 to the main branch of Soldier Creek. West Soldier Creek originates west of Building 3001 and flows northward toward the main branch of Soldier Creek. Base streams were surveyed in 2002 to provide both water elevation and base channel elevation data so that groundwater elevations could be directly compared to stream data.

The interaction of surface water with groundwater is an important factor in predicting local groundwater flow patterns at Tinker, and thus potential migration pathways for contaminated groundwater. Although no technical stream study data is presently available to determine what degree of interaction occurs between streams and groundwater, some qualitative observations provide clues to the importance of this system. The direction of stream flow on Tinker appears to be controlled largely by a topographic divide which extends from southwest to northeast across the south part of the base. Streams which originate on the north side of the divide flow to the north; these include Soldier Creek, Crutcho Creek, and Kuhlman Creek. Elm Creek which has its origin on the southeast side flows to the south. The four stream systems are labeled on Figures 1-8 through 1-11. Streams which flow northward become perennial before leaving the base. Crutcho and Kuhlman Creeks are considered to be recharged by the aquifer (gaining streams). East Soldier Creek probably gains much of its water from discharge from outfalls on base. Some data indicates however that these streams may become losing streams north of the base and may lose water to the aquifer. Information from wells and piezometers near the ponded section of Soldier Creek at the Industrial Waste Treatment Plant also suggests that the pond contributes to the groundwater (a losing stream) in the LSZ at that location. The elevation above mean sea level of the bottom of a portion of Soldier Creek tributaries near their headwaters off-base is higher than the groundwater. These stream segments flow only intermittently and probably recharge the aquifer through infiltration during periods of higher precipitation. Finally, where groundwater and stream elevations are the same, the observed direction of groundwater flow may be affected by transient factors such as bank storage from periods of increased precipitation.

Interaction between groundwater and surface water bodies occurs in several places, thus creating potential contaminant migration pathways. Locally, Crutcho Creek is recharged by HWBZ and USZ groundwater. Because of the low lateral mobility of groundwater within the HWBZ, discharge to surface water is small relative to the discharge in areas where creeks have eroded into the Garber Sandstone. Some surface discharge of the USZ groundwater into Crutcho Creek occurs where creeks have eroded into the top of the Garber Sandstone. Groundwater in the LSZ only discharges to one surface water body on Base or proximal to it, which is Soldier Creek, and only after it has exited the Base to the northeast.

Although water quality has degraded since pre-settlement times, the current quality of TAFB's surface waters is considered fair overall based on in-house biological diversity observations and weekly water quality monitoring. Tinker collects and analyzes water samples from all base creeks on a weekly basis. These samples are taken in order to monitor compliance with Oklahoma Water Quality Standards assigned to each creek. In addition to analytical monitoring, other conditions are noted at each creek outfall during each field visit including clarity, algae growth, odors, presence of foam, and presence of an oil sheen. All of these results and visual indicators are used to locate and eliminate illicit or harmful discharges.

Based on over a decade of creek sampling, and the lack of any contamination in Base ponds, it appears that the groundwater to surface water migration pathway for contaminated groundwater is either very limited or incomplete. All three primary perennial stream systems, Soldier Creek, Crutcho Creek, and Kuhlman Creek, as well as the ephemeral Elm Creek system, have been regularly monitored for COCs in the past, Crutcho Creek, Kuhlman Creek, and tributaries of Elm Creek under RCRA authority, and Soldier Creek under CERCLA (Operable Unit 2). On January 12, 2006, the ODEQ concurred with Tinker that no further water and sediment sampling at Crutcho, Kuhlman, and the tributaries of Elm Creek was warranted and that stream conditions at the Base boundaries can be determined by the National Pollutant Discharge Elimination System permit sampling program.

Soldier Creek has been regulated under Operable Unit 2 (OU-2) and Operable Unit 3 (OU-3) of the NPL site. OU-2 deals with sediment and surface water. In a letter dated August 9, 2004, EPA stated that there is no unacceptable risk to human health at Operable Unit 2 (Soldier Creek) sediment and surface water and that sampling could be discontinued. A Certificate for Remedial Action Complete was signed by the USEPA on January 19, 2006. The ODEQ also concurred with EPA's finding in a letter dated September 14, 2004. OU-3 deals with groundwater under the creek, mainly located north and east of the Base. No contaminants attributable to Tinker AFB were identified in groundwater during investigations between 1993 and 2007; No Further Action was the selected alternative, which was approved by the USEPA on January 9, 2008.

4.2 Ponds

There are 16 small man-made retention ponds and two detention basins located on TAFB. Named small surface water bodies on Tinker AFB include Beaver Pond, Redbud Pond, Prairie Pond, Primrose Pond, Woodduck Pond, Golf Course East Pond, Golf Course Central Pond, and Golf Course West Pond. Ponds are primarily maintained via precipitation and surface runoff. However, a comparison of potentiometric surface maps with bathymetric maps of these ponds suggests that six of them are probably fed, in part, by seepage from the HWBZ, which is not contaminated at Tinker. The six ponds include the westernmost Golf Course Pond as well as Prairie Pond, Woodduck Pond, Primrose Pond, Redbud Pond, and Beaver Pond. The Golf Course Central and East Ponds receive groundwater from the USZ, but these are located west of Crutcho Creek where groundwater in all zones is not contaminated. In the absence of seep and flow testing, it is not possible to quantify the extent to which groundwater feeds these ponds. Several ponds are used for recreational purposes, but this is restricted to fishing. Several ponds are stocked annually by the Base Natural Resources Management Office and the water is tested on a regular basis to ensure these waters are not contaminated.

5.0 MAN-MADE STRUCTURES

In the conceptual model of Tinker it is recognized that man-made features such as buried utilities (storm drains, waste lines) may further complicate the shallow groundwater picture. An additional problem encountered in generating the model involves improper monitoring well construction practices which not only may contribute preferred pathways for groundwater (and contaminant) movement where wells have multiple screens or overly long filter packs, but often provide non-representative, biased groundwater and sample data.

6.0 TOPOGRAPHY/SURFACE GEOLOGY

The topography of Oklahoma City and surrounding area varies from generally level to gently rolling in appearance. Local relief is primarily the result of dissection by erosional activity or stream channel development. At Oklahoma city, surface elevations are typically in the range of 1,070 to 1,400 feet MSL. Topography plays a role with respect to shallow groundwater flow patterns; the primary driver for groundwater flow direction is determined by geologic dip (generally westward) but there is an overprint related to topography, particularly as it relates to the HWBZ. Topography also controls creek geometry and flow as well as overland flow. A topographic map of the Base is included as Figure 1-12. Ground surface elevations range from 1,190 feet amsl near the northwest corner of Tinker AFB, where Crutcho Creek intersects the Base boundary, to approximately 1,320 feet amsl at site CG040, located roughly one mile east of the main base area at the intersection of S.E. 59th Street and Post Road.

Understanding the surface geology at the Base is also important as it provides clues to the location of more permeable geologic strata at ground surface, which can indicate areas where spills might migrate vertically downward more rapidly. At Tinker, this is somewhat modified by the presence of desiccation features that can provide temporary migration pathways even in finer grained geologic strata often assumed to act as a barrier to vertical migration, as described above under Local Hydrogeology. A generalized surface geologic map is provided as Figure 1-13.

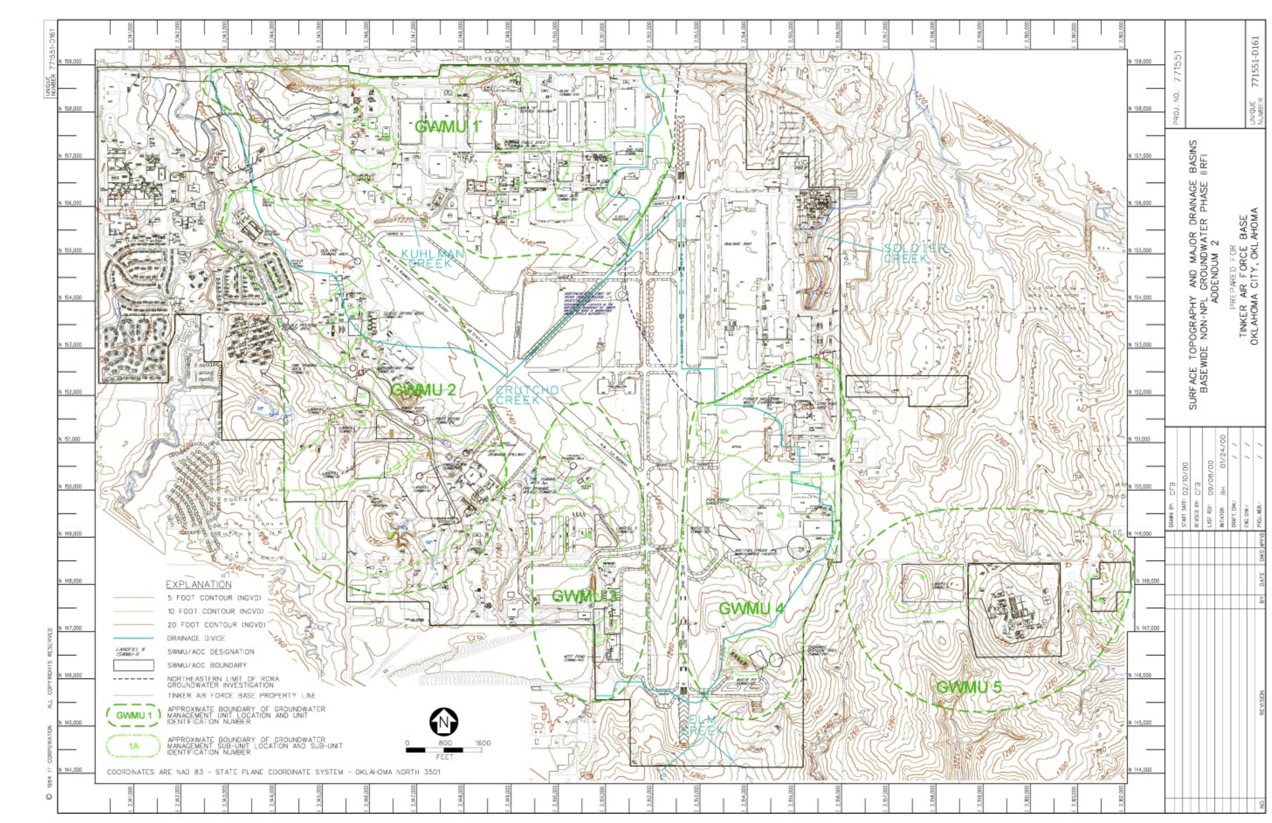


Figure 1-12 Topographic Map

7.0 CONTAMINATION OVERVIEW

Contamination is present at Tinker AFB in several media, including soil, groundwater and air. The general sampling history, and location for data for each medium, is given below. It should be noted that when investigations began at Tinker in the late 1980s, groundwater sampling included sample collection and analysis of an extensive array of analytes including VOCs and SVOCs, as well as RCRA metals, pesticides and PCBs and general chemistry parameters. Groundwater sampling has taken place via both the Basewide Sampling and Water Level Measurement program, ongoing since about 1994, and via specific site assessments and investigations. Additional specific sampling for radiological materials (Radium-226 and -228, Gross Alpha, Gross Beta) also occurred at sites where these materials were believed to have been disposed. Soil sampling also included the above constituents, although specific soil analytical methods were employed in their evaluation. Soil sampling generally has been performed on a site specific basis, although some general core soil data exists not related to a specific site evaluation.

Investigation of potential vapor issues was somewhat sporadic early on, mainly limited to certain buildings where either soil or groundwater contamination was found, but from 2009 through 2011 vapor intrusion potential was investigated at many buildings on Tinker where industrial practices have occurred or where other contamination has been detected, as well as in areas of housing. Two comprehensive RCRA Facility Assessment Reports for vapor intrusion were generated; each report focused on a separate portion of the Base.

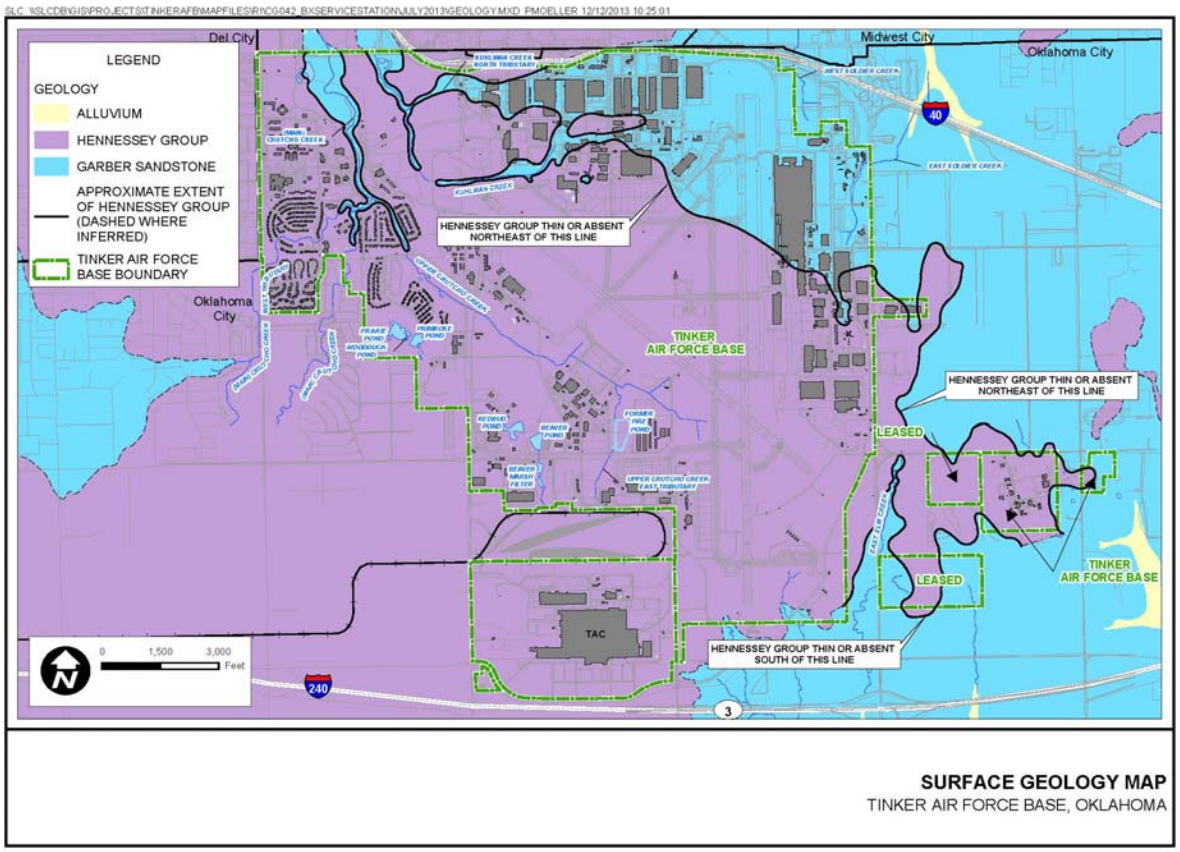


Figure 1-13 Surface Geology Map

The reports are *RCRA Facility Assessment Vapor Intrusion in Areas A and B on Tinker Air Force Base, Oklahoma (Parsons Engineering Science, Jan. 2011)* and *Final RCRA Facilities Assessment Report Phase I Soil Vapor Intrusion for Areas "C" and "D" Tinker Air Force Base, Oklahoma (CH2M HILL, Aug. 2010).*

The list of analytes required for sampling has undergone several alterations since sampling began. Pesticides and PCBs were dropped from required sampling in 2002. In the Groundwater Monitoring Schedule portion of the RCRA Facility Renewal Permit, dated Aug. 15, 2002, the ODEQ concurs with the Air Force's observations that PCB analysis may be suspended and that pesticide analyses may be reduced; there are no known historical sources for PCBs and there are no known recurring point sources for pesticides. Eventually, based on ODEQ concurrence with results from the Tinker Basewide sampling program, all sampling for pesticides and PCBs was curtailed. In addition, Permit language also indicated that radiological parameters, sampled in all Basewide wells in the past, could be restricted to wells associated with GWMU 2, CG038. However, since that time, no radiological hits have been detected and further sampling for these constituents has been dropped. Sampling for metals was also reduced based on the report *Draft Background Metals Concentrations in Groundwater, Tinker Air Force Base, Oklahoma (Jan. 1999)* as well as *Identification of the Sources of Elevated Chromium and Nickel Concentrations in*

Groundwater at Tinker Air Force Base (Feb. 2000). For example, a number of metals such as Barium, trivalent Chromium, and Arsenic have been found to be naturally occurring at high concentrations in local soils and are not attributable to Base industrial activities. Other metals species have been identified, but these are typically limited in concentration and extent. The result is that the current Basewide sampling program only evaluates total Chromium and hexavalent Chromium, as approved by the ODEQ via acceptance of ten years of Basewide sampling and report approvals.

7.1 Groundwater Contamination: The historical distribution, types, and concentrations of contaminants in groundwater are described in previous sections and in Attachment A of the current permit renewal application being submitted under separate cover. Note that Basewide contaminant isopleth maps for COCs are generated within each Basewide Sampling and Water Levels Report, which are regularly submitted to the ODEQ and the EPA. These maps are generally used to evaluate changes in plume extent or concentration across all GWMUs. They are not designed to fully characterize individual SWMUs or AOCs (accomplished via site specific investigations) but provide a template for ongoing and future evaluation of specific contaminated sites by providing a starting point to decide where data gaps may exist as well as a generic overview of possible COCs and concentrations of analytes. Basewide maps also provide a better understanding between sites being investigated, such as whether plumes from different areas are comingled.

7.2 Soil Contamination: Soil contamination is present at a number of sites; soil data has been collected at all sites and is outlined in site specific reports but is not normally included as part of the Basewide sampling program, which focuses on groundwater. A constituent or analyte profile similar to that for groundwater is present, although some additional analytes not found in groundwater also exist in soil. Soil contamination above screening levels has been found at a number of sites. On the other hand, at several sites where high concentrations of VOCs or fuel are found in the groundwater, little or no soil contamination is present. This includes Fire Training Area 2 for example, where TCE has been present in groundwater at part per million concentrations, but the ODEQ concurred on October 23, 2000, that further corrective action for soils at Fire Training Area 2 is not warranted since no concentrations above action levels were detected during Phase I and Phase II site RFIs. From a conceptual site standpoint, it must be remembered that shallow soils (down to about 30 feet) can be impacted by desiccation cracks, particularly during summer months; these are widespread at Tinker. These features can allow rapid migration of liquid contaminants to deeper zones, can help 'aerate' shallow soils, thus degrading volatile organics, or can help flush contaminants to deeper zones during heavy rainfall events. It is speculated that these process have, over time, eliminated much near surface soil contamination since most source events probably occurred prior to the mid-1970s before waste and clean-up regulations were instituted.

7.3 Vapor Contamination (Air): The primary sources of potential VI are the shallow vadose zone and the underlying uppermost saturated zone. USZ groundwater data collected under the BWGW program are used as one of the criteria for the investigation of shallow soil gas contaminants at occupied buildings. The USZ groundwater data are useful in characterizing the subsurface conditions beneath and near a building. Chlorinated hydrocarbons and petroleum hydrocarbon chemicals are the primary groundwater plumes investigated and monitored. Because of the shallow depths (approximately 5 – 20 ft bgs) of the USZ in many areas, groundwater could contribute to potential VI into overlying buildings. Therefore, chlorinated hydrocarbons and petroleum hydrocarbons are considered COPCs for vapor investigations.

Vadose zone chemicals are not as well defined beneath and near some of the buildings. Impacts to the vadose zone may have occurred due to undocumented or unknown releases from 1) industrial operations and/or processes, and 2) hazardous waste storage and disposal systems in the subsurface. Due to tight shallow lithologies preventing downward migration under buildings where desiccation cracks are unlikely, and where shallow more permeable sandstone units are not present, groundwater impacts beneath or near buildings may be minor or insignificant. As a result of these tight lithologies, contaminants may be "trapped" in the vadose zone and contributing to potential VI into overlying buildings.

The types and concentrations of vapor contamination are presented in the above two listed RCRA Facility Assessment Reports. Vapor constituents are generally reflective of soil and groundwater contamination, and therefore the types of analytes expected are the same with some additions. As of 2010, just prior to the preliminary investigation and screening of vapor issues on Base, the ODEQ, had deferred to USEPA's 2002 draft guidance on VI. For Areas A and B, site-specific sampling results provide a comparison of the data with soil gas-to-indoor air screening levels derived from USEPA's 2010 RSLs for indoor air. The screening level assessment of the sampling data was performed to eliminate those sites from further response action where the data indicates there is no potential threat to human health, and to identify and prioritize sites that should be considered for further response action. The near-slab and sub-slab soil gas sample results were combined and used to complete a screening level assessment for all 86 sites in Areas A and B where samples could be obtained. Either industrial or residential screening values were used as appropriate. For areas C and D the initial screening phase was used to prioritize buildings for additional sampling and assessment. Soil gas VI SLs were used when evaluating exterior soil gas results. Soil gas SLs were calculated for USEPA TO-15 target analytes using USEPA 2009 Regional Screening Levels (RSLs) for air adjusted by the USEPA 2002 default attenuation factor (AF) of 1e-01 for shallow soil gas-to-indoor air. (However, all future VI screenings will be done in accordance with the June 2015 VI Guidance and the new attention factor as noted below for the child care facility). SLs were calculated for industrial and residential receptors. For this project, industrial receptor values were used at all of the buildings which had detected chemical concentrations in the shallow soil gas samples. The child care facility at the north end of Area "C" would have used residential screening levels; however, only acetone and Freon-12 (dichlorodifluoromethane) were detected above the laboratory detection limit (MDL) but below the laboratory reporting limit (RL) were in soil gas samples collected at this building so no screening was done.

In June 2015, EPA published *the OSWER Technical Guide for Assessing and Mitigating the Vapor Intrusion Pathway from Subsurface Vapor Sources to Indoor Air*. Because of updated guidance, and since the time of initial data collection and screening efforts at Tinker AFB, the vapor data at the child care facility has been re-screened against updated RSL tables. New RSL tables were generated in June 2017. This post-dates the original screening efforts and therefore collected data at the child care facility has been re-screened to meet current requirements for this sensitive site.

Results of re-screening are that for acetone, the highest reported value is 25F ug/m^3 (F being the qualifier for below the RL). The 2010 report used an SL of 320,000 ug/m^3 after using an attenuation factor (AF)of 0.1. The June 2017 RSL for acetone has not changed, so using an AF of 0.1 gives the same screening value. For Freon-12, the highest reported value is 16F ug/m^3. The 2010 report used an SL of 2,100 ug/m^3 and an AF of 0.1. The June 2017 RSL for Freon-12 has been reduced, and the current value is 1,000 ug/m^3 using an AF of 0.1. A target cancer risk (TR) of 1E-06 and a target hazard quotient of 1.0 were used. Since the ODEQ allows a TR of 1E-05, the RSL would be an order of magnitude higher. The analysis shows that the collected data is below the 2017 RSLs. Note that if the EPA allowable AF of 0.03 were used, the resulting RSL would be three times higher than that used here.

The majority of the analytical data are measurements of soil gas concentrations; however, groundwater was also sampled and analyzed as an additional line of evidence. The following summarizes findings from the two soil vapor assessment reports and indicates whether industrial or residential screening levels were applied:

Area A (Industrial): Of 31 VOCs detected in Area A, only Benzene, Chloroform, and Tetrachloroethene exceeded industrial screening levels.

Area B (Non-Residential): Of 28 VOCs and methane detected in near-slab soil gas samples, only Benzene, Chloroform, and Ethylbenzene exceeded industrial screening levels.

Area B (Residential): Of 30 VOCs and methane detected, the following exceeded residential screening values – Benzene, Chloroform,, chloromethane, 1,2-Dibromoethane, Ethylbenzene, Tetrachloroethene, and Trichloroethene.

Area C (Industrial) and Area D (Industrial): Included nine distinct sampling areas. Primary chemicals detected above industrial screening levels include Tetrachloroethene, Trichloroethene, Vinyl Chloride, Benzene, Ethylbenzene, Xylene, and Chloroform. Additional chemicals were detected but at fewer locations.

7.4 CONTAMINATED GROUNDWATER MANAGEMENT UNITS and NPL Site

The following text provides additional detailed information regarding the four Contaminated Groundwater Management Units (CGMUs) at the base known as AF sites CG037, CG038, CG039, and CG040. These areas have also been designated as Installation Restoration Program (IRP) sites by the Air Force (AF). At each unit, certain sentinel wells located at or near the base fence line are showing current, or have shown past, groundwater contamination at levels above the MCL. The four CGs do not fully cover all contaminated sites on Tinker AFB, but address issues at most of the non-NPL sites (the NPL Site is located in the northeast quadrant of the Base). The only additional sites not covered by CGMUs are Landfill 6 and the Industrial Waste Treatment Plant (IWTP) soils, also designated as SWMU 01 and SWMU 24; both fall under RCRA authority. Landfill 6 has been investigated and does not pose a significant threat to human health or the environment; the IWTP has been partly excavated and remediated. Note that the CGMUs include most surface water bodies except Soldier Creek, which falls under CERCLA. A conceptual block diagram for each of the four contaminated groundwater management (IRP) sites and the NPL Site is presented at the end of each site description in this section.

7.4.1 CONTAMINATED GROUNDWATER MANAGEMENT UNIT CG037

CG037 is located in the northwestern and northcentral quadrant of Tinker AFB. This site was created to address groundwater in this vicinity by grouping an area with separate or commingled plumes into one administrative and regulatory unit. CG037 includes two groundwater management units (GWMUs), GWMUs 1 and 2, and multiple groundwater management subunits (GWMSUs). GWMU 1 includes GWMSUs 1A, 1B, 1C, 1D, 1E, 1F, and 1G; GWMSU 2 includes GWMSUs 2A, 2B, and 2C. CVOC contamination occurs to a significant extent at CG037 in only the upper saturated zone (USZ) and lower saturated zone (LSZ). Note that CG037 has been expanded geographically over time to include additional contaminated sites in the north part of the Base.

The chemicals of potential concern (COPCs) for CG037 that have the greatest impact are tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (DCE), vinyl chloride (VC), and 1,2-dichloroethane

(DCA). These COPCs are present in groundwater at GWMSUs 1A, 1C, and 1D, and GWMSU 2B. Other VOCs (including CVOCs and/or fuel-related chemicals) are also found in groundwater at some of these areas, usually in smaller or isolated areas with concentrations above their respective MCLs. Furthermore, total petroleum hydrocarbons (TPH), diesel range organics (DRO), and gasoline range organics (GRO) were present at concentrations above the ODEQ (2012) Tier 1 cleanup levels in groundwater at ST033 (GWMSU 1A) and ST007 (GWMSU 1C). A brief, and very generalized, overview of the extent of the COPCs by aquifer zone is provided in the following paragraphs; please note that data is representative of early sampling and data do not necessarily reflect current plume status as this is changing as additional remediation is occurring.

USZ: Five CVOCs were identified as COPCs in the USZ at CG037: PCE, TCE, cis-1,2-DCE, VC, and 1,2-DCA. From 1999 through 2009, 2,319 groundwater samples collected from the USZ within CG037 had a detection of one or more COPCs, with 44.3 percent of these samples having a concentration that exceeded the MCL for one or more of the respective COPCs. The extent of TCE contamination in the USZ far exceeds the extent of other contamination identified at CG037. TCE contamination in the USZ far exceeds the extent of other contamination identified at CG037.

LSZ and LLSZ*:* TCE and cis-1,2-DCE were identified in 2004 as COPCs for the LSZ at CG037 (Parsons, 2004), and a review of historical data indicates that the 2004 list of COPCs is still appropriate for the site. From 1999 through 2009, 1,105 groundwater samples collected from the LSZ in CG037 had a detection of one or more COPCs, with 60.9 percent of these samples having concentrations that exceeded the MCL for one or more of the respective COPCs. TCE was the only contaminant identified as a COPC for the LLSZ. From 1999 to 2009, 243 samples from the LLSZ had a detection of TCE, with 23.4 percent of these samples having a concentration above the MCL.

Potential sources of chlorinated compounds include vehicle maintenance activities (GWMU 1B and 1F areas), the base laundry (GWMU 1B), a waste oil tank (GWMU 1B area), sludge drying beds (GWMU 2A), fire training activities (GWMU 2B and 2C), aircraft maintenance and storage (GWMU 2B), and vehicle maintenance (GWMU 2B) and potential leaks in sewer and storm sewer line. Locations of the chlorinated plumes generally correspond to the identified chlorinated compound source areas. The total chlorinated hydrocarbon maps depict the sum concentration of the following compounds: chloroform; carbon tetrachloride (CT); chloroethane; 1,1,1-trichloroethane (TCA); tetrachloroethene (PCE); 1,1,2,2,-tetrachloroethane; TCE; 1,1,2-TCA; 1,1-dichloroethane (DCA); VC; 1,1-DCE; *cis*-1,2-DCE; 1,2,-DCA; and *trans*-1,2-DCE.

Based on the results from early basewide monitoring events, the chlorinated compounds in groundwater with relatively wide areal distribution at GWMU 1 and GWMU 2 include TCE; *cis*-1,2-DCE; 1,2-DCA; PCE; CT; and VC. TCE is the chlorinated compound most frequently detected in groundwater samples from the USZ and LSZ.

BTEX plumes have been identified in both the USZ and the LSZ at GWMU 1, but in the USZ only in the GWMU 2 area. The highest total BTEX concentration [607 micrograms per liter (ug/L)] within the USZ at GWMU 1 was detected at well MW-15, located at the northern boundary of Site CG037. Within the GWMU 1B area plume, the maximum total BTEX concentration (367ug/L) in the USZ was detected at well 2-246. The highest total BTEX concentration (8,706 ug/L) in the LSZ in the GWMU 1 area was detected at well 2-251R, also located within GWMU 1B.

Within the USZ at the GWMU 2 area, the highest total BTEX concentration (81.4ug/L) was detected at well 2-67A located in the GWMU 2A area. BTEX compounds were detected at low or estimated concentrations in the USZ within the GWMU 2B and 2C areas. BTEX compounds were not detected in the LSZ within the GWMU 2 area.

GWMU 1 – USZ:

PCE was detected in samples collected from USZ wells (2-372 and 2-166B) in the GWMU 1 area at concentrations of 2.1 to 3.6µg/L. TCE was detected in samples collected from USZ wells at GWMU 1 at concentrations ranging from 0.7J to 1,200µg/L. *Cis*-1,2-DCE was detected in groundwater samples collected from USZ wells in the GWMU 1 area at a maximum concentration of 350µg/L (well 2-370B). As noted above, the highest TCE concentration in GWMU 1 also was detected in this well. With this exception, the *cis*-1,2-DCE concentration in the USZ at GWMU 1 ranged from 3 to 10ug/L. The compound 1,2-DCA was detected in USZ wells and ranged in concentration from 1.1 to 28ug/L in the GWMU 1 area. The highest concentration was detected at well 2-245 located near the middle of GWMU 1B. Similar to TCE and *cis*-1,2-DCE, 1,2-DCA was not detected in USZ groundwater in GWMU 1F. Benzene was detected in USZ wells sampled as part of the basewide monitoring in the GWMU 1 area at concentrations ranging from 1 to 310 µg/L. Vinyl Chloride was detected at a concentration of 2.1ug/L in USZ well 2-370B. Carbon Tetrachloride (CT) was detected during the basewide monitoring in samples collected from USZ well in the GWMU 1 area, with concentrations ranging from 7.9 to 41µg/L. The highest CT concentration was detected west of the GWMU 1B area, and south of the GWMU 1F area.

GWMU 1 – LSZ/LLSZ:

PCE was detected in LSZ wells in the GWMU 1 area at concentrations ranging from 0.8J to 34 µg/L. PCE was detected in the GWMU 1B area only; PCE was not detected in LSZ wells in the GWMU 1F area. TCE was detected in samples collected LSZ wells at GWMU 1 at concentrations ranging from 1.6 to 1,100 µg/L. The highest concentration of TCE was detected in a sample collected from well 2-251R located within GWMU 1B. TCE was not detected in the LSZ at GWMU 1F. *Cis*-1,2-DCE was detected in samples collected from LSZ wells at GWMU 1 at concentrations ranging from 1 to 59 µg/L. VC was not detected in the LSZ in the GWMU 1 area. Benzene was detected in LSZ wells in the GWMU 1 area at a concentrations ranging from 1.5 to 8,600 µg/L. Benzene was detected in the LSZ in the GWMU 1B area only; with the highest benzene concentration detected at well 2-251R. The highest concentration of cis-1,2 DCE in the LSZ at GWMU 1 was also detected at this well. The compound 1,2-DCA was detected at concentrations ranging from 2.7 to 140ug/L in LSZ wells in the GWMU 1 area. The 1,2-DCA plume in the LSZ is within the GWMU 1B area; this compound was not detected at GWMU 1F.

GWMU 2 – USZ:

PCE was detected in samples collected from USZ wells at GWMU 2 at concentrations ranging from 0.5J to 96 µg/L. The highest PCE concentration was detected in a groundwater sample collected from well 62 located at GWMU 2C near the Supernatant Pond and Fire Training Area 1. TCE was detected in samples collected from USZ wells at GWMU 2 at concentrations ranging from 0.6J to 940 µg/L. The highest TCE concentrations (940 and 890 µg/L) were detected in samples collected from wells 2-348B and 2-280B, located within the northwest portion the GWMU 2B area. A relatively high TCE concentration (640ug/L) also was detected at GWMU 2B well 2-144B, located approximately 500 feet west and hydraulically downgradient of the Old Fire Training Area. TCE also was detected in the GWMU 2A and 2C areas near the Sludge Drying Beds, the AOC-Old Pesticide Storage Area, Fire Training Area 1, and the Supernatant Pond. *Cis*-1,2-

DCE was detected in samples from USZ wells at GWMU 2 at concentrations ranging from 0.6J to 540 µg/L. The highest concentration of *cis*-1,2-DCE was detected at well 2-20B located within GWMU 2C. A relatively high *cis*-1,2-DCE concentration (270ug/L) also was detected at well 2-144B located east and downgradient of the Old Fire Training Area, within GWMU 2B. The analyte 1,2-DCA was detected in samples from USZ wells in the GMMU 2 area. The highest 1,2-DCA concentrations were detected at wells 2-144B (840ug/L) and 2-409B (630ug/L), located within GWMU 2B west and southwest of the Old Fire Training Area. Carbon Tetrachloride was detected in sampled from USZ wells in GWMU 2. The highest CT concentration (450ug/L) was detected in a groundwater sample collected from GWMU 2A area. The maximum CT concentration detected in the GWMU 2B area was 38ug/L. CT was not detected in GWMU 2C. Benzene was detected in samples collected from USZ wells at GWMU 2 at concentrations ranging from 0.5J to 71µg/L. The highest benzene concentration was detected in a groundwater sample collected from well 2-67A. Vinyl Chloride was detected in USZ wells at GWMU 2. VC concentrations ranged from 0.7 J to 87ug/L, with the highest VC detected at wells 2-20B located within GWMU 2C. VC was also detected at relatively lower concentrations within the USZ at GWMU 2A and GWMU 2B. It is important to note that levels of VC do not appear to be migrating beyond the areas containing cis 1,2-DCE. This indicates that VC may be undergoing biological oxidation in the areas outside of anaerobic source areas.

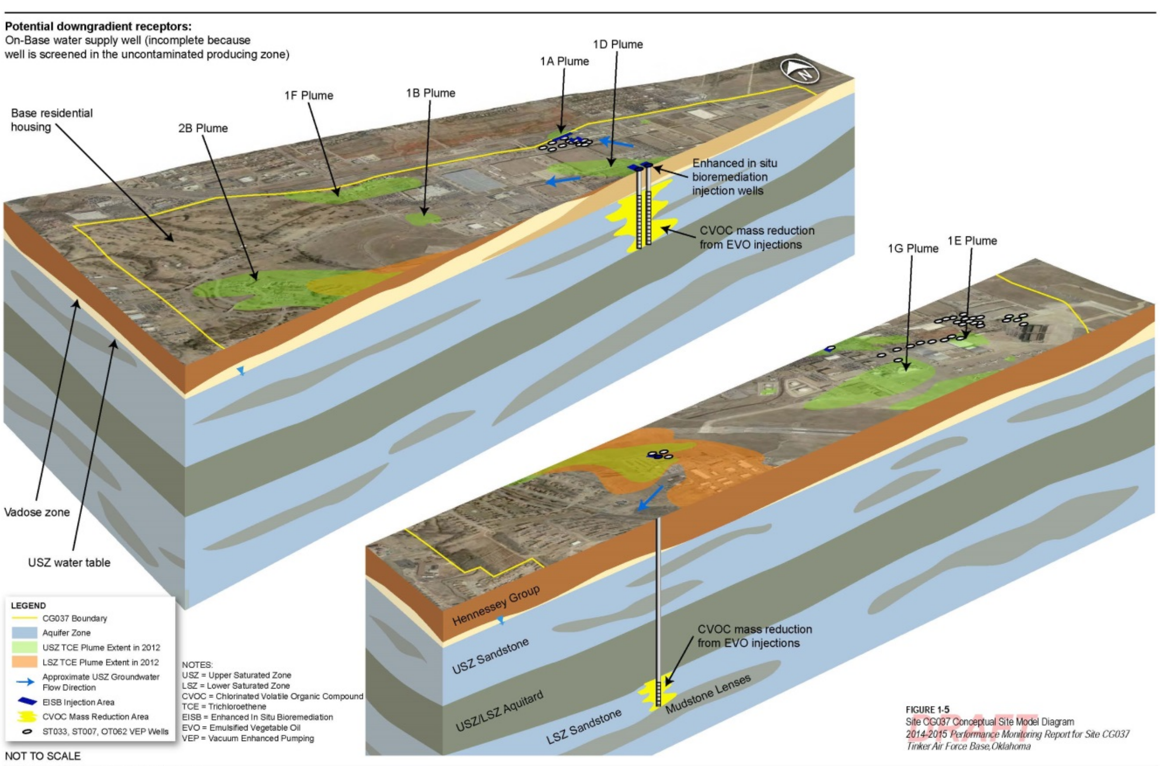
GWMU 2 – LSZ/LLSZ:

Tetrachloroethene was detected in samples collected from LSZ wells at GWMU 2 at concentrations ranging from 0.7J to 7.2µg/L. This compound was detected in wells located within GWMU 2A and 2B. TCE was detected in samples collected from LSZ wells at GWMU 2 at concentrations ranging from 0.3 to 2,400µg/L. The highest concentrations of TCE were detected in groundwater samples collected from monitoring wells 2-328A (2,400ug/L), 2-144A (710ug/L), 2-351A (610ug/L), and 2-284A (580ug/L) located within GWMU 2B. C*is*-1,2-DCE was detected in samples collected from LSZ wells in the GWMU 2 area at concentrations ranging from 5.1 to 71µg/L. The highest concentration of *cis*-1,2-DCE was detected in a sample collected from well 2-328A located near the Old Fire Training area within GWMU 2B. *Cis*-1,2-DCE concentrations at other wells in the GWMU-2 area did not exceed 23ug/L and were concentrated in GWMU 2A area. 1,2-DCA was detected in samples from LSZ wells in the GMMU 2 area. The highest 1,2-DCA concentration (800ug/L) was detected at well 2-398A, located within GWMU 2A, approximately 400 feet north of the Sludge Drying Beds. Carbon Tetrachloride was detected in samples from LSZ wells at GWMU 2. The highest CT concentration (270ug/L) was detected in a groundwater sample collected from GWMU 2A area near the Sludge Drying Beds. The maximum CT concentration detected in the GWMU 2B area was 220 ug/L. CT was not detected in LSZ wells located in GWMU 2C. Benzene was detected in only a single LSZ well at GWMU 2 at an estimated concentration of 0.6 ug/L.

The Area A Service Station site, also referred to as AF Site ST033, is located within Contaminated Groundwater Management Unit CG037, which covers much of the west-central part of the base. The boundary of CG037 was recently expanded to include VEP treatment systems used for groundwater and soil treatment, including the system at the Area A Service Station. Because many of the potential sources in CG037 are proximate, linking a contaminant plume to a specific source is difficult. The CG037 management unit was created to address groundwater in this portion of the base as a whole because of the presence of commingled plumes and the proximity of sources. The area encompassed by CG037 was previously subdivided into two groundwater management units (GWMUs) and multiple groundwater management subunits (GWMSUs) generally representing individual plumes. The Area A Service Station groundwater plume for example is synonymous with GWMSU 1A. The relationship of CGMUs and GWMUs is more fully described in Section 10.5.4.

This former service station, which is one block east of the Eaker Gate at the intersection of 5th Street and Avenue E, is located in the north part of CG037 at the north end of the base. The site served as a military vehicle fueling and repair station from 1942 to 1990. Leaded and unleaded gasoline, along with diesel fuel, was stored in four underground storage tanks (USTs) on site, each of which was suspected of leaking at various times. Because solvents have also been noted at the site, it is suspected that one or more tanks may have stored solvents for some period of time. The USTs were removed in 1996.

The Area A site was originally designated as a UST fuel site (Facility No. 55-08120, OCC Case No. 064-VS/Area A) under the Oklahoma Corporation Commission (OCC). Case Number 064-VS/Area A was closed by the OCC in a letter dated December 18, 2000 and fuel is no longer a concern at the site. TCE in the USZ at the fence line sentinel well (2-166B) has dropped below the MCL in the latest sampling round (2016) but concentrations on Base in the LSZ remain at up to 30 times the MCL, although this portion of the plume does not appear to have reached the base boundary at concentrations approaching the MCL. The most current analytical data shows that TCE in compliance wells is non-detect for the USZ (well 2-165B) and 0.25J ug/L in the LSZ (well 2-149A).



CG037 Conceptual Block Diagram

7.4.2 CONTAMINATED GROUNDWATER MANAGEMENT UNIT CG038

Contaminated Groundwater Management Unit 38 (CG038), also known as AF Site CG038, is located in the southwest quadrant of Tinker AFB and contains Groundwater Management Subunits (GWMSUs) 2D, 2E, and 2F. Analytical results from early investigations indicated the presence of two large plumes in the area consisting of VOCs [primarily trichloroethene (TCE); *cis*-1,2-dichloroethene (*cis*-1,2-DCE); and vinyl chloride (VC)] situated in the Upper Saturated Zone (USZ). The VOC plumes were designated as the 2D plume and the 2E plume because, at the time, only these two plumes had been identified within this portion of the newly designated GWMU 2. However, results from subsequent groundwater monitoring indicated the presence of a third plume of solvent-contaminated groundwater, referred to as the 2F plume, situated between the 2D and 2E plumes. In addition to chlorinated solvents, high concentrations of hexavalent chromium [Cr(VI)] were identified in USZ groundwater in GWMSUs 2E and 2F. The 2E hexavalent chromium plume has not reached the point of compliance at CG038, but the hexavalent chromium plume and the VOC plume designated as 2F have reached the point of compliance, but this plume is being addressed by injection of EVO, which will also reduce hexavalent chromium to less toxic trivalent chromium. The solvent plumes 2D and 2E were identified around 1996 as having migrated off-base at levels above the maximum contaminant level for drinking water (MCL) at the site. No contamination in deeper groundwater zones such as the LSZ/LLSZ or PZ has been found at CG038. A brief, and quite generalized, overview of the extent of the COPCs by aquifer zone is provided in the following paragraphs; please note that data is representative of early sampling and data do not necessarily reflect current plume status as this is changing as additional remediation is occurring. Note also that all landfills in this CGMU have RCRA compliant caps.

Remedial actions at Site CG038 are focused on the USZ, which exists between the overlying Hennessey water-bearing zone (HWBZ) and the underlying lower saturated zone (LSZ). The HWBZ and the LSZ/lower-lower saturated zone (LLSZ) are not targeted for active corrective measures due to low average groundwater flow velocities and no concentrations above action levels (in the HWBZ) and low concentrations and isolated occurrences of groundwater contaminants (in the LSZ/LLSZ). The USZ demonstrates significant concentrations of chemicals of concern, with chlorinated volatile organic compounds (CVOCs) historically the most frequently detected compounds in USZ groundwater in GWMSUs 2D and 2E. Since the corrective measures study was prepared in 2004, hexavalent chromium [Cr(VI)] and CVOC plumes have been detected in the USZ in the area between GWMSUs 2D and 2E. These plumes were designated as GWMSU 2F in 2008.

The extent of trichloroethylene (TCE) contamination in the USZ within Site CG038 is generally representative of the extent of CVOC contamination in GWMSUs 2D, 2E, and 2F, with a few exceptions: cis-1,2-DCE was detected at off-base monitoring well 2-333B above the maximum contaminant level (MCL) of 70 micrograms per liter (µg/L) in the past (but is now below the MCL), and the concentration and extent of the USZ TCE plume does not reflect the elevated concentrations of cis-1,2-DCE and VC detected in the vicinity of well 2-259B or in the area downgradient from the permeable reactive barrier (PRB) within GWMSU 2D.

2D Plume:

TCE: The GWMSU 2D TCE plume extends from downgradient of well 2-485B on the northeastern end of the plume to the PRB located just inside the Base boundary on the southwestern end of the plume. The plume begins downgradient of Landfill 3 and appears to originate in the vicinity of the former sludge pit.

In May 1988, the U.S. Corps of Engineers (USACE) drilled a series of borings at Landfill 3 to help determine the boundary of the sludge pit. TCE was detected in soil samples collected from three borings located along the north-south axis of the sludge pit at concentrations ranging from 3,000 mg/kg to over 6,000 mg/kg. In addition, soil samples collected at boring L3-2 exhibited the highest concentrations of *trans*-1,2-DCE and VC detected in all soil samples. A groundwater sample collected from well 2-259B, installed in 2001 and located south of the sludge pit, showed a 2.7-µg/L concentration in 2007 but originally had a concentration of 97 µg/L in 2001. The GWMSU 2D TCE plume extends beneath and downgradient from Landfill 4, although due to the thickness of the Hennessey Group waste disposed in trenches in Landfill 4 probably do not contribute to the GWMSU 2D TCE plume. Higher TCE concentrations in groundwater up-gradient from the Landfill 4 sludge land-farming area and sludge pit areas suggest that the sludge pit in Landfill 3 is the primary source of the 2D plume. Landfill 3 trenches may also be a source of VOCs.

***Cis*-1,2-DCE.:** Elevated concentrations of *cis*-1,2-DCE occur in GWMSU 2D groundwater and are currently mapped as a plume extending approximately 1,400 ft from monitoring well 2-485B (110 µg/L in January 2008) on the northern edge of Landfill 2 to well 11A (66 µg/L in January 2008), located west of Landfill 4. The highest concentration of *cis*-1,2-DCE recently observed in GWMSU 2D groundwater occurred in a sample collected from well 2-259B in January 2008 [51,000 µg/L (estimated)]. This well is located approximately 75 ft south of the Landfill 3 sludge pit.

VC: VC is mapped in GWMSU 2D as a plume extending approximately 2,000 ft from well 2-485 (100 µg/L in January 2008) southwest to extraction well EX-B02 [0.79 µg/L (estimated) in March 2008]. The core of the VC contamination is centered around well 2-259B, where it was detected at a concentration of 76,000 µg/L (estimated) in the sample collected in January 2008.

Cis-1,2-DCE and VC are believed to be daughter products of the degradation of TCE originally located in the Landfill 3 sludge pit. At the close of a low-temperature thermal desorption pilot test in 1989, the USACE placed all the treated and untreated soils back into the pit; the landfill was later covered by a RCRA cap. In taking these steps, a “bioreactor” was created mixing TCE and hydrocarbons and resulting in a decrease of TCE with a concomitant rise in *cis*-1,2-DCE and VC concentrations, which migrated from the pit area.

2E Plume:

TCE: The northeastern extent of the 2E plume is broad (roughly 1,350 ft wide) and partially underlies the Former Drum Storage Area. The plume narrows to approximately 550 ft in the vicinity of the Former Re-Drumming Area and then broadens again to as much as 2,100 ft across the southwestern portion of the plume. Thus, the plume is mapped in somewhat of a bow tie or hourglass shape. High concentrations of TCE occur in groundwater underlying the Former Re-Drumming Area (1,100 µg/L at well 2-512B in 2007) and Redbud Pond (940 µg/L at well 2-520B in 2007). The southwestern extent of the plume is well defined by a number of monitoring and extraction wells located near the Base boundary. The pinched appearance at the middle of the 2E plume may reflect the presence of preferred pathways and/or the presence of a slight groundwater high in the USZ caused by shallow groundwater seeping downward from the HWBZ (from Redbud Pond), which acts to divert the flow of contaminated USZ groundwater to the north. Original concentrations of up to 30,000 µg/L of TCE observed at the Former Re-Drumming Area (detected in monitoring well 2-466B on January 11, 2003) had been reduced to 210 µg/L by January 3, 2008 through injection of potassium permanganate during an ISCO pilot test completed in January 2003. Concentrations of 1,2-dichloroethane (DCA) were reduced from 810 µg/L to levels below the detection limit (1 µg/L). PCE; *cis*-1,2-DCE; and VC were generally detected at low levels prior to the injection and are currently detected at concentrations below the maximum contaminant levels (MCLs).

***Cis*-1,2-DCE:** There are two primary areas of *cis*-1,2-DCE contamination present in GWMSU 2E. One area is located east of Landfill 2 and extends to the southwest beneath the landfill cap. The southwestern portion of the plume partially underlies the Former Re-Drumming Area. The maximum concentration of *cis*-1,2-DCE most recently detected in this area of contamination occurred in monitoring well 2-443B (270 µg/L in January 2009). A broad front of *cis*-1,2-DCE contamination is present west of Redbud Pond, extending further west to the Base boundary. The downgradient portion of the plume extends from well 2-294B (*cis*-1,2-DCE detected at a concentration of 150 µg/L in October 2008) to extraction well EX-A10 (110 µg/L in December 2008). Smaller areas of *cis*-1,2-DCE contamination are present around monitoring wells 2-521B and 59B. The *cis*-1,2-DCE plume currently extends off-Base at concentrations below the MCL (70 µg/L); the *cis*-1,2-DCE concentration at well 2-333B was 210 µg/L in 2001, but has shown a steady decline since approximately 2002, with a sample collected at 2-333B having a concentration of 55 µg/L. These results indicate plume containment by the existing extraction well network.

VC: As mapped, VC is present in GWMSU 2E as a continuous plume extending southwest from monitoring well 2-131A (5.3 µg/L in December 2008), which is located just east of landfill 2 along Reserve Road near Building 1031, to the Base boundary (approximately 2,700 ft). The highest concentration of VC is seen in wells 2-214A (34 µg/L) and 2-215A [34 µg/L (estimated)]. Both wells were sampled in November 2008. An elevated concentration of VC in groundwater was also observed in the sample collected from well 2-443B in January 2009 (32µg/L). VC was also detected at a concentration of 4µg/L (estimated) in a groundwater sample collected from well 60B in November 2005. The existing remedial system appears to be continuing to prevent migration of VC above MCLs (2 µg/L) to off-Base areas.

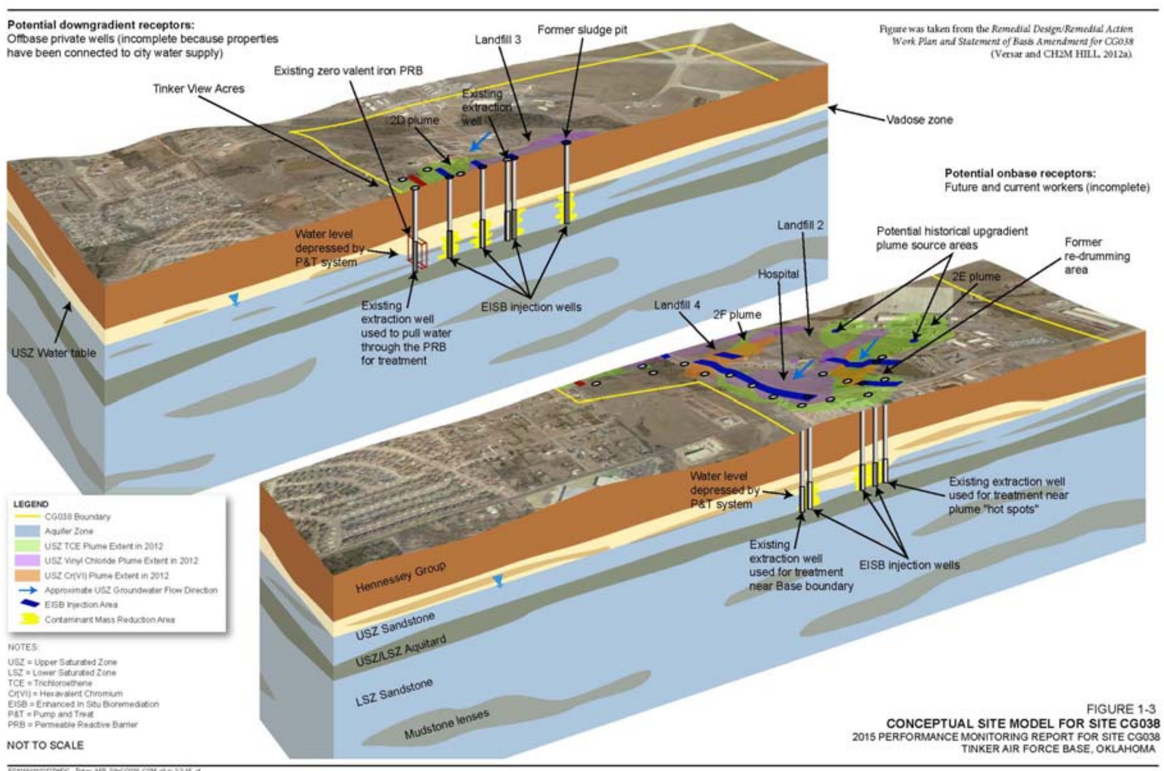
The northeastern (i.e., up-gradient) extent of the GWMSU 2E TCE plume partially underlies a former drum storage area. The plume narrows downgradient (in the vicinity of the former re-drumming area) and then broadens again across the southwestern portion of the plume. The southwestern edge of the GWMSU 2E TCE plume is well defined by a number of monitoring and extraction wells located near the Base boundary. The pinched appearance in the middle of the historical GWMSU 2E TCE plume may reflect the presence of preferred pathways and/or the presence of a slight groundwater high in the USZ caused by shallow groundwater seeping downward from the HWBZ (from Redbud Pond), which acts to divert the flow of contaminated USZ groundwater to the north, as documented in the 2010 *Contract Summary Report CG038 Remedial Process Optimization Upper Saturated Zone Volatile Organic Compound Plumes*.

2F Plume:

The GWMSU 2F TCE plume is smaller than the others and extends from the north-central portion of Landfill 2 to just beyond the southern boundary of Landfill 4. The highest TCE concentrations within GWMSU 2F have been detected in the north-central portion of Landfill 2. The 2F TCE plume extends from the north-central portion of Landfill 2 to just beyond the southern boundary of Landfill 4. This plume shows a more northeast-southwest alignment than the 2D plume and extends roughly 1,280 ft from up-gradient piezometer L2-16U (TCE was detected at 17 µg/L in 2007) on the northeastern end of the plume to well 10A (TCE was detected at 4 µg/L in 2007) at its southwestern extent. The highest plume concentrations occur in the north-central portion of Landfill 2. *Cis*-1,2-DCE is detected at concentrations well below the MCL in GWMSU 2F. VC is currently mapped at a single location, piezometer L2-16U, where it was detected at a concentration of 2.8 µg/L (estimated) in March 2008.

Hexavalent Chromium Plumes:

Two Cr[VI] plumes have been observed in CG038. One plume exists at GWMSU 2F and extends from well 2-523B on the northeastern end of the plume to well 2-534B and extraction well EX-A06 at its southwestern (downgradient) extent. The second Cr(VI) plume exists in the south-central portion of GWMSU 2E and extends from the southern portion of Landfill 2 (at well 2-512B) to south of Beaver Pond (well 2-517B). A third area where Cr(VI) has been detected in groundwater in GWMSU 2E near monitoring wells 2-464B, 2-465B, 2-466B, 2-467B, 2-468B, and 79BR. This area of elevated Cr(VI) was related to an injection of potassium permanganate during a pilot study conducted in 2002 and 2003 that oxidized existing Cr(III) to Cr(VI). Concentrations rapidly reduced back to Cr(III) after the pilot study was completed, although some rebound has occurred.



CG038 Conceptual Block Diagram

7.4.3 CONTAMINATED GROUNDWATER MANAGEMENT UNIT CG039

Contaminated Groundwater Management Unit 39 (also known as the East CGMU and AF Site CG039), is located in the southeastern quadrant of Tinker AFB. Groundwater contamination was previously separated into two general areas of contamination designated as GWMU 3 and GWMU 4. The particular subunits of interest in this attachment are GWMSU 4A, 4B and 3A. Note that GWMSU 3C and 4C are no longer of concern; GWMSU 3C represents a vehicle refueling site at which soil and groundwater contaminated with fuel was discovered and GWMSU 4C, consisting of Waste Pit 2, has been determined to have had no impact to soil or groundwater. Waste Pit 2 (SWMU 13) was approved for NFA in an ODEQ letter dated February 20, 2004. UST Site 7 within GWMSU 3C was investigated as a Category II site under Oklahoma Corporation Commission regulation OAC 165:25-3-76. Facility and case number are Facility #55-08120 and Case #064-1103. The OCC approved site closure in a letter dated June 7, 1996 when it was found that final fuel concentrations in soil and trace amounts of toluene and xylene in groundwater were below OCC cleanup levels for a Category II site. Because shallow groundwater at the site is in the HWBZ, and no deeper USZ wells were found to be contaminated, it is determined that there has been no migration to an aquifer zone where horizontal transport might be likely, and therefore there is little risk from this site.

Limited and low level soil or groundwater contamination related to Landfill 5 (SWMU 02, located in GWMSU 4B) is not currently considered as a significant risk and is not slated for remediation at this time. Note that this landfill also has a RCRA cap. GWMSU 4A includes a number of individual source locations such as an industrial evaporation basin, a fuel yard (AF Site 3700 Fuel Yard), engine test cells, and various other industrial buildings. The fuel yard, the primary source of LNAPL at this subunit, was designated as Case No. 064-DP by the OCC. The case was closed in September 1999. However, groundwater contaminated by solvents from several other sources remains at the site. GWMSU 4B consists of Waste Pit 1, undocumented areas of dumping, and several buildings such as Hangars 2121 and 2122, Building 2101, and the Fuel Truck Maintenance Facility with associated oil-water separator.

CG039 was formed by Tinker AFB in 1996 to address contaminated groundwater in the southeastern quadrant of the Base. Groundwater contamination encompassed by CG039 has been separated into two areas designated as Groundwater Management Units (GWMUs) 3 and 4 based on hydrogeologic conditions and the location of potential source areas. The GWMUs are further divided into Groundwater Management Subunits (GWMSUs) 3A, 3B, 3C, 4A, 4B, and 4C based upon particular plumes and source areas. A brief, and quite generalized, overview of the extent of the COPCs by aquifer zone is provided in the following paragraphs; please note that data is representative of early sampling and data do not necessarily reflect current plume status, as this is changing as additional remediation is occurring.

Contaminated groundwater at CG039 is present in the USZ, LSZ, and lower, lower saturated zone (LLSZ) in the form of several isolated plumes. The main sources of impacted groundwater in CG039 generally originate from Fire Training Area (FTA) 2, IWP1, and ST032; however, plumes are comingled from multiple sources in this area. There are approximately 6 plumes in the USZ, 2 plumes in the LSZ, and 1 small plume in the LLSZ. The saturated extent of the USZ pinches out a short distance to the east of the base boundary near ST032, which limits the potential for significant migration away from the site in this direction. The maximum concentrations based on the 2009 data include PCE at 947ug/L in the USZ near ST032, and in the USZ near WP018, concentrations of TCE at 6,500 ug/L, cis-1,2-DCE at 3,200 ug/L, and 1,2- dichloroethane (DCA) at 32,000ug/L.

USZ: Five VOCs were identified as primary COPCs for the USZ at Site CG039: 1,2-DCA, cis-1,2-DCE, PCE, TCE, and VC. From 1999 through 2004, 787 samples were collected, with 10.2% of 1,2-DCA, 14.5% of cis-1,2-DCE, 13.5% of PCE, 50.2% of TCE, and 4.7% of VC samples above respective MCLs. 1,2-DCA was identified above the screening criteria in two distinct areas: GWMSUs 3B and 4B.

The smaller area of 1,2-DCA contamination appears in GWMSU 3B adjacent to monitoring well 2-62B, immediately east of FTA 2, and extends northwest from the monitoring well. Monitoring well 2-62B contained the highest concentration (250 micrograms per liter [μg/L]) in 2004. A 1,2-DCA detection also occurred in monitoring well 2-168B (5.4 µg/L) south of FTAs 2 and 3. The second area of contamination was observed in GWMSU 4B extending beneath the Fuel Purge Facility (FPF), UST Site 33, and Waste Pit 1. Within the plume, monitoring well 2-176, located south of UST Site 33, was identified with the highest concentration of 1,2-DCA (27,000 µg/L). Detections also occurred in monitoring well 2-369B (5.5µg/L), located southwest of the FTMF, and in monitoring well 2-364B (7.6 µg/L), located near the corner of Building 2121 in GWMSU 4A.

PCE contamination was identified in GWMSUs 3A, 3B, 4A, and 4B. One small plume appeared northeast of FTA 2 (GWMSU 3B) at monitoring well 2-65B, with a concentration of 45µg/L. Two plumes were located in GWMSU 3A to the northwest and southwest of Landfill 5. The highest detections were in monitoring wells 2-302B and 2-114B, with concentrations of 17 and 6.5 µg/L, respectively.

Several PCE plumes were identified in GWMSUs 4A and 4B. Two small plumes were located north of the GWMSU 4A boundary, and one large plume extended from the 3700 Fuel Yard through the Former Industrial Waste Evaporation Basin toward the northwestern edge of Sector B of the Southeast Quadrant Industrial Wastewater Collection Area. The area is described in the *Southeast Quadrant Wastewater Collection System Site Investigation Report*, completed March 2001. The highest detection of PCE (610 µg/L) was identified at monitoring well 2-9, located southwest of the 3700 Fuel Yard. Two smaller plumes were located in GWMSU 4B, one extending from the FTMF and the other, slightly larger, plume extending south from UST Site 33 and the FPF toward Waste Pit 1. The highest detections in the two plumes were from monitoring well 2-60 (32 µg/L), located west of the FTMF, and from monitoring well 2-87B (79 µg/L), located south of the FPF and UST Site 33 and northeast of Waste Pit 1.

Two plumes were identified in GWMSU 3A, one to the northwest and one to the southwest of Landfill 5. Monitoring wells 2-302B and 2-357B had concentrations of 190 and 84 µg/L, respectively. The larger TCE plume, located near FTAs 2 and 3 in GWMSU 3B and extending to the northwest, had a TCE concentration of 8,300 µg/L at monitoring well 2-62B. A fourth plume was identified near UST 8, which is located just south of the landfill; the highest concentration of TCE occurred at monitoring well 2-155B (8.1 µg/L).

One large TCE plume was identified in GWMSU 4A, extending from the 3700 Fuel Yard through the Former Industrial Waste Evaporation Basin and Sector B of the Southeast Quadrant Industrial Wastewater Collection Area. The highest detection of TCE (2,000 µg/L) was identified at monitoring well 2-363B, located south of the Former Industrial Waste Evaporation Basin and north of the Southeast Quadrant Industrial Wastewater Collection Area. One smaller plume is located to the northeast of the 3700 Fuel Yard, with the highest concentration of TCE (200 µg/L) detected in monitoring well 2-107B.

TCE was also detected at Site 38 north of GWMSU 4A in monitoring well 2-199 at a concentration of 27 µg/L. Within GWMSU 4B, four areas of TCE contamination were identified. The largest area extends south from the FPF, UST Site 33, and Waste Pit 1. The highest detection in the plume was from monitoring well 2-176 (15,000 µg/L) located at UST Site 33. One smaller plume was identified extending from the FTMF. The highest detection occurred in monitoring well 2-60 (30 µg/L). Concentrations of TCE were also detected at two locations in the Southeast Quadrant Industrial Wastewater Collection Area (Sector A) between Buildings 2122 and 2136 at monitoring wells 2-366B (9.3 µg/L) and 2-367B (13 µg/L).

Several cis-1,2-DCE plumes were identified at Site CG039 in GWMSUs 3A, 3B, 4A, and 4B. Two plumes were identified in GWMSU 3A, one to the northwest and one to the southwest of Landfill 5. Monitoring wells 6 and 2-357B had concentrations of 32 and 17 µg/L respectively. The larger TCE plume, located near FTAs 2 and 3 and extending to the northwest, had a cis-1,2-DCE concentration of 880 µg/L at monitoring well 2-62B.

One cis-1,2-DCE plume was identified in GWMSU 4A extending south of the 3700 Fuel Yard, through the Former Industrial Waste Evaporation Basin and JETC Building 3234, and southward into Sector B of the Southeast Quadrant Industrial Wastewater Collection Area. The highest detection was identified at monitoring well 2-363B (370 µg/L), located south of the Former Industrial Waste Evaporation Basin and north of the Southeast Quadrant Industrial Wastewater Collection Area. Within GWMSU 4B, three cis-1,2-DCE plumes were identified near the FPF, UST Site 33, and Waste Pit 1. The highest detections in the plumes were from monitoring well 2-308B (1,200 µg/L), located at UST Site 33; monitoring well 2-119B (820 µg/L), located at Waste Pit 1; and monitoring well 2-369B (430 µg/L), located south of the FPF and UST Site 33. One smaller plume was identified extending from the FTMF. The highest concentration occurred at monitoring well 2-376B (24 µg/L).

VC was identified in two areas in GWMSU 3A and in one area in GWMSU 3B. Monitoring wells 6 and 58BR, located northwest and southwest of Landfill 5, had VC concentrations of 3.4 and 2.4 µg/L respectively. Monitoring well 2-65B, located northeast of FTA 2, had a concentration of 2.1 µg/L. One VC plume was also identified northwest of the JETC Building 3234 and south of UST Site 38. The highest concentration in the plume occurred at monitoring well 1-72B (21 µg/L). The presence of cis-1,2-DCE and VC in the groundwater indicates that biodegradation of TCE is occurring. The extent of TCE contamination in the USZ far exceeds the extent of other volatile organic constituents identified at Site CG039.

LSZ: TCE and cis-1,2-DCE were identified as primary COPCs for the LSZ. From 1999 through 2004, 323 samples were collected, with 25.1% of the TCE samples above the MCL, and 6.5% of the cis-1,2-DCE samples above the MCL.

Several large TCE plumes have been identified at Site CG039 in the LSZ. Monitoring well 2-115A, located west of UST Site 8, had a concentration of 9.2 µg/L of TCE. A larger TCE plume was identified in GWMSU 4A and extends from the 3700 Fuel Yard through the Former Industrial Waste Evaporation Basin, Sector B of the Southeast Quadrant Industrial Wastewater Collection Area, and the JETC buildings. The highest detection of TCE (610 µg/L) was identified at monitoring well 2-363B, located south of the Former Industrial Waste Evaporation Basin and north of the Southeast Quadrant Industrial Wastewater Collection Area. Within GWMSU 4B, two areas of TCE contamination were identified, one located south of the FPF and one located southeast of UST Site 33. The highest detections were from monitoring well 2-70 (12 µg/L), located south of the FPF, and from monitoring well 2-308A (12 µg/L), located southeast of UST Site 33.

Several areas of PCE, cis-1,2-DCE, and VC contamination were identified in GWMSU 4A within Site CG039. The highest detection of PCE (13 µg/L) was identified at monitoring well 2-10A, located north of the 3700 Fuel Yard. The cis-1,2-DCE plume extends from the 3700 Fuel Yard, the Former Industrial Waste Evaporation Basin, and the JETC buildings. The highest concentration of cis-1,2-DCE was identified at monitoring well 2-10A (310 µg/L), located north of the 3700 Fuel Yard. The VC plume was identified northwest of the JETC (Building 3234) and south of UST Site 38. The highest concentration in the plume occurred at monitoring well 1-72B (13 µg/L). The presence of cis-1,2-DCE and VC in the groundwater indicates that some natural biodegradation of TCE is occurring.

LLSZ: TCE was the only contaminant identified as a COPC for the LLSZ. From 1999 through 2004, 116 samples were collected, with 5.2% of the TCE samples above the MCL. A small TCE plume was identified in GWMSU 4A. Monitoring well 2-108C, located southeast of the Former Industrial Waste Evaporation Basin and north of the Southeast Quadrant Industrial Wastewater Collection Area, had the highest concentration of TCE at 30 µg/L.

Solvent plumes are found in both the USZ and the LSZ at GWMSU 4A of CG039; migration of these contaminants is primarily to the southwest. However, a groundwater divide exists in the USZ that creates a semi-radial flow pattern in that zone which results in some eastward contaminant movement. Because contamination in the easternmost solvent plume was noted in the 1990s to have reached the base boundary, data was reviewed to evaluate whether off-site migration was occurring. No active remedial technologies were implemented because it was discovered that migration off-site is prevented by the local hydrogeology; shallow (USZ) contamination that appears to be migrating off-base toward the east is actually migrating vertically downward to the next lower saturated zone (LSZ), and flows to the southwest back under the base (see Figure 1-14). Monitoring wells, which have existed and been tested at this location since 1994, show that saturation in the USZ ends less than 500 feet east of the base boundary, while contamination is contained on base. The limited saturated extent, and the presence of downward

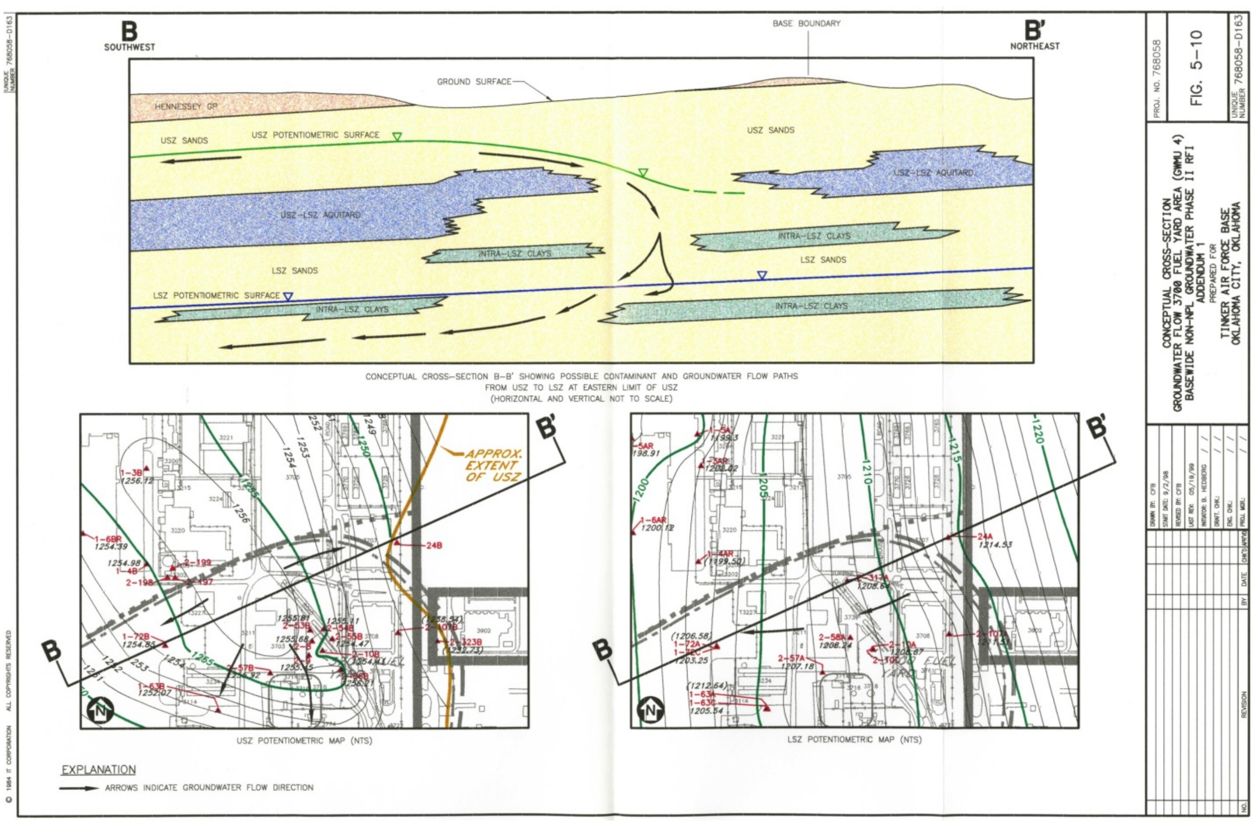
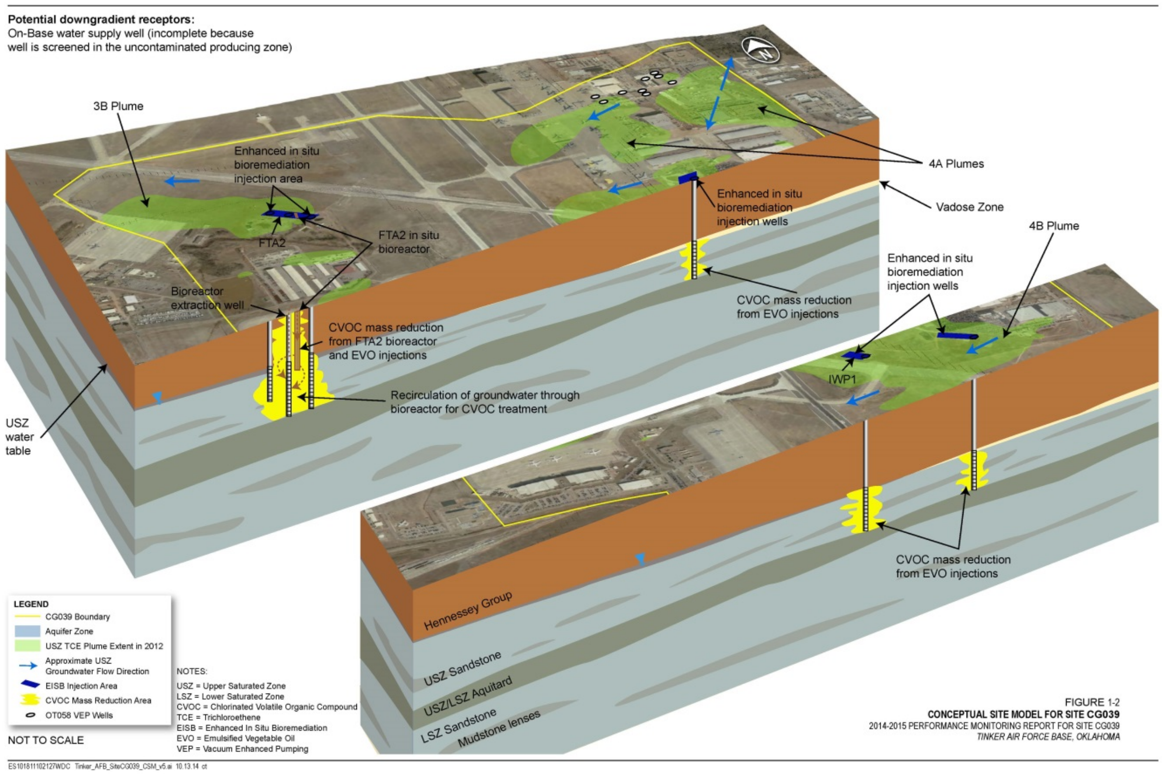


Figure 1-14 East CGMU 4A Groundwater Flow Diagram



CG039 Conceptual Block Diagram

vertical migration pathways, appears to preclude eastward migration. The current corrective action therefore includes compliance and sentinel well monitoring, which has continued over the last nearly two decades.

7.4.4 CONTAMINATED GROUNDWATER MANAGEMENT UNIT CG040

Contaminated Groundwater Management Unit 40, also known as AF Site CG040, the Gator Site, or Consolidated-Hands-On-Training (CHOT) Site, is located approximately 1 mile east-southeast of the main installation of Tinker AFB and south and east of the intersection of Southeast 59th Street and Post Road. The site encompasses an area of approximately 15 acres, with private property bounding it on all sides. The facility includes parking areas, an office and maintenance building (Building 4031), and a septic system. The Air Force purchased the CG040 site in the early 1950s. The site has been used for storage and maintenance of mobile communications equipment and monitoring equipment support units and is currently used as a satellite training site by the 3rd Combat Communication Squadron. The types of equipment stored, operated, and maintained at the site have included transport vehicles, electrical generators and transformers, and mission-related electronic equipment. Building maintenance supplies were probably also stored at the site. Potential contaminants resulting from these activities include vehicle and generator fuel and lubricants, dielectric oils (i.e., polychlorinated biphenyls) used in electric transformers and generators, and materials related to maintenance of electrical equipment such as solvents and metals from soldering materials. Unlike the other CGMUs which contain multiple plumes, CG040 has a single groundwater plume. Volatile organic contamination, primarily trichloroethene, is found in both the Upper Saturated Zone and the Lower Saturated Zone at the site. CG040 has also been referred to as GWMSU 5B; the relationship of CG040 to the GWMSU is more fully described in Section 10.5.4.1 of the current permit renewal application. A brief, and quite generalized, overview of the extent of the COPCs by aquifer zone is provided in the following paragraphs; please note that data is representative of early sampling and data do not necessarily reflect current plume status, which is changing as additional remediation is occurring.

TCE has historically been the only contaminant detected above its MCL in site monitoring wells although low levels (well below the MCL) of cis-1,2-dichloroethene (DCE) were detected in a few wells during early sampling, it has been detected above its MCL in three injection wells during more recent 2015 sampling, probably as a secondary effect of EISB. A specific source of TCE cannot be attributed to this site, and several attempts to find the source have proven unsuccessful.

USZ: The horizontal extent of TCE contamination in the USZ is bounded based on non-detect values in groundwater samples, with the southern and eastern extent of contamination defined by the edge of the USZ. Although the source of TCE contamination at CG040 has not been identified during previous investigations, persistent concentrations at certain locations over time provide an indication of specific areas where spills or dumping occurred, which may be acting as historical source areas. Historical data indicate that TCE concentrations are generally decreasing near the plume boundaries, including the area near the Matlock well, which is the closest private off-Base domestic well. However, TCE concentrations were generally stable near the area surrounding now abandoned GTR-P6 well prior to optimization, indicating this well is near the likely historical source of the USZ TCE plume.

Under static conditions (non-pumping), groundwater in the USZ beneath the Gator Facility flows in a semi-radial pattern off a northwest-southeast trending groundwater high that bisects the site. The area of highest concentrations of TCE in the USZ coincides with the axis of the groundwater high around monitoring well cluster 2-116 and the piezometer GTR-P7, up gradient of the septic tank and leach field. If the TCE plume were not contained by pumping, it would migrate primarily northwest and southeast. Under “pumping” conditions with the French drain sumps operational, drawdown is developed around the drains, altering the groundwater flow pattern and helping to contain and extract contamination. The southeastern extent of contamination in the USZ coincides with the terminal edge of the USZ; the remaining horizontal extent of TCE contamination is delineated by wells and therefore has been defined in the USZ.

Only TCE was detected above the maximum contaminant level (MCL) in groundwater prior to EVO optimization based on data collected in 2011 during the basewide monitoring event. The maximum historical detection of TCE was 1,200 micrograms per liter (µg/L) in 2001 at former USZ well GTR-P6; this well can no longer be used as a monitoring well since it was replaced during the RA-C and the location is currently within the north bioreactor recently installed at the site. The new well is designated as GTR-P6R. The TCE concentration in former well GTR-P6 was 720ug/L in 2011, according to the most recent data available prior to RA-C design and construction (Versar, 2012a). The maximum historical detection of cis-1,2-dichloroethene (cis-DCE or DCE) was 38ug/L at well 2-118B in 1995; however, concentrations of cis-1,2-DCE in site monitoring wells are currently below the MCL of 70µg/L, but has appeared in several injection wells. While cis-1,2-DCE and vinyl chloride were not present at the site in excess of their respective MCLs prior to the RA-C, short-term accumulation of these TCE degradation products is expected to occur as a result of enhanced in situ bioremediation (EISB) treatment.

USZ: The horizontal extent of TCE contamination above regulatory limits in the USZ was defined based on the extent of values above the MCL in groundwater samples. The USZ pinches out in the area north of Southeast 59th Street and in areas to the south and east of Tinker AFB property, where creeks have eroded away the sediments or where the USZ/LSZ aquitard sediments are too thin to support a saturated zone. Although the source of TCE contamination at CG040 has not been identified during previous investigations, persistent concentrations at certain locations over time provide an indication of specific areas that may be acting as historical source areas. Historical data indicate that TCE concentrations are generally decreasing near the plume boundaries, including the area towards the northern limit of extent near the Matlock well, which is the closest private off-base domestic well.

Between 2002 and 2010, the TCE concentration in former well GTR-P6 fluctuated between 80 and 743ug/L, indicating natural attenuation and the existing French drains in the USZ alone were not sufficient to achieve the cleanup goals. Optimized remedial activity includes EISB via injection wells and two bioreactors.

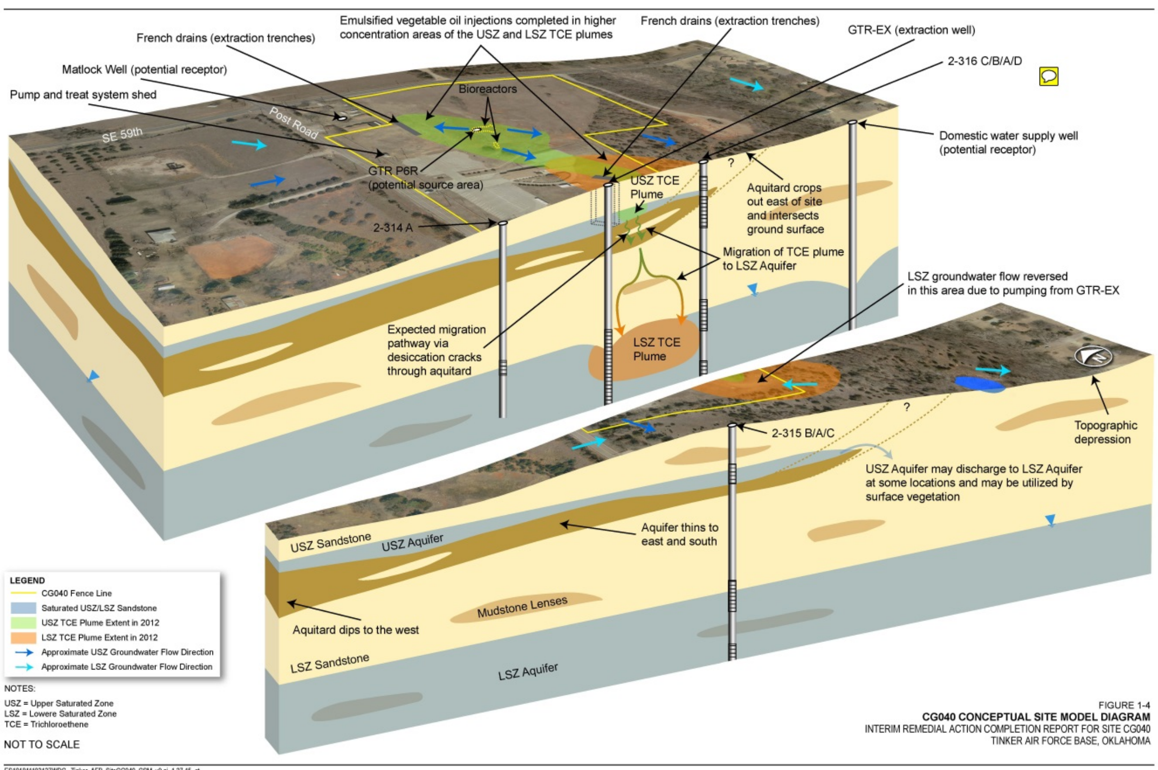
Because the saturated edge of the USZ is approximately coincident with the eastern site boundary, lateral migration to the east is limited within the USZ to about 250 feet; the current sentinel well 2-118B has a TCE concentration below the MCL and the down gradient POC well, 2-316C, located roughly 100 feet to the east off-site, is non-detect for volatile organic compounds.

Because the site consists of a single plume, remedial activities are described by groundwater zone, including the USZ and the LSZ/LLSZ. The upper zone is essentially treated as the source for the lower zone. No clear past or ongoing soil source has been identified at this site.

LSZ: Under static conditions, groundwater in the LSZ flows off an east-west trending groundwater high located in the southern portion of the site. Groundwater flow in the area of the site where TCE concentrations are the greatest (around monitoring well cluster 2-118) is generally to the east-southeast. Under pumping conditions generated by extraction well GTR-EX, screened across the entire LSZ, a large capture zone developed that extended past wells 2-118A and 2-118E, eventually reaching beyond monitoring wells 2-460A and 2-461A to the south and east, and extended past 2-116A to the north; GTR-EX therefore captured the entire LSZ TCE plume when operational. The extent of contamination in the LSZ is fairly well defined except possibly just west of the extraction well; the highest concentration of TCE was originally at boundary well 2-118A, but once pumping began the LSZ water table dropped below the screen of the well. A deeper well, 2-118E, was there for installed to allow monitoring of the down gradient LSZ at this fence line location. However, the LSZ wells to the south are widely spaced (400 feet apart or more) and the closest well to the north originally was 2-116A. New monitoring wells 2-460A and 2-461A installed in late 2002 helped to define the extent of TCE to the south and east, and well 2-505A, currently showing the highest LSZ TCE concentration, was installed to help characterize the up-gradient extent to the northwest. Unfortunately, remediation based solely on the extraction well was slow, and additional remedial activity via EISB is now underway at the LSZ.

LLSZ: The impact of dissolved chlorinated hydrocarbons in the LLSZ appears to be limited to low concentrations in the southeastern corner of the site in the area of well 2-118C and the extraction well, GTR-EX, which is partially screened in the upper portion of the LLSZ. The concentration in 2-118C had been constant or rising slightly over the last four years but was expected to be contained by the extraction well. The vertical extent of contamination appears to be defined, with no TCE detected in any of the deepest monitoring wells on site (2-116C, 2-118D, 2-315C, 2-316D), and only originally detected in the extraction well.

LSZ/LLSZ: Volatile organic compounds, primarily trichloroethene, have migrated vertically to the LSZ from the USZ, and then traveled off site to the southeast. Compliance and sentinel wells consist of an array of both on site and off site monitoring points located to the southeast where the down gradient end of the plume is found. Potential receptors are private water supply wells in a housing addition located just under 1,000 ft east and southeast of the on-Base plume along Raintree Drive. Analytical results from groundwater samples previously collected by the Oklahoma Department of Environmental Quality from a number of the private water wells in that subdivision indicate that wells have not been impacted by groundwater contamination associated with CG040. Although no well construction records exist, these private water wells are believed to be screened in the LSZ and/or LLSZ. In addition, the concentration of TCE has generally declined over time in monitoring wells located off-site and down gradient within the LSZ, indicating that the single extraction well has been effective in preventing further migration of TCE to the southeast. Based on the decline in TCE concentrations in monitoring wells located beyond the fence line, the extraction well also appeared to be pulling TCE back toward the base due to locally reversing the hydraulic gradient. TCE concentrations off-site are now below the MCL based on the latest (2016) sampling (CH2M Hill, pers. communication).



CG040 Conceptual Block Diagram

7.4.5 NPL (Northeast Quadrant)

Results of an investigation of contaminated groundwater in and around B3001, an aircraft and jet engine repair and overhaul facility located in the northeast quadrant of the Base, placed the B3001/Soldier Creek Site on the National Priorities List (NPL) in 1987 [National Priorities List for Hazardous Waste Sites (Final Rule), Federal Register 52:140 (July 22, 1987) p. 27620]. In the description of the NPL Site, the U.S.

Environmental Protection Agency (EPA) geographically delineated (by streets and other physical boundaries) those portions of Tinker AFB and surrounding property that were placed on the NPL. This was and is the geographical delineation of the official NPL Site at Tinker AFB. In addition, in at least one instance (the IWTP), the regulatory scheme [i.e., CERCLA or the Resource Conservation and Recovery Act of 1976 (RCRA)] depends on whether the contamination within this geographical area is in the soil or the groundwater. The NPL Site is, therefore, defined as all CERCLA-contaminated areas within the geographical area delineated by EPA, plus any other locations where that contamination has come to be located. Except as defined, the rest of Tinker AFB (generally to the south and west) is not included in the NPL Site. On December 9, 1988, the Air Force, EPA, and Oklahoma State Department of Health (OSDH) [now Oklahoma Department of Environmental Quality (ODEQ)] signed the Federal Facility Agreement (FFA), which defined the roles and responsibilities of the parties with respect to the conduct of response actions at the Site. The FFA also established a procedural framework and schedule for developing, implementing, and monitoring response actions at the Site in accordance with CERCLA and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

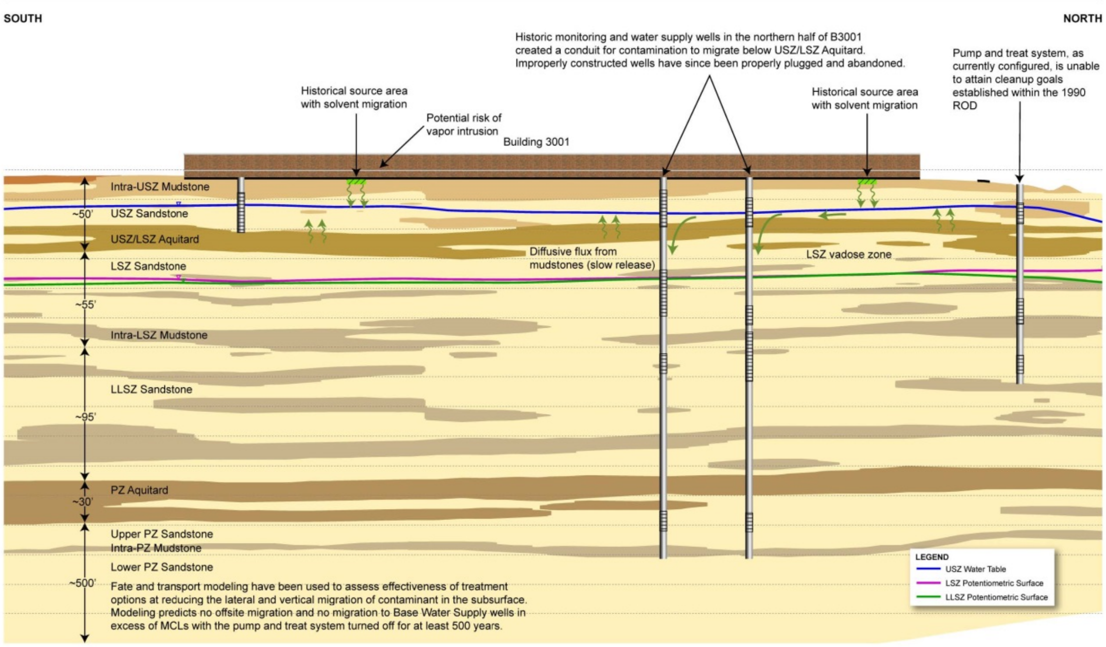
The B3001/Soldier Creek NPL Site is currently divided into four OUs as an administrative tool to investigate, remediate, and monitor the Site (Figure 1-2):

- B3001 OU (OU1)
- Soldier Creek Sediment and Surface Water OU (OU2)
- Soldier Creek Groundwater OU (OU3)
- IWTP Groundwater OU (OU4).

Each of the four OUs is proximate to the others within the northeast quadrant of the Base and adjacent off-Base areas. A groundwater flow divide separates OU3 from OU4. The flow divide exists, depending on depth, from just north of the northeast corner of Tinker AFB to I-40. The groundwater divide determines the migration pathway for contaminants in the groundwater system in the northeast quadrant of the Base. Groundwater north of the divide generally flows to the north and east; groundwater south of the divide flows to the south-southwest beneath the Base. The groundwater divide, in conjunction with regional groundwater flow to the west, prevents, or greatly hinders, the migration of contaminants from on-Base areas to any off-Base areas.

The B3001 OU (OU1) consists of the B3001 complex, the North Tank Area (NTA), Pit Q-51, and surrounding areas encompassed by the lateral extent of the contaminant plume emanating from the building. The NTA, situated at the northwest corner of B3001, included five underground storage tanks (USTs). Pit Q-51 was a below-grade concrete pit inside B3001 used to store liquids from the aircraft engine overhaul process. Organic solvents were used to clean and degrease metal engine parts during aircraft and jet engine service, repair, and overhaul activities from the 1940s through the 1970s. Historically, subsurface contamination occurred primarily by leakage from pits and trenches, discharges to storm drains, accidental spills, and leaking tanks. Leaking utility lines and improper connections between wastewater and storm drains as well as improperly constructed monitoring wells may also have contributed to groundwater contamination.

The groundwater was impacted by volatile organic compounds and metals from past industrial operations at Tinker AFB. The primary chemicals of potential concern are trichloroethene, tetrachloroethene, dichloroethene, vinyl chloride and hexavalent chromium. The Upper Saturated Zone is more severely impacted than the Lower Saturated Zone and Lower Lower Saturated Zone and is the source of continued contamination of the deeper aquifer zones. Observed groundwater concentrations of the chemicals of potential concern decline with depth in the Lower Saturated Zone and Lower Lower Saturated Zone. Although multiple volatile organic compounds are constituents of the groundwater, there are no current or predicted future risks to human health via the groundwater pathway; therefore, potential remedial alternatives focus on reducing the potential risks associated with vapor intrusion and further groundwater migration with continued groundwater monitoring for a period of time sufficient to verify model predictions and by targeting for remediation the areas of highest soil and groundwater impacts in the USZ, many of which occur directly beneath and just west of B3001. A conceptual model diagram for the NPL Site is provided below.



NOT TO SCALE

Note: Cross-section interpreted from SAIC, 2009

FIGURE 5-1
Building 3001 Conceptual Site Model Diagram
Tinker Air Force Base, Oklahoma

ES101811102127WDC Figure_5-1_Tinker_AFB_Battelle_SiteF-FB3001_CSM_v2.ai 9.7.12 ct

5-17

8.0 MIGRATION PATHWAYS/SOURCE POTENTIAL

Soil to groundwater migration is widespread, as documented by the multiple groundwater plumes that have been identified on Base. Therefore, a migration pathway between soil and groundwater has been documented; site investigation reports (RFIs) document potential pathways at individual sites. Most groundwater solvent plumes, such as TCE, PCE, cis-1,2-DCE and VC are primarily sourced from soil via surface spills; undocumented indiscriminate dumping that appears to have occurred prior to the 1970s is a likely source for groundwater solvent contamination, although plumes also stem from leaks related to landfills, waste water transfer lines, lift stations, or waste disposal pits. Fuel in groundwater is sourced both by surface spills as well as leaks from USTs or associated fuel lines. In some areas, both solvent and fuel are found comingled. Metals sources, specifically for hexavalent Chromium, are located at Building 3001 (NPL), and Landfill 4 in CG038; trivalent Chromium has been found to be naturally occurring at high concentrations in local redbed strata. However, total Chromium continues to be evaluated primarily to allow comparison with hexavalent Chromium. Release areas for all types of contaminants are discussed in Section 10.1.3 and listed in Table 10-1 of Section 10 of the current permit renewal application.

Groundwater contamination, particularly since it is found in deeper aquifer zones, indicates that vertical migration is occurring. In fact, hydrologic data from many monitoring wells demonstrates that a significant vertical component of groundwater flow (in addition to horizontal flow) is present at Tinker, primarily in the eastern part of the Base, which increases the likelihood of contamination from soils migrating deeper into the aquifer. In addition, desiccation cracks, discussed earlier, can act as pathways where generally tighter (more fine grained, less permeable) soils would seem to prevent downward migration. Locally, interbedded fine grained geologic layers do impede flow, thus creating complex migration pathways, but over much of the Base these do not prevent, only hinder, contaminant movement through the groundwater. It should be noted that the identified aquitards, the USZ/LSZ aquitard and the LSZ/PZ aquitard, are both probably leaky features. However, groundwater data obtained near Building 3001 from a series of 2009 Westbay wells (see *Focused RI Report for the Building 3001 and IWTP Groundwater OUs, SAIC, 2010)*, seems to show that the LSZ/PZ aquitard is relatively more competent than the USZ/LSZ aquitard. These multilevel monitoring wells were used to help determine the degree of hydraulic separation between the LSZ and the first several sandy zones in the PZ. The data demonstrated that it is unlikely that shallow groundwater contamination could naturally migrate to the PZ, or that migration is extremely slow. The PZ continues to be used on Base (and was previously the primary source for nearby municipalities before most went to surface water sources) for obtaining potable water. The distribution of groundwater contamination in the USZ and the LSZ/LLSZ indicates that the USZ/LSZ aquitard is apparently more competent over roughly the south half of the Base since little or no LSZ groundwater contamination occurs there, whereas significant LSZ contamination exists to the north. Note that a number of Base water supply wells located in areas of shallow groundwater contamination have been plugged to preclude any chance of contaminating the PZ.

Several groundwater plumes (solvent plumes in GWMU 2D and 2E at CG038 and the solvent plume at CG040) once extended beyond the Base fence line; the 2D plume impacted several private wells in a subdivision adjacent to the southwest quadrant of Tinker, which is known as the Tinker View Acres (TVA). Remedial activities such as installing an interim pump and treat system at CG038 and an iron permeable reactive barrier across the toe of the 2D plume, have mitigated the off-site portions of the CG038 plumes however, and an interim extraction system including French drains and an extraction well at CG040, along with recent vegetable injections, has decreased off-site contaminants to below MCLs there. However, off-site groundwater contaminated above MCLs demonstrates the potential for migration of contaminated groundwater beyond the Base boundary; therefore, plumes continue to be monitored in all areas of the Base. Land use controls provide an additional level of protection for Base personnel coming in contact with soil or groundwater contamination.

Vapor intrusion (VI) potential has been recently evaluated over the entire Base. The potential for soil and groundwater to air migration of vapor has been identified at a number of industrial buildings on Tinker. Tinker is continuing to evaluate the likelihood for vapor intrusion into buildings, and the CSM will be updated when further information is forthcoming. Dual phase Vapor Enhanced Pumping systems were installed at several sites on Base where there were early indications of indoor air contaminant issues (prior to the comprehensive vapor intrusion investigations), but these have recently been taken off-line as sampling indicates that recovery rates have become asymptotic. These systems operated for years, but are no longer viable due to low recovery; the Area "C" VI investigation included three sites with VEP systems. The presence of air quality issues however documents that at least locally a completed migration pathway to air from soil and/or groundwater sources can, and does, exist.

9.0 ECOLOGICAL PROFILE

Details regarding the natural resources (flora and fauna, soil and water) at Tinker AFB are available in the 2007 Tinker Air Force Base *Integrated Natural Resources Management Plan*. The following figures are taken from the report: Figure 1-15 presents land use categories for the Base; Figure 1-16 presents soil classifications; Figure 1-17a presents ponds and watersheds, and includes text describing potential non-point source impacts to surface water features, while Figure 1-17b documents creeks and associated watersheds; Figure 1-18 provides an overview of vegetative communities on Base; Figure 1-19 provides the location of Base wetlands. These figures are presented in Attachment A. Note that additional information regarding ecologically sensitive areas and potential receptors can be found in the Base 2010 Community Relations Plan.

The surface soils have been studied by the U.S. Department of Agriculture (USDA) Soil Conservation Service (1969) and by several soil boring projects conducted for geotechnical (foundation construction) investigations at Tinker AFB. A more detailed Basewide soil survey was conducted by the USDA Soil Conservation Service in 1983 and updated in 1991. This survey identified 46 soil types within the Base's boundary. Surface soils of the installation area are predominantly of two basic types: residual and alluvial.

The four major soil associations mapped within the Base limits are Darnell- Stephenville, Renfrow-Vernon-Bethany, Dale-Canadian-Port, and Dougherty-Norge-Teller. The residual soils associations Darnell-Stephenville, Renfrow-Vernon-Bethany, and Dougherty-Norge-Teller, are products of the weathering of underlying ancient bedrock. The alluvial materials of the Dale-Canadian-Port are developed on younger silts and sands, which are typically restricted to floodplains of area streams.

10.0 POTENTIAL RECEPTORS

This subsection provides general information on potential human and ecological receptors of groundwater contamination at Tinker AFB. Property surrounding the Base includes residential, industrial and non-industrial businesses, and agricultural areas. Potential receptor populations include those related to residences with private water wells, industrial facilities and other businesses with private wells where potable water might be available, and potentially wells used for agricultural purposes such that crops may become contaminated. All of these wells tap into a portion of the Garber-Wellington Aquifer. Lake Stanley Draper, a local surface water supply reservoir with a small portion of its drainage basin in the southeast part of Tinker AFB, is also used for recreational purposes. Local streams, such as Soldier Creek and Crutcho Creek, which either transect the Base or have tributaries that extend onto the Base, may be used for recreation and fishing downstream. Note that additional information regarding ecologically sensitive areas and potential receptors can be found in the Base 2010 Community Relations Plan.

10.1 Human Receptors

Tinker AFB is situated on a relatively flat expense of grassland. Prior to the development of the Base, the area was characterized by large tracts of private agricultural land. The Base currently occupies approximately 4,277 acres of semi-improved and unimproved grounds that are used for the airfield, golf course, housing area, offices, shops, and other uses characteristic of military installations. Property surrounding the Base includes residential, industrial and non-industrial businesses, and agricultural areas. Potential receptor populations include those related to residences with private water wells, industrial facilities and other businesses with private wells where potable water might be available, and potentially wells used for agricultural purposes such that crops may become contaminated. All of these wells tap into a portion of the Garber-Wellington Aquifer. Lake Stanley Draper, a local surface water supply reservoir with a small portion of its drainage basin in the southeast part of Tinker AFB, is also used for recreational purposes. Local streams, such as Soldier Creek and Crutcho Creek, which either transect the Base or have tributaries that extend onto the Base, may be used for recreation and fishing downstream.

The Garber-Wellington Aquifer, which underlies Tinker AFB and the surrounding area, is the single most important source of potable groundwater in the Oklahoma City area. Currently, the main part of the Base's water supply is obtained from production wells pumping from this aquifer; however, the newly acquired Tinker Aerospace Complex (TAC) (formerly the General Motors plant) obtains its water from local city water supplies. Industrial operations, individual homes, farm irrigation, and small communities not served by municipal distribution systems also depend on the Garber-Wellington Aquifer. Communities such as Oklahoma City, Midwest City and Del City depend on surface water supplies but at least one local municipality also maintains a well system that taps this aquifer as a standby source of water in the event of drought.

Tinker AFB employs approximately 27,000 military and civilian personnel. Of these personnel, approximately 2,800 personnel occupy on-Base housing, which consists of around 530 family housing units and seven dormitories. Of base housed families, roughly 1,300 residents are children. Military personnel and their families who reside on Base represent the nearest receptors to releases from Tinker AFB. However, access to areas impacted by Base activities is restricted in most cases, and direct contact by Base residents is not likely. The current land use at and near the Base is not expected to change because the facilities have decades of useful life remaining and the Base has an important and continuing mission. To date, no soil or groundwater contamination requiring active remediation has been detected beneath Base housing areas, although some low level soil screening vapor hits have been detected.

The closest human receptor populations include on-Base residents, government personnel working at the Base, and contract workers since these (other than those working at the TAC facility) depend on Base water supply wells for drinking water and water for industrial activities. Because Tinker water wells are not contaminated, and it is unlikely that they will become contaminated in the future, this receptor scenario is considered incomplete. Non-industrial Tinker facilities such as day cares, hospitals, schools, and restaurants all rely on this same water system. Because Base surface water bodies have been determined to be uncontaminated, this pathway is also considered incomplete for all on-Base entities. Vapor intrusion is limited to specific industrial buildings, and therefore non-workers, including sensitive populations, are unlikely to be exposed to any air contamination. The existence of LUCs, presented in Section 10.2.4, also tends to limit exposure to soil, groundwater, or vapor contamination.

However, workers on base, whether they are government or contract, can potentially be exposed to soil, groundwater, and air contamination. Activities such as trenching, cutting through building slabs, excavating foundations for buildings or removing a lift station, drilling wells, or other ground intrusive activities, have the potential to have workers encounter either soil or groundwater contamination, depending on the depth to which they go and the depth to groundwater. In addition, exposure to vapor intrusion is also a possibility where either soil or groundwater contamination is present. Because the Base has robust, and active, land use controls (both institutional and engineering), soil and groundwater exposure is generally mitigated. Because vapor intrusion is limited to a few industrial sites, where air monitoring can occur, vapor intrusion has also not been a major issue. In all cases the potential for exposure exists, but is generally incomplete since contaminated sites are well documented and construction type activities on Base are governed by LUCs. The potential for exposure to contamination is provided in more detail in individual site reports, such as an RFI or CMS.

As discussed below in the section on migration pathways, several groundwater solvent plumes once extended off-Site. However, since these plumes no longer extend past the fence line above MCLs due to mitigation by years of remediation, the risk of exposure to off-Base populations is currently considered to be incomplete. In addition, groundwater contamination once thought to have migrated off Tinker to the northeast from near Building 3001, is now known to be contained on Base due to a groundwater divide which extends across the northeast corner of the Base. Although this is related to NPL Site OU-1 (Building 3001 Soil and Groundwater), it demonstrates how groundwater migration pathways may be controlled by aquifer hydraulic properties; evaluation of RCRA sites should include this type of information. Monitoring of compliance and sentinel wells (listed in Section 10 of the current permit renewal application) continues as part of the Basewide Sampling Program; data is used to evaluate plume stability, including the extent of groundwater plumes as well as the rate of migration.

10.2 Ecological Receptors

Tinker AFB lies within a grassland ecosystem, which is typically composed of grasses and riparian (trees, shrubs, and vines associated with water courses) vegetation. This ecosystem has generally experienced fragmentation and disturbance as a result of urbanization and industrialization at and near the Base. While no threatened or endangered plant species occur on the Base, the Oklahoma penstemon (Penstemon oklahomensis), identified as a rare plant under the Oklahoma Natural Heritage Inventory Program, thrives in several locations on Base. Tinker AFB policy (AFR 126-1) is to treat rare species as if they were threatened or endangered and provide equivalent protection for these species.

In general, wildlife on the Base is tolerant of human activities and urban environments. No federal threatened or endangered species have been reported at the Base. The Oklahoma Department of Wildlife Conservation also lists several species within the state as Species of Special Concern. Information on these species suggests declining populations but information is inadequate to support listing, and additional monitoring of populations is needed to determine the species status. These species also receive protection by Tinker AFB as if they were threatened or endangered. Of these species, the Swainson's hawk (Buteo swainsoni) and the burrowing owl (Athene cunicularia) have been sighted on Tinker AFB. Swainson's hawk, a summer visitor and prairie/meadow inhabitant, has been encountered Basewide. The burrowing owl has been known to inhabit the airfield at the Base.

11.0 MONITOR PROGRAM/WELLS

Tinker AFB was issued a Resource Conservation and Recovery Act (RCRA) Hazardous Waste Management Permit on July 1, 1991 by the U. S. Environmental Protection Agency (EPA). The permit specified a list of solid waste management units (SWMU) and Areas of Concern (AOC). Tinker AFB was required to perform RCRA Facility Investigations (RFI) at each of these sites to determine whether releases had occurred, and if corrective actions were warranted. In addition to investigating individual SWMUs and AOCs, Tinker performed a series of facility wide RCRA Facility Investigations between 1996 and 2000, each one building on the previous report. The reports, submitted previously, are titled *Basewide Non-NPL Groundwater Phase II RFI for Appendix I and II SWMUs, Addendum I, Addendum II, and Addendum III.* Note that although Basewide data were collected, and recorded in the reports, including both analytical and water level data for the sites under CERCLA authority, only the RCRA portion of the Base was evaluated in these reports since Operable Units are investigated separately.

As part of this effort, groundwater monitoring wells have been installed on and around Tinker AFB. A map (Figure 1-20) that presents all active monitoring wells, piezometers, water supply wells, extraction wells, and injection wells at Tinker is provided in a pocket at the end of this document. Monitoring wells have generally been installed in clusters or groups that intercept a prescribed portion of the four principal hydrostratigraphic or water-bearing zones (WBZs) of a portion of the Central Oklahoma Aquifer system commonly referred to as the Garber- Wellington Aquifer and a shallow WBZ in the Hennessey Group. These WBZs are designated as the upper saturated zone (USZ), lower saturated zone (LSZ), lower-lower saturated zone (LLSZ) and producing zone (PZ) in the Garber-Wellington Aquifer and the Hennessey water-bearing zone (HWBZ) in the overlying Hennessey Group. Individual wells and groups of wells are spread over the entire Base and some outlying areas. They are identified by their depth and respective aquifer and their surface locations within a particular sampling zone. Table 1, which matches wells plotted on Figure 1-20 (located in a pocket at the end of this document), presents existing well locations by the following: Location ID (well number), aquifer zone, horizontal coordinates, established date, measuring point elevation, ground elevation, and site code (WIMSID). A horizontal coordinate grid is located around the edge of the well location map, allowing for rapid location of the wells. The table includes monitoring wells, extraction wells, injection wells, water supply wells and piezometers as each may be sampled during a given sampling event. All monitoring wells, piezometers and most extraction wells have water levels measured during each Basewide sampling event and during site specific sampling episodes. Table 1 is located in Attachment A.

All wells constructed by the Air Force on and around the Base and surface completions are designed to collect representative and unbiased groundwater samples and to provide accurate groundwater elevations for long-term monitoring from discrete aquifer zones in each GWMU. Well design criteria such as well type, total depth, surface casing depth and screen interval were developed based upon a review of existing cross sections, well data, topographic maps, etc.

Wells are constructed to minimize the potential for migration of any substance between the surface and subsurface and/or geologic formations. Each new monitoring well borehole was geophysically logged prior to well installation. The logs were reviewed in the field and used to determine surface casing depths, well completion depths, and screen intervals. Proposed well designs were verified or altered in the field based upon the actual conditions encountered at each site. All wells installed on or around Tinker AFB by the Air Force are constructed to meet OWRB Title 785, Chapter 35 requirements.

Basewide groundwater monitoring is an essential part of the environmental restoration program conducted by the Environmental Restoration Office at Tinker AFB. The data collected under this program are used in conjunction with other data at specific sites to meet regulatory requirements for long-term monitoring, site characterization, and site close-out. The long-term goal of the monitoring program is to help complete environmental restoration of contaminated groundwater sites.

The basewide groundwater monitoring program began primarily as an annual event (1994) that evolved into a 15-month program via a 2005 modification to the Tinker AFB 2002 Resource Conservation and Recovery Act Part B Renewal Permit. In addition, more frequent site-specific sampling has been included during site specific investigations throughout the years on an as-needed basis. The basewide program includes the collection of water level measurements and groundwater samples from a network of monitoring wells, piezometers, extraction and recovery wells, landfill sumps, and private off-base wells. A detailed discussion of the groundwater monitoring program at Tinker AFB is contained in Section 10.5 of the permit renewal application.

12.0 HISTORY OF REMEDIATION

Sections 10.1 through 10.4, including Tables 10-1, 10-2, and 1-3, as well as Table 10-5 in Section 10.5 of the permit renewal application, provide information regarding contaminated sites at Tinker AFB. This data includes an overview of any remedial activities that have occurred or are being planned, as well as areas where additional work may be needed. Information presented in those sections should be incorporated into the Conceptual Site Model and will not be discussed further here. Additional details of remediation activities are available in various site specific reports. Remediation is ongoing. Previous activities include pilot tests, interim actions, and final actions, depending on the site.

13.0 GROUNDWATER FLOW & TRANSPORT MODELING

Groundwater flow and transport modeling has been performed at Tinker AFB to evaluate anticipated future times of arrival and concentrations of groundwater contaminants at the Base boundary in three primary areas, CG038, CG039, and the Soldier Creek/Building 3001 NPL Site. However, it should be noted that although the latter model focuses on the northeast quadrant of Tinker, it extends westward well into CG037 and therefore addresses a significant portion of that area also. The modeling depends heavily on data and assumptions from several aspects of the conceptual site model for the Base, including geology, groundwater data, and contaminant data, and is used to support conclusion made at various contaminant sites such as SWMUs and groundwater management units (GWMUs) regarding groundwater transport/migration of subsurface contamination. The modeling efforts are presented below by contaminated groundwater management units (CGMUs), which are more fully described in other parts of this conceptual site model, including the relationship of GWMUs to CGMUs. However, it should be noted that discussion below is limited to an overview of the modeling efforts; individual modeling reports should be consulted in order to evaluate the full effort and conclusions for each area evaluated.

CG038 Modeling

Evaluation of Source and Extent of Hexavalent Chromium, Site CG038 (August 2008): A conceptual groundwater flow and transport model was developed in 2007/2008 describing the hydro-geochemistry of the study area, including the source and extent of Cr(VI). The conceptual model integrates information from soil and groundwater sampling events, monitoring well installation and sampling, stream gauging, groundwater extraction rate data, aerial photography, site-specific tests, and literature studies.

From this conceptual model, a three-layer numerical groundwater flow and transport model was developed to predict future plume migration. Evolution of the plumes over time from specified sources (representing past release of contaminants to the USZ) was simulated, and the extent, shape, and general concentration distributions of the currently observed Cr(VI) plumes were reproduced. Uncertainties were identified with respect to transport parameters, initial conditions, and boundary conditions (sources).

The numerical groundwater flow and transport model was then used to predict the future transport of Cr(VI) in the study area. Two primary Cr(VI) transport simulations were conducted; one was conducted with the calibrated solute transport model parameters while the other was conducted without sorption to provide a conservative prediction of future transport.

In the reactive transport simulation, the northern plume is about 400 ft beyond the Base boundary at 40 years, but is moving towards the extraction wells. In the non-reactive transport simulation, the downgradient edge of the northern plume moves more quickly (due to a lack of sorption) along the arcing path toward the extraction wells. At 10 years, it is about 400 ft beyond the Base boundary (similar to the reactive transport simulation at 40 years); by 40 years, it has moved more towards the extraction wells and is only about 200 ft beyond the Base boundary. The southern plume is predicted not to migrate past the Tinker AFB boundary during the 40-year period for either simulation. Instead, the extent of the southern plume diminishes over time, consistent with a low continuing source concentration.

After evaluation of the results of the original transport simulations, a series of additional simulations was conducted to support the remedial alternatives evaluation for the northern Cr(VI) plume; these additional simulations were evaluated at up to 300 years in the future at two different points of compliance (the current Base boundary and a potential future Base boundary located west of Gott Gate).

Note: The CG038 chrome model area was expanded geographically to also cover the location of solvent plumes although only hex chrome was simulated in this report. Model area expansion was designed to allow future modeling of solvent plumes if desired at a much lower cost. As noted in the report model, "Based on the successful flow and transport model calibration, the model is appropriate to be used for predictions of future contaminant transport under the influence of various remedial alternatives." The basic CG038 model, with only minor update, was in fact used in 2010 to support the remedial process optimization (RPO) for three CG038 volatile organic compound plumes at that site, although predicted future plume extent was not modeled.

CG039 Modeling

Corrective Measures Study Report, Installation Restoration Program Site CG039 (Feb. 2006): The groundwater model was the primary tool used to evaluate alternatives. The model was used to generate predictions of future plume extent and to assess contaminant concentrations at the Base boundary and at potential compliance points in the future. The groundwater model is an eight-layer numerical model that was constructed to represent the entire area of CG039. Although CG039 Subunit 4B, which includes Waste Pit 1, is not included in the scope of this CMS, the area was included in the groundwater model developed for CG039 so that information regarding the fate and transport of contaminants in the vicinity of Subunit 4B will be available to remedial managers responsible for that area.

A solute transport model was developed using the same finite-difference grid as that of the flow model. The model also was used to confirm receptor pathways and locations used in the risk characterization. Although CG039 Subunit 4B, which includes Waste Pit 1, is not included in the scope of this CMS, the area was included in the groundwater model developed for CG039 so that information regarding the fate and transport of contaminants in the vicinity of Subunit 4B will be available to remedial managers responsible for that area.

Existing well contaminant and geochemical data were analyzed to assess positive evidence for ongoing natural attenuation and to determine a suitable degradation rate for inclusion in the solute transport model. Finally, solute transport modeling was performed with these half-life values for the various solvents. The results of this modeling indicate that no TCE, 1,2-DCA, or other solvent degradation products are expected to exceed their respective MCLs at the Base boundary for simulation times out to 500 years. In addition to depicting the solvent plume extent at a specific time, the report includes concentration versus time graphs for the solvent concentration predicted at a probable compliance point at the Base boundary. The model results also indicate that plumes reach their maximum extent and are contracting after 500 years given stipulated source extent and concentration.

Modeling results show no COPC will reach the Base boundary above MCLs from CG039 sites studied in this project. Although no COPCs are projected to exceed MCLs at the Base boundary, empirical evidence indicates that Subunit 3B of the CG039 Site has the potential to impact Crutcho Creek if the 3B plume would reach a preferential pathway. Contaminant source area terms for TCE, as well as for 1,2-DCA in the plume 4B area only, were included at current groundwater plume core concentrations, with a duration of 140 years. This duration is based on previous source area modeling performed for the 2E plume (SAIC 2005) and assumed to be valid in the Site CG039 area. These source areas were included for plumes 3A, 3B, 4A, and 4B. The solute transport model was qualitatively calibrated by comparing particle tracking results to current plume extents for the plume areas 4A, 4B, and 3B. Solute transport model simulations without contaminant degradation predict that TCE will exceed the MCL at the Base boundary in the USZ (only in plume 4B) after approximately 150 years and in the LSZ after approximately 250 years. Similar results were obtained for 1,2-DCA in both the USZ and the LSZ. However, it must be noted that these results are very conservative because contaminant degradation was not included as a fate process and because of the long-term continuous concentration sources.

B3001 Modeling (includes part of CG037)

Focused Remedial Investigation Report, Building 3001 and Industrial Wastewater Treatment Plant Groundwater Operable Units – Appendix N (Nov. 2010): Based upon recent modeling work (SAIC 2007a, SAIC 2007b), it was anticipated prior to the current modeling effort that lateral migration of currently existing groundwater plumes would not result in concentrations exceeding regulatory limits at the Base boundary for the hydrogeologic zones (USZ, LSZ, LLSZ) within which the contamination currently occurs. However, to delineate long-term plume migration, the model evaluated the potential for migration of groundwater contaminant plumes to lateral potential points of exposure extending across the Base. In addition, a primary objective of the Focused RI and this appendix was to evaluate the potential for impact to the underlying Producing Zone (PZ) from vertical leakage of contaminated groundwater through the PZ aquitard.

The scope of this recent modeling included the following:

• Update the existing Soldier Creek Groundwater Operable Unit (OU-3) groundwater flow and solute transport model (SAIC 2007a). This model was built to directly support the Comprehensive Environmental Response, Compensation, and Liability Act process for OU-3, but was constructed so as to be readily adaptable to support a Focused RI/FS process for the Building 3001 OU and IWTP GWOU as well (OU-1 and OU-4). The OU-3 model includes the upper three hydrogeologic zones beneath Building 3001, IWTP, and Soldier Creek, and was updated herein to include the underlying PZ in order to evaluate potential impacts from the Building 3001 OU and IWTP GWOU to the PZ.

• Perform baseline and sensitivity/uncertainty contaminant transport scenarios with the updated flow and transport model. To evaluate groundwater flow and contaminant fate and transport (F&T), a 15-layer conceptual model of the Garber-Wellington to the base of fresh groundwater was developed. This model includes the USZ (layer 1), the USZ-LSZ aquitard (layer 2), the LSZ/LLSZ (layers 3 through 6), the PZ aquitard (layer 7), and the PZ to the base of fresh groundwater (layers 8 through 15). Layer 8 represents the uppermost PZ sandstone, layer 9 represents a laterally-continuous intra-PZ mudstone, and layers 10 through 15 represent the remaining PZ interval to the base of fresh groundwater. Layers 10 through 15 are not subdivided as such due to distinct hydrogeologic properties (insufficient data is available to do so), but are subdivided instead for numerical model reasons. As such, layers 10 through 15 can alternately be regarded as a single conceptual model layer.

The current modeling effort updated the OU-3 model by adding the PZ aquitard (layer 7) and the PZ to the base of fresh groundwater (layers 8 through 15). Layer 8 represents the uppermost PZ sandstone, layer 9 represents a laterally-continuous intra-PZ mudstone, and layers 10 through 15 represent the remaining PZ interval to the base of fresh groundwater.

The conceptual geologic model layer elevations for layers 1 through 6 were initially developed during the OU-3 modeling effort. Elevations for the layers added to the OU-3 model were developed during a recent Basewide 3D geologic modeling effort (SAIC 2009). This Basewide 3D geologic model was also used to update the elevations for the major hydrostratigraphic contacts from the OU3 model (top of USZ, top of USZ/LSZ aquitard, top of LSZ, and top of PZ aquitard). However, the intra-LSZ/LLSZ subdivisions (tops of layers 4, 5, and 6) from the OU3 model were not incorporated into the Basewide 3D geologic model, and so those elevations are not updated in the current modeling effort.

The numerical transport model was constructed from the conceptual flow and transport model. The numerical groundwater flow and transport model was then used to predict future transport of TCE, *cis*-1,2-DCE, and VC in the study area. A baseline 500-year transport simulation was conducted, along with a number of sensitivity simulations. In the baseline transport simulation, contamination above MCLs is predicted to migrate only as far west as Runway 12/30 in 500 years. Thus, no off-Base impacts are predicted. Low-level impacts are predicted in the top PZ sandstone (layer 8). Predicted maximum concentrations at WSW-13, the water supply well with the greatest predicted impacts, are about 20% of the respective MCLs for TCE and VC. WSW-13 provides a preferential pathway for contamination to migrate from layers 6 and 8 to lower layers. The model simulations indicate that even under pumping conditions, WSW-13 permits the lower layers to gain water (and hence contamination, if present) from layers 6 and 8.

Contamination above MCLs is predicted to be far from reaching the Base boundary after 500 years. Low-level impacts are predicted in the top PZ sandstone (layer 8), with the greatest impacts predicted in the simulation with the degradation halved. In this simulation, rising TCE and VC concentrations are predicted to approach the MCLs at 500 years.

Note: The B3001/NPL model area was extended westward as far as Crutcho Creek and therefore includes a large portion of CG037. Together, the three models described above cover roughly 80% of the Base area; some overlap was included to allow each model to 'tie' into other models. Geographically, the modeled area is inclusive of all but 2 contaminant sites, CG040 and Landfill 6, which are located roughly one mile to the east of the main portion of the Base. There is no interaction between these sites and contaminant plumes on the main Base area. Also, because the models were generated by the same contractor, input data such as boundary conditions and hydraulic parameters for the models in areas where they overlap are the same, or require only minor changes. This ensures continuity in interpretation between all three areas.

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ATTACHMENT A

Figures 1-15 through 1-19 and Table 1

Based on a 2006 detailed digitizing of all base grounds by the Conservation Management Institute of Virginia Tech University, Table 2-2 represents the current acreages of the various grounds maintenance categories on Tinker AFB.

Table 2-2. Grounds Maintenance Land Use Classification.

Grounds Classification	Acreage	% of Total Base Acreage
Improved (Paved/Built)	1640	37%
Improved (Turf and Landscape Beds)	945*	22%
Semi-improved Grounds	1205	28%
Unimproved Grounds	564	13%
Total Grounds Acreage**	**4356**	

* Landscape beds comprise 2 acres of this category
** This acreage does not include easements for which Tinker AFB does not manage grounds

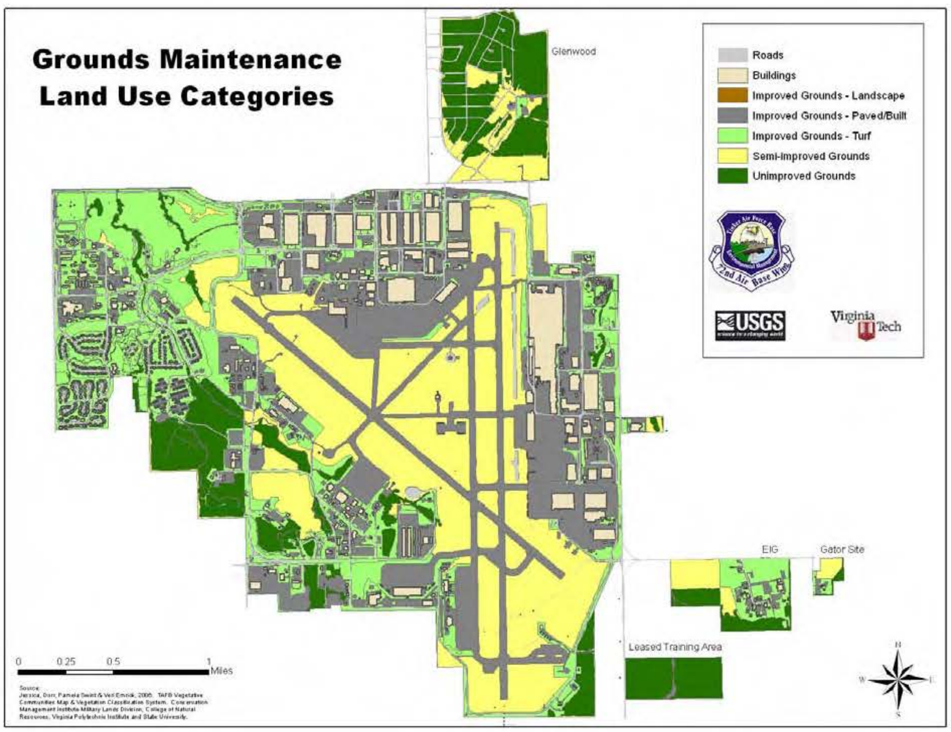
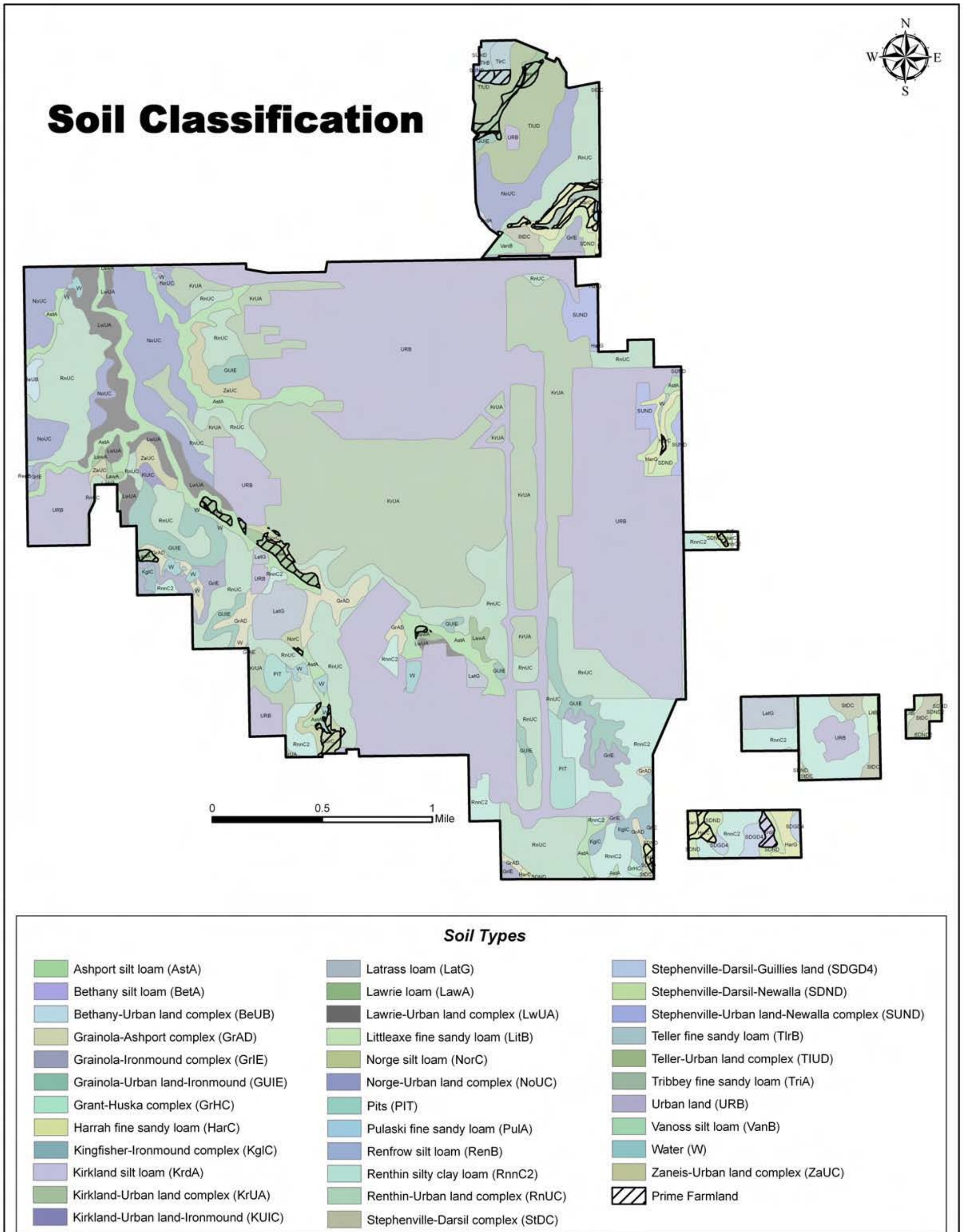


Figure 1-15 Land Use Categories

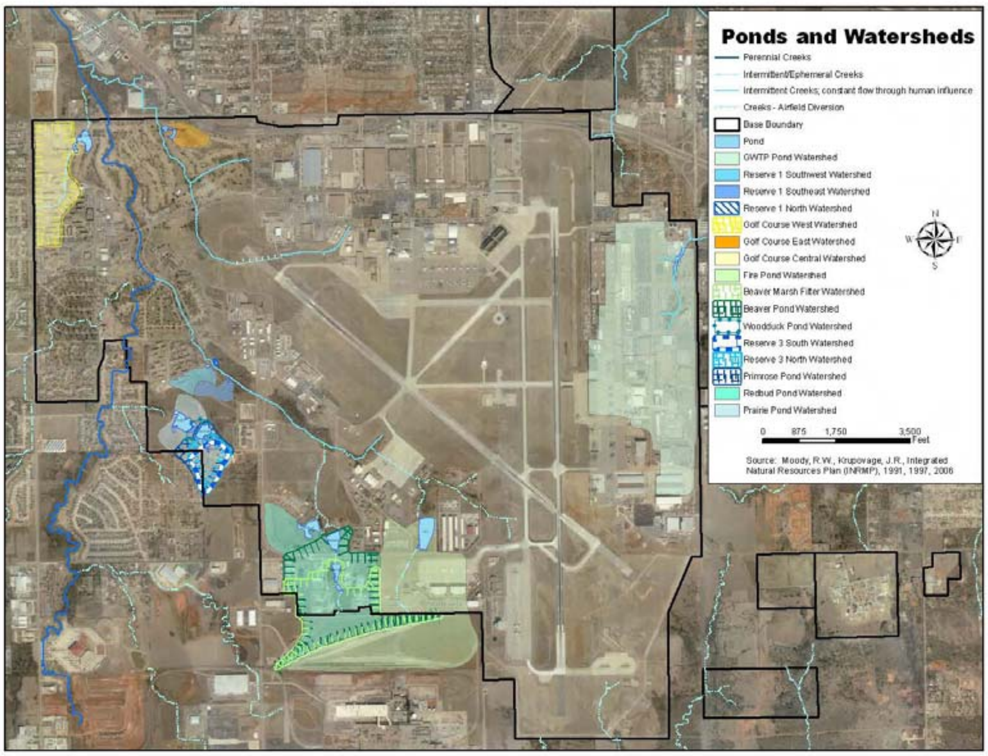


Source: NRCS

Figure 10-11. Soil types occurring on Tinker AFB

Figure 1-16 Soil Classifications

Surface water degradation is primarily due to nonpoint-source pollution. The most common examples include sediment from soil erosion associated with construction/ demolition activities; automobile oil/fluid runoff from parking lots; runoff from areas treated with fertilizers and pesticides; chemical substances from spills associated with industrial activities; and deicing compounds from roadways, taxiways, runways, ramp areas, and aircraft. Some indications of non-point source pollution include periodic fish kills and depauperate aquatic floral and faunal communities.



Tinker is considered to be a federal aviation facility and is therefore required by the Oklahoma Department of Environmental Quality (ODEQ) to possess storm water discharge permits. The base has eleven permitted discharge points that fall into one of the following two permit categories: 1) National Pollutant Discharge Elimination System (NPDES) permit for source pollution and 2) construction site permit for all construction sites. Occasional NPDES permit exceedances have occurred.

Figure 1-17a Ponds & Watersheds

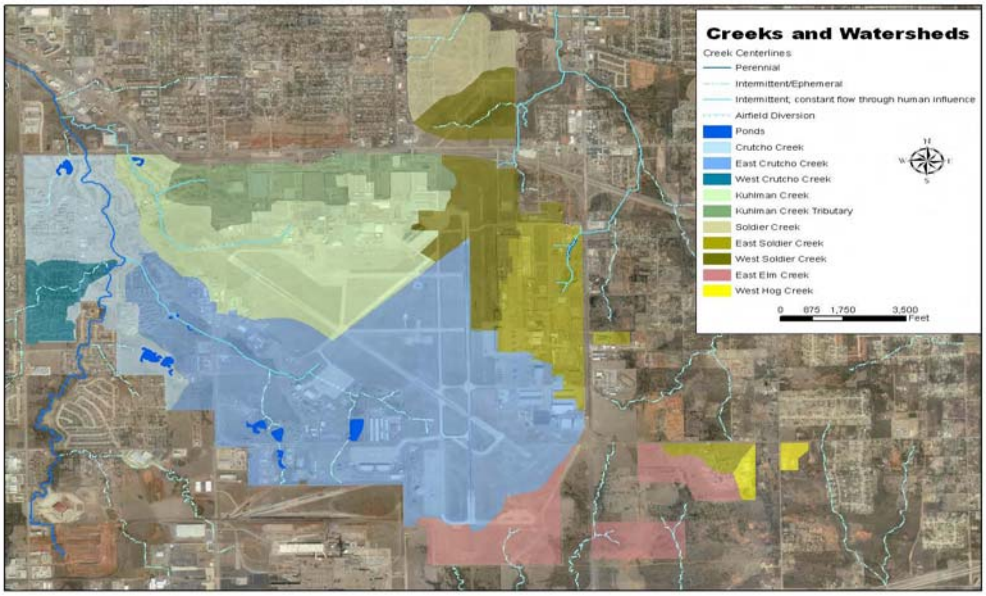


Figure 1-17b Creeks & Watersheds

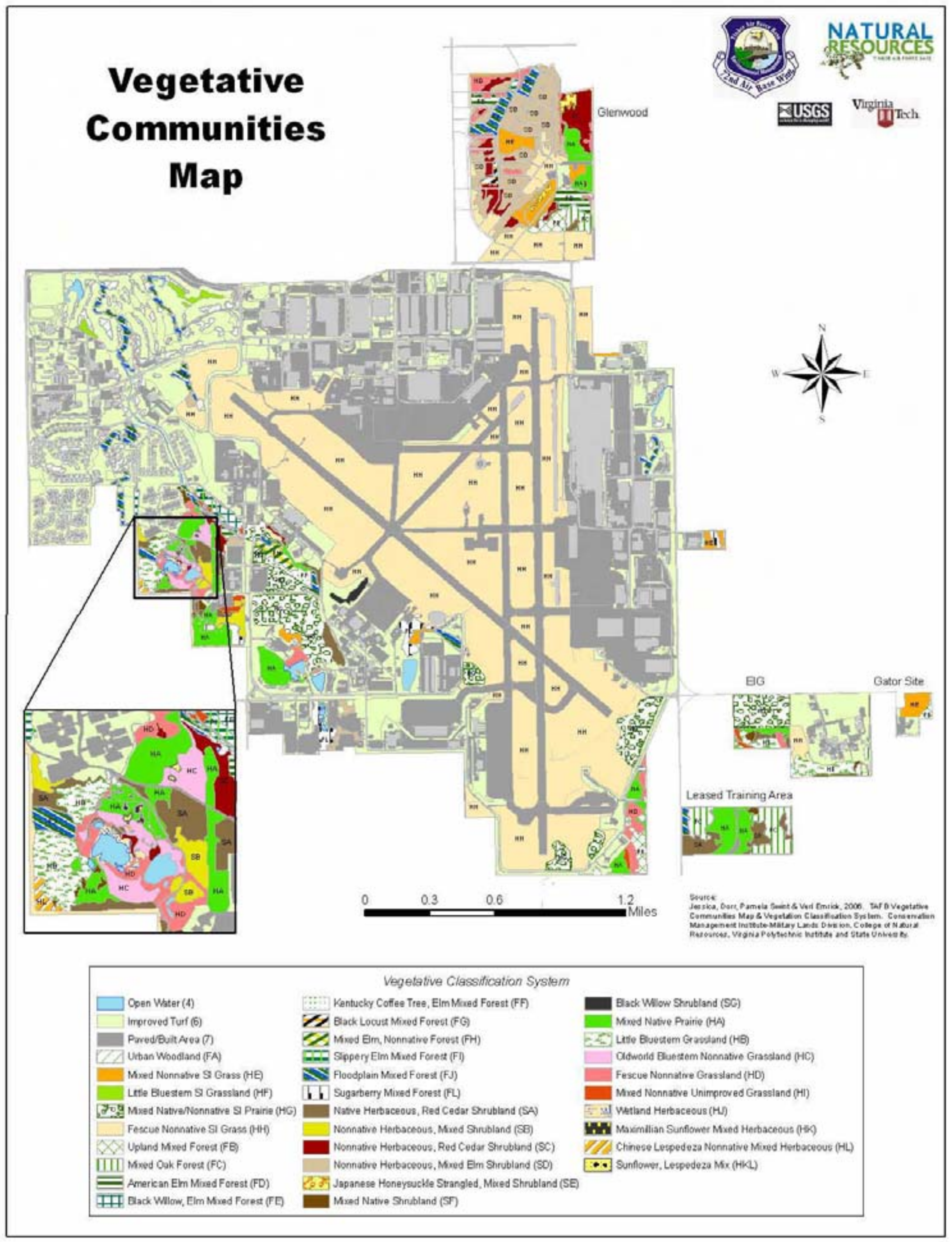
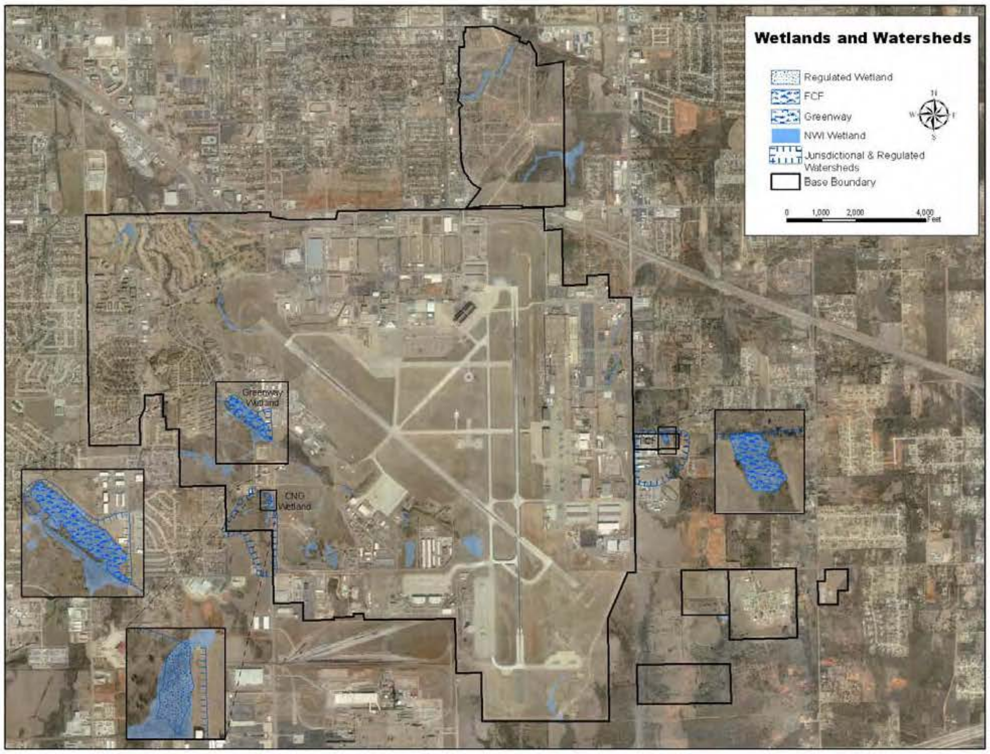


Figure 1-18 Vegetative Communities



This excluded the off-base portion (8.5 acres) of the Glenwood wetland which was located immediately adjacent to the east of the base on county and private land. All jurisdictional wetlands on TAFB were man-made with the exception of the Glenwood Wetland which was created by beaver activity.

Quality rankings for base jurisdictional wetlands.

Jurisdictional Wetland	Quality Ranking
Compressed Natural Gas (CNG)	Intermediate
Greenway	High
Fuel Control Facility (FCF)	Intermediate

In 1999, the Glenwood wetland was drained because it attracted waterfowl which presented an aircraft strike hazard. Mitigation for the Glenwood wetland removal included the construction of wetlands in the cities of Choctaw (two wetlands totaling 2.3 acres) and McCloud (3 acres), Oklahoma; Eagle Ridge Institute in Oklahoma City (3 acres); and at the Kids-We-Care site (three wetlands totaling 10 acres) south of Guthrie, Oklahoma. Mitigation acreages are approximated.

Figure 1-19 Wetlands

Table 1 Tinker Active Wells

LOCID	AQUIFER ZONE	NCOORD	ECOORD	ESTDATE	MPELEV	ELEV	WIMSID
105-MW11	USZ	155693.4	2153561.6	12-Aug-91	1275.93	1276.17	OT001
105-MW12	USZ	155679.19	2153478.49	29-Jul-92	1275.91	1276.19	OT001
105-MW13	USZ	155780.42	2153497.45	28-Jul-92	1275.91	1276.15	OT001
105-MW14	USZ	155763.74	2153543.88	28-Jul-92	1275.88	1276.16	OT001
10A	USZ	150205.15	2146061.03	15-Nov-83	1255.63	1253.52	LF014
10B	HWBZ	150204.49	2146070.5	11-Dec-87	1255.9	1253.23	LF014
10C	LSZ	150202.59	2146082.02	11-Dec-87	1255.55	1252.91	LF014
10D	LLSZ	150207.7	2146047.4	20-Mar-95	1255.87	1253.25	LF014
10E	HWBZ	150210.32	2146036.37	31-Mar-95	1255.81	1253.15	LF014
1-10AR	LSZ	156350.19	2153815.47	18-Oct-93	1268.87	1269.02	OT001
1-10BR	USZ	156353.03	2153822.54	03-Nov-93	1268.52	1268.72	ST003
1-10CR	LLSZ	156350.54	2153800.23	01-Nov-93	1268.89	1268.89	OT001
1-116A	LSZ	157032.18	2154744.18	28-Nov-94	1270.79	1267.84	OF059
1-116B	LSZ	157033.45	2154755.12	17-Dec-94	1270.9	1268.09	OF059
1-116C	LLSZ	157032.62	2154733.83	22-Dec-94	1270.72	1267.8	OF059
1-11A	LSZ	156156.15	2154891.6	11-Apr-86	1270.52	1268.2	OT001
1-11BR	USZ	156182.58	2154890.82	16-Sep-93	1268.81	1269.11	OT001
1-11C	LLSZ	156134.41	2154894.23	09-Mar-87	1268.17	1268.2	OT001
1-12AR	LSZ	155919.84	2152927.4	10-Sep-93	1262.58	1263.1	OT001
1-12BR	USZ	155929.8	2152929.12	13-Aug-93	1262.87	1263	OT001
1-12CR	LLSZ	155902.92	2152926.46	09-Sep-93	1262.89	1262.99	OT001
1-12D	PZ	155893.58	2152926.63	08-Sep-93	1263.06	1263.1	OT001
1-13AR	LSZ	155088.85	2152918.6	14-Sep-93	1265.02	1265.39	OT001
1-13B	USZ	155098.43	2152902.5	26-Aug-86	1265.01	1265.4	OT001
1-13CR	LLSZ	155077.92	2152923.84	15-Sep-93	1265.27	1265.52	OT001
1-13D	PZ	155067.28	2152923.5	10-Sep-93	1265.18	1265.52	OT001
1-14AR	LSZ	154409.18	2152917.97	13-Sep-93	1266.55	1266.57	OT001
1-14B	USZ	154426.43	2152908.51	10-Jul-86	1266.13	1266.7	OT001
1-14CR	LLSZ	154396.2	2152927.52	16-Sep-93	1266.84	1266.89	OT001
1-14D	PZ	154386.39	2152926.54	14-Sep-93	1266.87	1266.78	OT001
1-15AR	LSZ	155106.96	2154426.23	19-Oct-93	1275.59	1275.65	OT001
1-15BR	USZ	155096.02	2154423.48	28-May-96	1275.93	1276	OT001
1-15CR	LLSZ	155116.28	2154426.87	18-Oct-93	1275.36	1275.55	OT001
1-15D	PZ	155122.8	2154427	15-Oct-93	1275.56	1275.55	OT001
1-16	USZ	153091.07	2153191.83	17-Nov-86	1270.18	1270.75	ST006
1-17	USZ	153607.63	2153182.62	18-Nov-86	1268.68	1269.19	ST006
1-18	USZ	153711.17	2153319.92	27-Oct-86	1275.07	1275.58	ST006
11A	USZ	150800.81	2145457.4	17-Nov-83	1242.49	1238.76	LF014
1-1A	LSZ	155990.95	2154414.9	28-Mar-86	1273.3	1273.3	OT001
11B	LSZ	150791.88	2145459.01	10-Nov-87	1241.03	1238.44	LF014
1-1BR	USZ	155992.56	2154425.62	27-Oct-93	1273.28	1273.49	OT001
11C	HWBZ	150779.59	2145462.29	03-Aug-88	1240.43	1237.8	LF014
12	USZ	147658.19	2157585	17-Nov-83	1297.7	1304.11	LF016
123RW-1A	LSZ	156886.02	2177498.1	12-Dec-97		1224.37	ST123
123RW-2A	LSZ	157010.23	2145714.4	12-Dec-97		1224.03	ST123
123RW-3A	LSZ	157154	2146099.3	17-Dec-97		1223.93	ST123

123RW-4A	LSZ	157335.26	2145973.81	12-Dec-97		1222.72	ST123
1-27	USZ	156138.44	2153620.5	24-Oct-86	1273	1273	ST003
1-28AR	LSZ	155881.38	2152209.46	10-Nov-93	1259.43	1259.55	OT001
1-28B	USZ	155893.24	2152207.8	08-Jan-86	1259.28	1259.43	OT001
1-29	USZ	156220.98	2152277.16	08-Jan-86	1258.54	1257.9	OT001
1-2A	LSZ	154086.62	2154201.55	17-Apr-86	1275.67	1275.5	OT001
1-2B	USZ	154085.14	2154212.42	18-Apr-86	1275.94	1275.7	OT001
1-2D	PZ	154082.44	2154210.52	05-Nov-93	1275.4	1275.77	OT001
13	USZ	148746.55	2150884	20-Nov-83	1257.6	1261.71	LF015
1-36	LSZ	155224.45	2154997.51	21-May-87	1270.7	1267.7	OT001
1-38	LSZ	155225.46	2155227.51	21-May-87	1253.24	1252.8	OT001
13A	LSZ	148748.74	2150872.41	16-Oct-86	1262.54	1262.8	LF015
1-3AR	LSZ	153255.67	2154235.15	04-Nov-93	1275.8	1275.91	OT001
1-3B	USZ	153240.84	2154215.72	22-Apr-86	1275.79	1276.6	OT001
1-40	LSZ	155226.46	2155487.51	21-May-87	1237.5	1234.5	OT001
1-41	LSZ	155228.21	2155567.5	21-May-87	1247.6	1244.6	OT001
1-42	LSZ	155227.46	2155667.51	21-May-87	1252.9	1249.9	OT001
1-45AR	LSZ	153158.67	2152931.84	16-Aug-93	1268.45	1268.6	OT001
1-45B	USZ	153167.24	2152922.73	16-Oct-87	1267.95	1268.34	OT001
1-45CR	LLSZ	153148.44	2152931.88	17-Aug-93	1268.65	1268.71	OT001
1-49AR	LSZ	155927.71	2155207.59	12-Nov-93	1256.74	1254.21	OT005
1-49B	LSZ	155953.53	2155204.84	26-Feb-88	1257.5	1254.7	OT005
1-49C	LLSZ	155938.85	2155206.27	09-Aug-89	1257.45	1254.6	OT005
1-4AR	LLSZ	152626.19	2154218.07	28-Oct-93	1275.4	1275.69	OT001
1-4B	USZ	152614.64	2154217.33	26-Apr-86	1275.48	1275.7	OT001
14P9701		150912.93	2145747.38	29-Sep-97	1236.01	1236.31	LF014
14P9702	HWBZ	150674.41	2145761.33	28-Sep-97	1247.65	1247.95	LF014
14P9703	HWBZ	150333.83	2145820.05	28-Sep-97	1255.02	1255.32	LF014
14P9704	HWBZ	150856.79	2146149.93	28-Sep-97	1246.57	1246.87	LF014
14P9705	HWBZ	150371.48	2146097.68	28-Sep-97	1258.45	1258.75	LF014
15	HWBZ	146502.55	2154273.5	29-Nov-83	1309.89	1310.46	VI084
1-50AR	LSZ	155587.91	2155307.42	17-Dec-93	1248.15	1245.68	OT005
1-50BR	LSZ	155586.82	2155317.59	02-Dec-93	1247.63	1245.16	OT005
1-50CR	LLSZ	155586.89	2155297.17	11-Jan-94	1248.99	1246.16	OT005
1-50DR	PZ	155582.18	2155357.19	16-Dec-94	1246.71	1244.1	OT005
1-51AR	LSZ	155781.61	2155587.31	11-Jan-94	1242.54	1239.71	OT005
1-51B	LSZ	155804.62	2155587.38	18-Feb-88	1242.6	1239.97	OT005
1-51C	LLSZ	155812.7	2155587.68	17-Aug-89	1243.16	1240.03	OT005
1-52A	LSZ	156021.2	2155843.52	23-Feb-88	1236.4	1233.78	OT005
1-52B	LSZ	156012.06	2155845.75	23-Feb-88	1237	1233.98	OT005
1-52C	LLSZ	156032.87	2155845.39	05-Jul-90	1237	1234.06	OT005
1-53A		156341.7	2155599.57	09-Mar-88	1250.2	1247.57	OT005
1-53B	LSZ	156341.96	2155582.3	09-Mar-88	1251.5	1248.51	OT005
1-53C	LLSZ	156341.4	2155591.06	09-Mar-88	1249.24	1249.27	OT005
1-59AR	LSZ	156338.93	2155156.09	18-Jan-94	1265.72	1265.72	OT001
1-59B	USZ	156339.46	2155048	18-Jan-95	1267.34	1267.73	OT001
1-59CR	LLSZ	156339.21	2155142.54	14-Jan-94	1266.09	1266.14	OT001

1-5AR	LSZ	153436.61	2154024.27	06-Dec-93	1274.75	1274.98	OT001
1-5BR	USZ	153435.63	2153995.31	29-Jul-10	1275.16	1275.72	OT001
1-5C	LLSZ	153436.65	2154014.97	08-Dec-93	1274.59	1274.81	OT001
1-60A	LSZ	156340.93	2154567.77	21-Mar-90	1270.31	1270.48	OT001
1-60B	USZ	156340.22	2154550.31	15-Mar-90	1270.59	1270.78	OT001
1-60CR	LLSZ	156335.11	2154588.69	13-Jan-94	1270.37	1270.56	OT001
1-61A		151542.95	2153316.73	12-May-93	1274.73	1275.02	OT001
1-61BR	USZ	151544.85	2153332.61	29-Jun-98	1274.77	1274.96	OT001
1-61C	LSZ	151543.59	2153303.28	11-May-93	1274.43	1274.71	OT001
1-61D	LLSZ	151544.24	2153290.06	10-May-93	1274.32	1274.58	OT001
1-62A	LSZ	156382.67	2151019.25	05-May-93	1253.13	1253.44	ST007
1-62B	USZ	156394.36	2151023.34	05-May-93	1253.3	1253.6	ST007
1-62C	LSZ	156378.41	2151002.93	06-May-93	1253.04	1253.35	OT001
1-63A	LSZ	151655.56	2154668.98	14-May-93	1279.18	1279.79	OT001
1-63B	USZ	151654.12	2154680.31	28-Apr-93	1279.53	1279.72	
1-63C	LSZ	151656.35	2154658.98	14-May-93	1279.63	1279.83	OT001
1-63D	LLSZ	151657.99	2154649.28	15-Jul-96	1279.38	1279.71	OT001
1-64A	LSZ	154329.41	2154220.12	21-May-93	1275.65	1275.69	OT001
1-64B	USZ	154355.39	2154218.49	28-May-93	1275.97	1276.23	OT001
1-64C	LLSZ	154321.14	2154219.71	22-May-93	1275.72	1275.87	OT001
1-64D	LLSZ	154311.38	2154219.45	22-May-93	1275.67	1275.9	OT001
1-65A	LSZ	154886.28	2151058	21-May-93	1253.37	1253.72	OT001
1-65B	USZ	154894.89	2151069.78	20-May-93	1253.6	1253.9	OT001
1-65C	LLSZ	154877.59	2151047.9	21-May-93	1253.37	1253.72	OT001
1-66A	LSZ	153347.38	2150401.63	04-Jun-93	1244.28	1244.61	OT001
1-66C	LLSZ	153337.47	2150392.79	04-Jun-93	1244.26	1244.62	OT001
1-67A	LSZ	151562.5	2152068.28	28-May-93	1264.75	1264.98	OT001
1-67B	USZ	151573.47	2152068.75	27-May-93	1264.82	1264.52	OT001
1-67C	LSZ	151551.99	2152067.92	02-Jun-93	1264.77	1264.48	OT001
1-68B	LSZ	154470.24	2155444.41	09-Sep-93	1247.75	1248.01	OT001
1-68C	LLSZ	154450.75	2155443.96	20-Sep-93	1247.84	1247.9	OT001
1-69A	LSZ	154128.2	2153387.65	22-Nov-93	1273.94	1273.96	OT001
1-69B	USZ	154137.95	2153387.22	09-Nov-93	1274.08	1273.95	ST216
1-69C	LLSZ	154118.2	2153387.95	02-Dec-93	1273.96	1273.85	OT001
1-69D	LLSZ	154106.53	2153387.8	06-Dec-93	1274.06	1274.4	OT001
1-69E	PZ	154094.46	2153386.72	11-Jun-09	1274.43	1274.92	OT001
1-6AR	LSZ	152815.14	2153793.27	27-Oct-93	1274.72	1275.01	OT001
1-6BR	USZ	152815.64	2153801.6	22-Oct-93	1274.61	1274.93	OT001
1-6C	LLSZ	152815.17	2153784.15	29-Oct-93	1274.86	1275.1	OT001
16R	HWBZ	146461.95	2154219.29	15-Aug-96	1311.13	1309	VI084
16RT	HWBZ	146454.35	2154229.89	16-Sep-02	1308.45	1309	VI084
1-70A	LSZ	155588.53	2153375.4	07-Oct-93	1273.02	1272.85	OT001
1-70B	USZ	155598.89	2153375.83	04-Oct-93	1273	1272.69	OT001
1-70C	LLSZ	155577.74	2153374.48	11-Oct-93	1272.98	1273.3	OT001
1-70D	PZ	155568.4	2153374.12	13-Oct-93	1273.3	1273.27	OT001
1-70E	PZ	155550.22	2153374.6	19-Jun-95	1273.04	1273.63	OT001
1-71D	PZ	157669.87	2153822.54	22-Sep-93	1256.4	1256.46	OT001

1-72A	LSZ	152073.39	2154337.59	23-Nov-93	1274.34	1274.66	OT001
1-72B	USZ	152080.11	2154337.6	11-Nov-93	1274.35	1274.65	
1-72C	LSZ	152067.43	2154337.56	19-Nov-93	1274.39	1274.66	OT001
1-72D	PZ	152061.45	2154337.47	18-Nov-93	1274.44	1274.71	OT001
1-73A	LSZ	158677.3	2151924.95	01-Nov-93	1256.03	1256.39	OT001
1-73D	PZ	158678.2	2151908.8	05-Nov-93	1256.27	1256.49	OT001
1-74A	LSZ	157231.59	2152100.65	18-Aug-93	1258.65	1259.01	OT001
1-74B	USZ	157230.96	2152112.01	02-Aug-93	1258.66	1258.84	OT001
1-74C	LLSZ	157231.98	2152090.49	30-Aug-93	1258.74	1259.03	OT001
1-74D	LLSZ	157232.64	2152079.85	31-Aug-93	1258.92	1259.04	OT001
1-75A	LSZ	156491.39	2152922.04	27-Aug-93	1261.51	1261.43	OT001
1-75B	USZ	156503.59	2152922.06	16-Aug-93	1261.27	1261.29	CG037
1-75C	LLSZ	156480.6	2152921.87	27-Aug-93	1261.3	1261.5	OT001
1-75D	PZ	156469.12	2152922.48	26-Aug-93	1261.4	1261.53	OT001
1-76A	LSZ	157088.57	2152925.43	06-Aug-93	1258.99	1259.26	OT001
1-76B	USZ	157098.76	2152924.93	26-Aug-93	1259.01	1259.16	OT001
1-76C	LLSZ	157075.44	2152927.47	25-Aug-93	1258.98	1259.06	OT001
1-7AR	LSZ	154623.35	2153312.26	16-Sep-93	1275.14	1272.69	OT001
1-7BR	USZ	154623.03	2153321.55	03-Sep-93	1275.15	1272.85	OT001
1-7C	LLSZ	154663.03	2153300.89	16-Apr-87	1275.08	1272.4	OT001
1-7D	LLSZ	154622.58	2153301.78	20-Sep-93	1275.04	1272.46	OT001
1-81A	LLSZ	157552.28	2155539.2	03-Nov-94	1271.26	1271.69	OT002
1-81B	LSZ	157542.15	2155540.07	15-Nov-94	1271.64	1271.86	OT002
1-81C	LLSZ	157561.84	2155537.35	03-Nov-94	1271.25	1271.64	OT002
1-85A		156811.29	2156071.68	08-Nov-94	1260.38	1260.7	OT002
1-85B		156813.39	2156084.49	21-Oct-94	1260.55	1260.7	OT002
1-85C		156810.02	2156062.88	09-Nov-94	1260.34	1260.58	OT002
1-86B	LSZ	157380.97	2154372.9	09-Nov-94	1250.17	1250.56	OT002
1-8A	LLSZ	155088.34	2153364.21	09-Jan-86	1273.03	1273.6	OT001
18B	HWBZ	149038	2153567.84	10-Feb-84	1278	1275.99	WP018
1-8BR	USZ	155078.84	2153367.21	15-Dec-93	1276.12	1273.56	OT001
1-90A	LSZ	156556.66	2155092.55	24-Oct-94	1272.62	1272.67	OT002
1-90B	USZ	156569.43	2155091.19	22-Oct-94	1273.07	1273.2	OT002
1-90C	LLSZ	156547.35	2155096.39	25-Oct-94	1272.51	1272.83	OT002
1-91A	LSZ	156546.04	2155045.66	01-Nov-94	1272.84	1272.46	OT002
1-91C	LLSZ	156555.63	2155039.61	11-Nov-94	1272.49	1272.92	OT002
1-92		153561.75	2153409.04	21-Oct-93	1276.49	1276.6	ST006
1-94		153507.15	2153395.12	21-Oct-93	1276.2	1276.47	ST006
1-95		153479.77	2153415.77	21-Oct-93	1275.87	1276.16	ST006
1-97B	USZ	156801.8	2152938.51	15-Jun-01	1260.5	1260.88	OT001
19AR	LSZ	155331.02	2154889.34	27-Jul-00	1268.04	1268.53	OT001
1-9AR	LSZ	156039.33	2153348.61	20-Sep-93	1274.35	1271.71	ST003
19BR	USZ	155371.11	2154891.77	08-Oct-93	1267.09	1267.49	OT001
1-9BR		156048.22	2153349.12	08-Sep-93	1274.21	1271.68	ST003
1-9C	LLSZ	156031.44	2153347.79	16-Sep-93	1274.33	1271.71	OT001
19CR	LLSZ	155379.9	2154890.89	06-Oct-93	1267.45	1267.59	OT001
D	PZ	155388.95	2154890.81	07-Oct-93	1267.23	1267.59	OT001

1-9D	LLSZ	156022.1	2153346.71	21-Sep-93	1274.21	1271.56	OT001
1AR	USZ	152188.37	2145787.34	19-May-95	1218.56	1216.01	LF011
1B	HWBZ	152189.5	2145762.12	15-Nov-83	1256.03	1216.74	LF011
1C	LSZ	152183.65	2145741.42	02-May-95	1220.47	1217.91	LF011
20A		154453.95	2154892.02	27-Jun-84	1271.58	1268.6	OT001
20BR		154423.93	2154898.14	12-Oct-93	1267.86	1268.26	OT001
20C		154412.31	2154897.89	13-Oct-93	1267.98	1268.24	OT001
20D		154401.29	2154897.75	05-Oct-93	1267.85	1268.24	OT001
2-1	HWBZ	148832.08	2153889.5	18-Dec-86	1276.39	1276.88	WP018
2-101B	USZ	146692.12	2157646.08	30-Dec-94	1284.14	1281.05	LF016
2-102A	LSZ	147988.56	2157326.53	21-Dec-94	1301.95	1299.21	LF016
2-102B	USZ	147997.33	2157326.51	19-Dec-94	1302.04	1298.96	LF016
2-104B	USZ	148101.44	2159111.5	17-Oct-94	1311.83	1309.43	LF016
2-105A	LSZ	149017.36	2158656.94	08-Nov-94	1291.19	1288.89	LF016
2-106B	USZ	148061.45	2152192.68	14-Apr-95	1263.63	1264.28	CG039
2-107A	LSZ	152151.24	2155852.2	12-Dec-94	1286.88	1284.31	CG039
2-107B	USZ	152161.91	2155852.59	11-Nov-94	1286.3	1284.46	CG039
2-108A	LSZ	151390.91	2155851.75	07-Dec-94	1287.58	1285.15	CG039
2-108B	USZ	151403.33	2155850.48	11-Nov-94	1287.29	1284.79	CG039
2-108BT	USZ	151414.87	2155847.89	06-Sep-02	1287.54	1285.15	CG039
2-108C	LLSZ	151379.43	2155854.35	08-Dec-94	1287.37	1285.5	CG039
2-109A	LSZ	150411.09	2155859.52	10-Dec-94	1294.03	1294.49	CG039
2-109B	USZ	150421.15	2155859.26	01-Dec-94	1293.92	1294.26	CG039
2-10AR	LSZ	152081.1	2155424.25	24-Mar-06	1271.18	1271.18	ST032
2-10BR	USZ	152089	2155417.81	21-Mar-06	1270.97	1270.97	ST032
2-10CR	LLSZ	152072.83	2155430.02	22-Mar-06	1271.39	1271.39	ST032
2-11	USZ	152433.1	2145777.37	21-Oct-92	1221.78	1219.47	WP017
2-110A	LSZ	148722.19	2155785.9	07-Dec-94	1298.98	1296.24	CG039
2-110B	USZ	148733.2	2155794.97	03-Nov-94	1298.28	1295.77	CG039
2-111A	LSZ	148998.77	2152130.87	28-Mar-95	1258.59	1259.11	CG039
2-111B	USZ	148998.91	2152144.56	29-Mar-95	1258.48	1258.87	CG039
2-112A	LSZ	149422.53	2150150.69	23-Jan-95	1251.41	1248.03	LF015
2-112B	USZ	149433.52	2150150.53	20-Jan-95	1250.89	1247.65	LF015
2-113A	LSZ	148956.53	2150112.79	26-Jan-95	1256.52	1253.45	LF015
2-113B	USZ	148969.64	2150112.74	25-Jan-95	1256.57	1253.31	LF015
2-114A	LSZ	148549.82	2150318.12	03-Feb-95	1266.39	1263.49	LF015
2-114B	USZ	148549.5	2150330.99	31-Jan-95	1266.77	1263.47	LF015
2-115A	LSZ	148111.26	2150812.68	21-Jan-95	1264.59	1262.23	LF015
2-115B	USZ	148124.47	2150812.46	14-Jan-95	1264.37	1262.05	LF015
2-116A	LSZ	147893.5	2161492.45	28-Oct-94	1305.45	1303.18	CG040
2-116B	USZ	147902.56	2161492.71	31-Oct-94	1305.69	1303.24	CG040
2-116C	LLSZ	147883.68	2161492.46	01-Aug-96	1305.56	1302.74	CG040
2-117A	LSZ	147975.43	2161863.36	27-Oct-94	1294.88	1292.52	CG040
2-117B	USZ	147968.61	2161857.97	27-Oct-94	1295.04	1292.6	CG040
2-118A	LSZ	147563.9	2161785.93	26-Oct-94	1284.8	1282.28	CG040
2-118B	USZ	147572.69	2161786.06	26-Oct-94	1284.88	1282.44	CG040
2-118C	LLSZ	147554.13	2161785.71	01-Aug-96	1283.96	1281.82	CG040

2-118D	LLSZ	147546.69	2161783.54	04-Sep-97	1283.98	1281.74	CG040
2-118E	LSZ	147532.49	2161783.21	26-Sep-02	1283.77	1281.32	CG040
2-119B	USZ	149141.65	2153377.04	13-Feb-95	1277.97	1275.14	CG039
2-12	LSZ	152551.2	2145792.57	22-Oct-92	1223.08	1220.75	WP017
2-120A	LSZ	148128.02	2156737.25	15-Dec-94	1280.03	1277.23	LF016
2-120B	USZ	148138.22	2156738.52	14-Dec-94	1279.91	1277.31	LF016
2-122C	LSZ	152977.54	2145861.06	07-Apr-95	1232.06	1229.47	WP017
2-123A	USZ	152221.17	2145295.6	31-Mar-95	1222.76	1220.37	FT021
2-123B	HWBZ	152220.87	2145308.51	31-Mar-95	1222.63	1220.13	FT021
2-124A	USZ	151141.98	2144914.47	16-Mar-95	1264.54	1261.89	LF014
2-126A	USZ	150001.84	2146336.13	24-Mar-95	1246.55	1244.39	LF012
2-126C	LSZ	149996.14	2146345.75	30-Mar-95	1246.48	1244.07	LF012
2-127A		149310.8	2146009.35	22-Mar-95	1252.79	1250.63	LF012
2-127C		149298.71	2146008.93	22-Mar-95	1252.92	1250.62	LF012
2-128A	USZ	149513.95	2146897.03	01-Mar-95	1237.47	1235.92	LF012
2-128C	LSZ	149506.65	2146904.13	27-Feb-95	1237.58	1235.88	LF012
2-129A	USZ	149019.52	2147810.19	22-Feb-95	1256.39	1253.65	LF012
2-129B	HWBZ	149009.39	2147817.28	06-Mar-95	1256.86	1253.86	LF012
2-129C	LSZ	149028.89	2147802.48	01-Mar-95	1256.24	1253.23	LF012
2-13	LSZ	152599.05	2145885.17	23-Oct-92	1224.22	1221.8	WP017
2-130A	USZ	149237.8	2148457.68	30-Mar-95	1268.7	1266.04	LF012
2-130B	HWBZ	149249.56	2148457.99	31-Mar-95	1268.53	1266.14	LF012
2-130C	LSZ	149226.19	2148457.75	03-Apr-95	1269.06	1266.41	LF012
2-131A	USZ	150099.64	2147893.68	18-Feb-95	1246.36	1243.67	LF012
2-131B	HWBZ	150094.61	2147899.25	23-Feb-95	1246.27	1243.94	LF012
2-131D	LLSZ	150114.59	2147885.04	27-Feb-95	1245.8	1243.48	LF012
2-132A	USZ	148947.41	2146831.88	18-Feb-95	1253.43	1253.78	LF012
2-132C	LSZ	148936.62	2146825.06	11-Mar-95	1254.4	1254.71	LF012
2-132D	LLSZ	148926.91	2146818.46	10-Mar-95	1254.91	1255.21	LF012
2-134A	LSZ	153460.74	2145544.15	20-Apr-95	1227.14	1227.55	OT050
2-134B	USZ	153474.51	2145543.4	06-Apr-95	1226.95	1227.52	OT050
2-135A	LSZ	153298.35	2145544.57	21-Apr-95	1227.39	1227.77	OT050
2-135B	USZ	153274.21	2145545.67	06-Apr-95	1227.84	1228.15	OT050
2-135C		153297.43	2145543.46	11-Jul-97	1227.25	1227.69	OT050
2-136A	LSZ	152988.21	2145270.05	24-Apr-95	1218	1216.11	OT050
2-136B	USZ	152975.95	2145279.58	06-Apr-95	1218.32	1215.99	OT050
2-136C	LSZ	152997.84	2145262.49	24-Jul-96	1218.87	1216.19	OT050
2-137A	LSZ	156153.5	2145451.01	21-Apr-95	1230.47	1228.01	CG037
2-137C	LSZ	156141.14	2145451.11	20-Apr-95	1230.26	1227.79	CG037
2-137D	PZ	156128.95	2145451.27	24-Apr-95	1229.82	1227.47	CG037
2-138A	LSZ	155113.2	2147093.76	12-May-95	1226.36	1226.83	OF060
2-138B	USZ	155102.35	2147101.43	12-May-95	1226.39	1226.73	OF060
2-138BL	USZ	155131.02	2147079.8	13-Mar-13	1226.66	1227.15	OF060
2-138C	LLSZ	155123.32	2147086.12	10-May-95	1226.18	1226.65	OF060
2-139A	LSZ	153925.37	2148476.11	05-May-95	1235.34	1235.83	OF060
2-139B	USZ	153917.14	2148485.85	05-May-95	1235.49	1235.99	OF060
2-139C	LLSZ	153933.67	2148466.6	04-May-95	1235.39	1235.83	OF060

2-139D	PZ	153941.62	2148456.24	03-May-95	1235.43	1235.87	OF060
2-14	USZ	149603.18	2154061.44	18-Dec-92	1288.26	1288.49	WP036
2-140A	LSZ	155635.88	2148669.42	01-Jun-95	1240.51	1237.95	OF060
2-140B	USZ	155643.58	2148669.16	24-May-95	1240.69	1238.09	OF060
2-140BU	USZ	155648.67	2148668.85	16-Jan-13	1238.66	1239.07	OF060
2-140C	LLSZ	155626.87	2148669.17	30-May-95	1240.27	1237.8	OF060
2-142B	USZ	151591.81	2149218.17	19-May-95	1242.09	1242.45	CG038
2-143A	LSZ	155389.46	2143806.79	07-Apr-95	1223.1	1220.61	CG037
2-143B	USZ	155386.5	2143820.09	12-Apr-95	1223.23	1220.91	CG037
2-143C	LSZ	155392.07	2143793.96	12-Apr-95	1223.01	1220.64	CG037
2-144A	LSZ	154752.19	2145278	04-Apr-95	1223	1220.52	CG037
2-144B	USZ	154743.73	2145287.99	03-Apr-95	1222.86	1220.4	CG037
2-144C	LSZ	154760.16	2145268.78	19-Jul-96	1222.9	1220.28	CG037
2-145B	USZ	158602.58	2148943.88	14-Jun-95	1242.75	1243.28	ST033
2-146B	USZ	158205.45	2148856.89	13-Jun-95	1240.7	1241.16	ST033
2-147A	USZ	147160.92	2149518.87	01-Feb-95	1271.51	1268.58	OF059
2-148A	LSZ	158710.64	2149910.8	11-May-95	1250.11	1247.45	OF059
2-148B	USZ	158722.57	2149910.89	20-May-95	1250.12	1247.46	OF059
2-149A	LSZ	158560.72	2148128.29	05-Jun-95	1236.72	1237.39	OF059
2-149B	USZ	158561.58	2148139.81	07-Jun-95	1236.55	1237.08	OF059
2-149C	LLSZ	158560.47	2148117.86	06-Jun-95	1237.23	1237.75	OF059
2-14A	LSZ	149603.26	2154089.14	15-Oct-93	1288.44	1288.38	WP036
2-15	USZ	149468.63	2153980.73	18-Dec-92	1285.97	1286.09	WP036
2-150A	LSZ	158521.82	2146800.34	17-May-95	1233.78	1231.28	CG037
2-150B	USZ	158522.04	2146813.13	10-May-95	1234.05	1231.4	CG037
2-151A	LSZ	157255.05	2147447.61	17-May-95	1235.89	1233.26	OF060
2-151B	USZ	157254.78	2147459.57	16-May-95	1235.99	1233.49	OF060
2-152A		157730.62	2149135.38	18-May-95	1246.36	1243.63	OF060
2-153A	LSZ	157769.77	2150503.11	09-May-95	1251.21	1248.52	OF060
2-154A	LSZ	156166.34	2151519.65	23-May-95	1256.04	1256.39	ST007
2-154B	USZ	156175.27	2151511.16	22-May-95	1256	1256.34	ST007
2-154C	LLSZ	156157.49	2151521.63	30-Sep-99	1256.39	1257.04	OF060
2-155A	LSZ	156172.18	2148457.85	02-Jun-95	1244.45	1241.75	ST008
2-155B	USZ	156186.96	2148458.03	03-Jun-95	1244.34	1241.43	ST008
2-155BL	USZ	156200.7	2148466.46	11-Jan-13	1240.87	1241.23	ST008
2-156A	LSZ	156399.09	2149275.23	12-Jun-95	1246.3	1243.73	ST008
2-156B	USZ	156399.6	2149287.5	06-Jun-95	1246.17	1243.37	ST008
2-156BL	USZ	156410.06	2149275.52	17-Jan-13	1243.49	1244.02	ST008
2-157AR	LSZ	157151.55	2150131.07	20-Aug-99	1248.02	1248.67	ST007
2-157BR	USZ	157151.06	2150140.41	13-Aug-99	1248.2	1248.76	ST007
2-158B	USZ	156335.53	2150323.26	23-May-95	1247.77	1248.04	ST008
2-159B	USZ	156338.86	2150512.61	31-May-95	1251.04	1249.56	ST007
2-16	USZ	149441.58	2153981.24	18-Dec-92	1285.57	1285.7	WP036
2-160B	USZ	156406.15	2150791.02	05-Jun-95	1253.8	1251.23	ST007
2-161B	USZ	156523.7	2151169.04	30-May-95	1252.77	1253.26	ST007
2-162B	USZ	156604.17	2151391.55	02-Jun-95	1254.62	1255.04	ST007
2-163B	USZ	158373.5	2148244.92	01-Jun-95	1237.1	1237.5	ST033

2-164B	USZ	158195.2	2148174.28	02-Jun-95	1239.9	1236.22	ST033
2-165B	USZ	158789.56	2148306.14	07-Jun-95	1223.6	1225.95	ST033
2-166B	USZ	158667.52	2148609.7	07-Jun-95	1244.97	1242.38	CG037
2-167B	USZ	150566.3	2150810.4	07-Aug-95	1250.71	1247.92	FT022
2-168B	USZ	150275.37	2150379.22	08-Aug-95	1243	1240.1	FT022
2-17	USZ	149436.53	2154026.77	18-Dec-92	1286.05	1286.28	WP036
2-171		156132.69	2153436.25	13-Dec-94		1272.16	ST003
2-172		156119.56	2153436.75	10-Jan-95		1272.44	ST003
2-173B	USZ	158088.6	2148589.37	14-Jun-95	1240.41	1237.94	ST033
2-174B	USZ	157150.98	2150353.19	15-Jun-95	1251.13	1248.52	ST007
2-175	USZ	149422.97	2154283.92	16-Jun-95	1288.16	1286.1	ST133
2-176	USZ	149394.98	2154191.99	19-Jun-95	1286.19	1284.89	ST133
2-177	USZ	149627.33	2154292.33	19-Jun-95	1288.44	1288.91	ST133
2-178	USZ	156264.48	2150891.14	21-Jun-95	1251.46	1251.84	ST121
2-179	USZ	156257.65	2150760.27	22-Jun-95	1250.62	1250.92	ST121
2-18	LSZ	152646.16	2145661.01	20-Apr-93	1219.12	1217.36	FT021
2-181	USZ	156045.28	2147364.09	06-Jul-95	1223.34	1223.59	ST122
2-182	USZ	155963	2147276.02	06-Jul-95	1221.65	1221.95	ST122
2-183	USZ	155877.02	2147334.5	06-Jul-95	1224.73	1222.33	ST122
2-184	USZ	156082.8	2147533.41	11-Jul-95	1225.62	1225.65	ST122
2-185	USZ	156299.35	2147560.63	11-Jul-95	1226.48	1226.68	ST122
2-186	HWBZ	147050.56	2151153.65	15-Jul-95	1275.55	1275.83	ST107
2-187	HWBZ	147053.51	2151086.85	14-Jul-95	1275.4	1275.73	ST107
2-188	HWBZ	147112.44	2151059.8	18-Jul-95	1275.15	1275.42	ST107
2-189	HWBZ	147118.98	2151179.97	18-Jul-95	1275.3	1275.61	ST107
2-190	USZ	157325.89	2145974.37	24-Aug-95	1222.58	1222.64	ST123
2-191R	USZ	157318.23	2146074.55	26-May-99	1222.87	1223.16	ST123
2-193	USZ	157111.37	2146095.34	25-Aug-95	1223.79	1224.14	ST123
2-194	USZ	157169.3	2145991.25	25-Aug-95	1223.18	1223.47	ST123
2-195	USZ	157023.95	2146258.97	25-Aug-95	1224.26	1224.49	ST123
2-195A	LSZ	157010.82	2146259.02	20-Aug-97	1223.98	1224.46	ST123
2-197	USZ	152524.59	2154402.72	25-Oct-95	1273.33	1273.7	ST138
2-198	USZ	152525.84	2154352.44	25-Oct-95	1273.63	1274.15	ST138
2-199	USZ	152587.15	2154386.8	26-Oct-95	1273.24	1273.67	ST138
2-19A	LSZ	152431.55	2145652.53	19-Apr-93	1218.83	1216.5	FT021
2-19B	USZ	152431.64	2145662.48	20-Apr-93	1218.2	1216.44	FT021
21AR	LSZ	153868.78	2155047.38	22-Oct-93	1267.95	1268.22	OT001
21BR	USZ	153873.88	2155047.57	15-Oct-93	1268.16	1268.26	OT001
21C	LLSZ	153860.17	2155047.59	27-Oct-93	1268.02	1268.2	OT001
2-2	USZ	158283.8	2148768.8	18-Dec-86	1241.99	1240.18	CG037
2-200	USZ	156406.35	2149003.41	02-Nov-95	1242.27	1242.57	ST120
2-20AR	LSZ	152453.77	2145539.42	04-Aug-00	1216.03	1216.63	FT021
2-20B	USZ	152466.83	2145539.49	21-Apr-93	1218.21	1216.68	FT021
2-212PT	USZ	149490.71	2146181.94	22-Aug-95	1246.64	1244.37	CG038
2-213PT	LSZ	149484.56	2146189.69	24-Aug-95	1246.24	1244.09	CG038
2-214A	USZ	149551.58	2146224.74	24-Aug-95	1247.12	1244.95	LF012
2-215A	USZ	149498.66	2146187.52	28-Aug-95	1246.61	1244.39	CG038

2-216C	LSZ	149492.23	2146195.57	30-Aug-95	1246.56	1244	CG038
2-217C	LSZ	149543.46	2146235.6	30-Aug-95	1246.45	1244.09	LF012
2-218A	USZ	149471.86	2146205.16	29-Aug-95	1246.14	1243.72	CG038
2-219C	LSZ	149466.26	2146213.25	30-Aug-95	1245.96	1243.55	CG038
2-21D	PZ	149514.58	2151236.33	27-Jan-95	1247.65	1244.33	LF015
2-22	LSZ	152433.3	2145787.97	22-Apr-93	1222.32	1219.47	WP017
2-220B	HWBZ	149496.84	2146174.15	24-Aug-95	1246.9	1244.74	CG038
2-225	USZ	156306.33	2149003.31	02-Nov-95	1241.9	1242.15	ST120
2-225BL	USZ	156307.56	2149000.5	14-Jan-13	1242.23	1242.61	ST120
2-226	USZ	156297.25	2148743.87	06-Dec-95	1240.83	1241.31	ST120
2-227	USZ	156081.15	2148911.41	07-Dec-95	1242.93	1243.51	ST120
2-228		148323.09	2151108.19	08-Nov-95	1255.44	1255.72	ST108
2-229		148272.7	2150972.92	21-Dec-95	1255.16	1255.8	ST108
2-230		148344.42	2151025.8	01-Dec-95	1255.39	1255.54	ST108
2-231	USZ	148242.29	2151003.11	01-Dec-95	1255.09	1255.5	ST108
2-232	HWBZ	148267.57	2150971.2	02-Jan-95	1255.46	1255.92	ST108
2-237	USZ	155964.29	2148833.28	09-Oct-96	1242.63	1243.14	ST120
2-238	USZ	156471.58	2148504.27	10-Oct-96	1237.36	1237.82	ST120
2-239	USZ	156144.38	2149053.69	15-Oct-96	1244.37	1244.92	ST120
2-23A	LSZ	156564.73	2149275.74	28-Dec-93	1243.35	1243.48	ST008
2-23B	USZ	156558.87	2149275.33	03-Jan-94	1243.41	1243.48	ST008
2-240	USZ	156118.14	2149297.03	21-Oct-96	1243.31	1243.83	OT062
2-240BL	USZ	156120.79	2149303.51	24-Jan-13	1244.05	1244.47	ST120
2-241	USZ	157413.1	2146060.9	04-Nov-96	1222.38	1222.88	ST123
2-242	USZ	157440.83	2145842.79	05-Nov-96	1220.38	1220.84	ST123
2-242A	LSZ	157441.48	2145834.76	19-May-99	1220.53	1220.81	ST123
2-243	USZ	157151.59	2145817.03	05-Nov-96	1221.94	1222.48	ST123
2-244	USZ	157006.2	2145838.52	08-Nov-96	1222.76	1223.25	ST123
2-245	USZ	156902.4	2145901.9	07-Nov-96	1224.14	1224.5	ST123
2-245A	LSZ	156891.61	2145902.03	20-Aug-97	1223.99	1224.54	ST123
2-246	USZ	157010.34	2146036.79	06-Nov-96	1223.57	1224.04	ST123
2-247	USZ	156854.81	2146299.07	18-Nov-96	1224.49	1227.29	ST123
2-248	LSZ	157336.44	2145959.35	18-Nov-96	1221.84	1222.3	ST123
2-249	LSZ	157107.44	2145807.1	19-Nov-96	1221.64	1222.15	ST123
2-24B	USZ	156635.69	2149274.53	28-Dec-93	1243.75	1243.94	ST008
2-250	LSZ	157138.01	2146086.76	20-Nov-96	1223.38	1223.99	ST123
2-251R	LSZ	156997.69	2146032.03	18-Aug-97	1223.44	1224.08	ST123
2-253B	USZ	150668.27	2143964.89	24-May-01	1265.68	1266.02	CG038
2-254B	USZ	150128.93	2143517.89	06-Jun-01	1249.69	1250	CG038
2-255B	USZ	149884.44	2143768.91	11-Jun-01	1263.48	1263.54	CG038
2-256A	LSZ	149886.39	2144007.09	11-Jun-01	1269.82	1270.32	CG038
2-256B	USZ	149886.12	2144017.63	13-Jun-01	1270.07	1270.46	CG038
2-257B	USZ	149228.8	2143524.92	05-Jun-01	1255.66	1256.09	CG038
2-258A	LSZ	149154.43	2143970.82	23-May-01	1263.24	1263.69	CG038
2-259B	USZ	151048.05	2146468.14	15-Jun-01	1231.52	1231.84	CG038
2-25B	USZ	156714.3	2149354.95	29-Dec-93	1246.11	1246.31	ST008
2-260B	USZ	150996.06	2145218.66	14-May-01	1255.51	1256	CG038

2-261B	USZ	158368.43	2145340.17	03-Jun-96	1218.97	1216.37	CG037
2-262B		158396.3	2145765.53	04-Jun-96	1224.74	1222.14	CG037
2-263B	USZ	157937.19	2144925.44	03-Jun-96	1208.73	1209.02	CG037
2-264B	USZ	158494.24	2147830.36	12-Jun-96	1234.86	1235.08	ST033
2-265B	USZ	158317.89	2147775.84	12-Jun-96	1236.63	1234.13	ST033
2-266A	LSZ	156886.65	2148859.54	08-Jul-96	1244.86	1242.35	ST008
2-266B	USZ	156896.64	2148860.3	09-Jul-96	1244.83	1242.28	ST008
2-267A	LSZ	156617.19	2148707.51	12-Jul-96	1239.24	1239.63	ST008
2-267B	USZ	156626.83	2148704.12	10-Jul-96	1239.2	1239.65	ST008
2-268A	LSZ	156054.59	2148874.82	30-Jul-96	1243.53	1243.96	ST008
2-269B		158084.6	2146214.1	12-Jul-96	1223.04	1223.4	CG037
2-26A	LSZ	156761.88	2149609.56	30-May-95	1243.78	1246.13	ST008
2-26B	USZ	156762	2149617.42	21-Dec-93	1245.9	1246.02	ST008
2-26C	LLSZ	156758.45	2149601.2	24-May-95	1243.57	1245.9	ST008
2-270B	USZ	158522.87	2146251.46	09-Jul-96	1229.44	1226.91	CG037
2-272B	USZ	150811.08	2149984.27	09-Aug-96	1248.91	1249.38	FT022
2-273B		150376.5	2149978.29	18-Jun-96	1238.42	1238.92	FT022
2-274A	LSZ	151142.26	2150034.47	17-Jul-97	1248.75	1249.1	FT022
2-274B	USZ	151151.6	2150027.89	25-Jul-96	1248.32	1248.77	FT022
2-277A	LSZ	155606.74	2151636.38	13-Jul-00	1255.59	1256.17	OF060
2-277B	USZ	155594.97	2151636.1	08-Aug-96	1255.62	1256.15	OF060
2-278A	LSZ	156066.54	2143378.83	17-Jul-97	1216.53	1217.14	CG037
2-278B	USZ	156056.8	2143385	19-Jun-96	1216.69	1217.11	CG037
2-279B	USZ	155610.36	2143130.99	11-Jun-96	1209.06	1209.59	CG037
2-27B	USZ	156596.49	2149526.53	27-Dec-93	1243.52	1245.76	ST008
2-280A	LSZ	155047.13	2143613.59	21-Aug-97	1207.45	1207.99	CG037
2-280B	USZ	155037.77	2143621.63	21-Jun-96	1207.28	1207.64	CG037
2-281A	LSZ	155586.5	2144351.97	08-Jul-97	1214.95	1212.42	CG037
2-281B	USZ	155574.94	2144351.2	22-Jul-96	1215.34	1212.59	CG037
2-282A	LSZ	154781.81	2145920.86	23-Jul-96	1226.27	1226.63	CG037
2-282B	USZ	154789.54	2145919.72	19-Jun-96	1226.41	1226.68	CG037
2-283A	LSZ	155025.61	2144556.41	28-Jun-96	1222.28	1219.69	CG037
2-284A	LSZ	154526.03	2144786.08	02-May-96	1224.49	1222.06	OF060
2-285A	LSZ	154077.07	2144695.35	21-Jun-96	1222.8	1220.26	CG037
2-285B	USZ	154086.77	2144694.42	20-Jun-96	1222.72	1220.13	CG037
2-285C	LSZ	154068.2	2144696.37	10-Jul-97	1222.51	1220.11	CG037
2-286A	LSZ	153224.91	2145121.88	26-Jun-96	1223.96	1224.4	OT050
2-286C	LSZ	153220.08	2145116.28	11-Jul-97	1223.51	1224.01	OT050
2-287AR	LSZ	152859.23	2144637.51	08-Aug-96	1223.08	1220.44	OT050
2-287B	USZ	153025.02	2144681	03-Sep-96	1212.8	1213.24	OT050
2-288A	LSZ	152470.92	2144798.58	29-Jul-96	1227.91	1224.91	OT050
2-288B		152776.52	2145018.23	21-Aug-96	1212.18	1212.51	OT050
2-289A	LSZ	154097.1	2145949.54	02-Jul-96	1225.25	1225.53	OT050
2-28B	USZ	156667.24	2149821.32	20-Dec-93	1247.9	1248.03	ST008
2-290B	USZ	150837.45	2144223.08	30-May-96	1261.6	1259.01	LF014
2-291B	USZ	149782.33	2144701.29	20-May-96	1268.91	1266.31	LF014
2-292B	USZ	150239.87	2144234.72	18-Jun-96	1270.6	1268.32	LF014

2-293B	USZ	149791.27	2145149.41	25-Jun-96	1260.42	1257.62	LF012
2-294B	USZ	149469.05	2145593.18	16-Jul-96	1264.68	1262.21	LF012
2-295B	USZ	149152.01	2145596.04	17-Jul-96	1267.39	1264.74	LF012
2-296B	USZ	148565.18	2145806.99	18-Jul-96	1271.18	1268.55	LF012
2-297B	USZ	147917.09	2146414.85	16-Jul-96	1270.19	1267.52	LF012
2-298B	USZ	149604.2	2148490.45	13-Jun-96	1261.62	1258.95	LF012
2-299B	USZ	150526.7	2144475.16	23-Jul-96	1265.71	1263.19	LF014
2-29A	LSZ	156566.38	2149569.71	06-Dec-93	1245.69	1245.77	ST008
2-29B	USZ	156576.37	2149573.39	20-Dec-93	1245.74	1245.8	ST008
2-29C	LLSZ	156554.45	2149568.98	20-May-95	1244.05	1244.56	ST008
22A	LSZ	155286.16	2155787.31	19-Jun-84	1256.15	1252.5	OF059
2-2A	LSZ	158285.62	2148758.61	09-Nov-93	1240.5	1240.51	ST033
22B	LSZ	155282.2	2155766.42	04-Apr-86	1254.9	1252.5	OF059
22DR	LSZ	155245.69	2155766.89	21-Sep-93	1253.15	1253.4	OF059
22ER	LLSZ	155333.33	2155770.13	29-Sep-93	1250.23	1250.52	OF059
2-3	USZ	158405.08	2148582.75	06-Jan-87	1242.34	1240.96	ST033
2-300B	USZ	151152.63	2147760.96	17-Jun-96	1233.79	1231.23	LF012
2-301B	USZ	149729.21	2150987.76	17-Jun-96	1244	1241.56	LF015
2-302B	USZ	149518.18	2150509.33	24-Jul-96	1249.15	1246.46	LF015
2-303B	USZ	150161.85	2153362.72	01-Aug-96	1284.06	1284.48	WP018
2-304B	USZ	150131.51	2144677.07	07-Aug-96	1263.49	1260.51	LF014
2-305B	USZ	147844.83	2153133.65	12-Aug-96	1281.36	1278.76	WP018
2-306B	USZ	148009.37	2153740.67	09-Aug-96	1276.89	1274.28	WP018
2-307B	USZ	148385.09	2155047.79	01-Aug-96	1300.18	1297.57	OT055
2-308A	LSZ	149146.69	2154399.45	02-Aug-96	1290.35	1287.9	WP018
2-308B	USZ	149137.48	2154394.75	16-Jul-96	1288.42	1287.59	WP018
2-309B	USZ	149663.94	2154682.24	01-Aug-96	1289.84	1290.31	WP018
2-30A	LSZ	156677.88	2149231.05	07-Dec-93	1243.83	1243.94	ST008
2-30B	USZ	156670.72	2149230.84	28-Dec-93	1243.95	1244	ST008
2-30C	LLSZ	156663.87	2149230.96	23-May-95	1243.21	1243.74	ST008
2-312B	USZ	148118.37	2161449.54	30-Jul-96	1307.19	1304.64	CG040
2-313B	USZ	147781.16	2161341.13	30-Jul-96	1305.91	1303.36	CG040
2-314A	LSZ	147475.48	2161334.39	06-Aug-96	1296.69	1294.07	CG040
2-315A	LSZ	147349.39	2161520.5	06-Aug-96	1293.05	1293.31	CG040
2-315B	USZ	147349.35	2161532.37	07-Aug-96	1292.51	1292.88	CG040
2-315C	LLSZ	147350.11	2161509.17	29-Aug-97	1293.43	1293.99	CG040
2-316A	LSZ	147565.68	2161945.28	07-Aug-96	1274.98	1275.34	CG040
2-316B	LSZ	147560	2161938.44	05-Aug-96	1275.36	1275.74	CG040
2-316C	USZ	147569.37	2161930.4	27-Aug-96	1276.17	1276.74	CG040
2-316D	LLSZ	147577.98	2161923.4	29-Aug-97	1276.52	1277	CG040
2-317A	LSZ	152503.64	2155185.99	30-Jul-96	1270.82	1271.28	CG039
2-318A	LSZ	151294.91	2154395	01-Aug-96	1277.84	1278.09	CG039
2-318C	LLSZ	151298.03	2154407.54	28-Sep-99	1277.52	1278.03	CG039
2-319A	LSZ	150881.94	2153336.59	02-Aug-96	1279.78	1280.1	CG039
2-31B	USZ	156853.26	2149606.47	21-Dec-93	1246.26	1246.4	ST008
2-320A	LSZ	150634.47	2155230.38	10-Jul-96	1295.81	1296.13	CG039
2-320B	USZ	150634.37	2155240.16	05-Sep-96	1295.87	1296.22	CG039

2-320C	LSZ	150636.23	2155222.61	22-Jul-98	1295.27	1296.1	CG039
2-321B	USZ	150261.34	2156103.07	31-Jul-96	1286.9	1287.14	OF060
2-322B	USZ	151013.85	2156080.25	09-Aug-96	1294.36	1294.73	OF060
2-323B		152106.26	2156109.9	13-Aug-96	1284.37	1284.37	OF060
2-324B	USZ	149641.84	2153151.4	09-Aug-96	1275.02	1275.29	WP018
2-324BT	USZ	149636.75	2153162.4	23-Sep-02	1274.94	1275.5	WP018
2-325A	LSZ	155356.92	2142956.62	08-Jul-97	1204.64	1202.42	CG037
2-325B	USZ	155340.03	2142966.15	20-Jun-96	1204.98	1202.39	CG037
2-326B	USZ	155646.73	2149578.25	06-Aug-96	1247.31	1247.76	ST008
2-326BL	USZ	155647.13	2149582.93	25-Mar-13	1247.99	1248.39	ST008
2-327B	USZ	148673.99	2155246.82	09-May-96	1298	1298	ST215
2-328A	LSZ	155191.84	2145228.28	23-Jul-97	1214.41	1214.86	CG037
2-328B	USZ	155189.96	2145237.64	27-Jun-96	1214.54	1214.88	CG037
2-328C	LLSZ	155193.89	2145220.76	10-Jul-98	1214.74	1214.98	CG037
2-329A	LSZ	154633.33	2144380.41	18-Jun-97	1223.84	1221.32	CG037
2-329B	USZ	154641.85	2144378.36	15-Jul-96	1224.04	1221.61	CG037
2-32A	LSZ	156842.75	2149840.13	03-Dec-93	1249.06	1249.2	ST008
2-32B	USZ	156851.18	2149840.13	20-Dec-93	1249.04	1249.24	ST008
2-330A	LSZ	155615.8	2150985.84	24-Aug-99	1255.05	1255.58	OF060
2-330B	USZ	155618.1	2150993.89	01-Jul-96	1255.51	1255.86	OF060
2-331B	USZ	148142.59	2161702.11	07-Aug-96	1305.67	1302.93	CG040
2-332A	LSZ	151098.67	2156799.25	02-Aug-96	1295.52	1292.9	OF060
2-333B	USZ	149241	2145389.2	02-Aug-96	1258.64	1259.08	LF012
2-334B	USZ	148732.39	2145384.85	24-Jul-96	1262.12	1262.57	LF012
2-335B	USZ	148384.45	2145619.36	31-Jul-96	1266.24	1266.68	LF012
2-336B	USZ	158821.37	2145377.77	05-Jun-97	1224.28	1224.92	CG037
2-337B	USZ	158790.16	2145701.93	22-Jul-97	1224.92	1225.29	CG037
2-338B	USZ	158741.18	2146005.05	22-Jul-97	1226.91	1227.43	CG037
2-339B	USZ	157795.46	2145233.48	06-Jun-97	1212.06	1212.61	CG037
2-33B	USZ	156686.94	2150383.84	17-Dec-93	1247.82	1247.92	ST008
2-341B	USZ	157852.32	2146603.98	19-Jun-97	1227.53	1228	CG037
2-342B	USZ	156199.86	2143430.88	07-Jul-97	1217.13	1217.61	CG037
2-343B	USZ	155910.49	2144149.61	12-Jun-97	1209.32	1206.91	CG037
2-344B	USZ	155831.09	2142638.89	08-Jul-97	1200.61	1201.02	CG037
2-346B	USZ	156421.45	2142762.26	22-Jul-97	1197.77	1198.1	CG037
2-347B	USZ	154738.17	2143668.24	11-Jun-97	1204.29	1204.71	CG037
2-348B	USZ	155669.24	2143994.11	12-Jun-97	1216.18	1216.71	CG037
2-349A	LSZ	154956.64	2144214.76	17-Jun-97	1222.55	1223.02	CG037
2-349B	USZ	154967.68	2144209.16	27-Jun-97	1222.23	1222.78	CG037
2-349C	LSZ	154947.3	2144219.15	10-Jul-97	1222.52	1222.93	CG037
2-34B	USZ	156642.29	2150518.38	16-Dec-93	1249.62	1249.71	ST008
2-350B	USZ	155236.85	2144834.82	14-Jul-97	1219.96	1220.31	CG037
2-351A	LSZ	155359.5	2145372.75	18-Jul-97	1215.21	1215.58	CG037
2-351B	USZ	155359.31	2145381.1	14-Jul-97	1215.35	1215.91	CG037
2-351C	LSZ	155359.39	2145363.53	16-Jul-97	1214.67	1215.23	CG037
2-352B	USZ	153651.38	2144130.27	14-Jul-97	1208.87	1209.3	CG037
2-353B	USZ	150893.09	2148298.41	25-Jun-97	1238.21	1238.72	CG037

2-354B	USZ	150259.75	2149080.4	27-Jun-97	1237.66	1238.13	CG038
2-355B	USZ	151259.84	2149803.18	09-Jul-97	1245.92	1246.61	CG039
2-356B	USZ	151488.67	2149950.52	10-Jul-97	1249.3	1249.75	CG039
2-357B	USZ	148717.44	2150552.47	08-Jul-97	1264.96	1262.44	CG039
2-358B	USZ	149500.23	2149748.56	27-Jun-97	1245.57	1243.46	CG039
2-359B	USZ	149701.77	2150321.97	26-Jun-97	1245.43	1243.52	CG039
2-35B	USZ	156823.28	2150594.66	14-Dec-93	1250.04	1250.22	ST008
2-360B	USZ	152276.56	2153020.47	14-Jul-97	1270.3	1270.79	CG039
2-361B	USZ	152660.38	2155393.62	21-Jul-97	1271.99	1272.37	
2-362B	USZ	150713.14	2153029.52	17-Jul-97	1274.69	1275.17	CG039
2-363A	LSZ	151277.98	2155153.68	23-Jul-98	1285.88	1286.28	CG039
2-363B	USZ	151287.67	2155153.55	25-Jun-97	1285.56	1286.2	CG039
2-364B	USZ	150371.42	2154058.68	17-Jul-97	1290.48	1290.9	CG039
2-365B	USZ	147734.2	2154153.49	25-Aug-97	1280.67	1281.1	CG039
2-366B	USZ	149884.14	2154963.8	09-Sep-97	1293.34	1293.82	CG039
2-367B	USZ	149890.53	2155560.76	17-Jul-97	1293.74	1294.21	CG039
2-368B	USZ	151446.09	2154016.54	06-Aug-97	1275.87	1276.36	CG039
2-369B	USZ	148390.26	2154346.89	15-Jul-97	1288.5	1288.88	CG039
2-36B	USZ	156664.24	2150605.59	11-Nov-93	1250.44	1250.54	ST008
2-370A	LSZ	156960.66	2148543.11	09-Jul-97	1237.93	1238.36	OF060
2-370B	USZ	156960.61	2148556.43	19-Jun-97	1238	1238.45	OF060
2-371A	LSZ	156842.73	2148271.78	09-Jul-97	1234.38	1234.9	OF060
2-371B	USZ	156852.24	2148271.08	17-Jun-97	1234.33	1234.95	OF060
2-372A	LSZ	155889.42	2148087.21	22-Jan-13	1236.6	1236.88	OF060
2-372B	USZ	155897.73	2148073.59	13-Jun-97	1234.98	1235.43	OF060
2-373B	USZ	155160.31	2148394.26	08-Aug-97	1234.22	1234.59	OF060
2-374A	LSZ	153955.82	2144410.48	08-Jul-97	1209.31	1209.76	CG037
2-375A	LSZ	156819.33	2146095.21	20-Aug-97	1224.66	1225.1	ST123
2-376B	USZ	149009.43	2155503.68	02-Aug-97	1294.94	1295.2	ST214
2-377B	USZ	148573.67	2155230.8	15-Aug-97	1297.7	1298.09	ST215
2-378	HWBZ	148590.38	2155209.85	18-Aug-97	1298.07	1298.5	ST215
2-379B	USZ	148709.24	2155543.31	11-Aug-97	1302.84	1303.34	VI084
2-37B	USZ	156571.32	2150598.03	14-Dec-93	1250.15	1250.26	ST008
2-380B	USZ	148832.35	2155505.29	03-Aug-97	1294.59	1294.78	VI084
2-381	HWBZ	148713.08	2155271.16	26-Aug-97	1295.47	1295.92	VI084
2-382B	USZ	149021.84	2155369.01	01-Aug-97	1294.72	1294.98	ST214
2-383B	USZ	148977.74	2155258.17	04-Aug-97	1294	1294.48	ST214
2-384B	USZ	149006.67	2155082.6	17-Aug-97	1293.88	1294.29	ST214
2-386B	USZ	157513.6	2147890.95	21-May-01	1232.23	1232.52	ST008
2-387A	LSZ	154969.39	2149053.95	27-Mar-13	1238.34	1238.67	OF060
2-387B	USZ	154977.1	2149038.07	10-May-01	1237.75	1238.07	OF060
2-387BU	USZ	154968.73	2149065.04	27-Mar-13	1238.35	1238.74	OF060
2-388A	LSZ	154481.73	2148883.62	14-Oct-02	1237.6	1238.41	OF060
2-388B	USZ	154491.04	2148883.66	14-Jun-01	1237.98	1238.34	OF060
2-388BU	USZ	154467.78	2148888.92	15-Feb-13	1238.42	1238.9	OF060
2-389A	LSZ	154194.45	2149533.88	07-Mar-13	1242.12	1242.41	OF060
2-389B	USZ	154182.34	2149523.65	16-May-01	1241.77	1242.07	OF060

2-38B	USZ	156616.56	2150830.33	15-Dec-93	1254.41	1254.41	ST008
2-390B	USZ	152302.97	2152242.35	15-May-01	1263.3	1263.57	OT001
2-391A	LSZ	154202.38	2150213.64	27-Mar-07	1246.23	1246.23	OT001
2-391B	USZ	154214.74	2150213.75	25-Sep-02	1246.56	1246.87	OF060
2-392B	USZ	150722.65	2149833.42	29-Jul-97	1244.99	1245.3	FT022
2-393B	USZ	151460.46	2149683.39	30-Jul-97	1245.97	1246.19	FT022
2-394B		154309.52	2144904.63	03-Jun-98	1222.78	1223.39	CG037
2-395A	LSZ	153735.83	2145130.79	17-Jul-98	1225.54	1223.6	CG037
2-395B	USZ	153736.09	2145144.37	02-Jun-98	1226.08	1224.28	CG037
2-396A	LSZ	154151.58	2145413.65	25-Jun-98	1225.63	1226.05	CG037
2-396B	USZ	154151.47	2145422.18	27-May-98	1225.4	1226	CG037
2-396C	LLSZ	154152.02	2145404.19	30-Jun-98	1225.62	1226.19	CG037
2-397A	LSZ	153681.64	2145772.86	18-Jun-98	1228.6	1229.08	CG037
2-397B	USZ	153681.14	2145781.74	29-May-98	1228.73	1229.21	CG037
2-398A	LSZ	153955.77	2145634.21	15-Jul-98	1227.35	1227.76	CG037
2-399A	LSZ	154409.51	2145643.36	03-Jun-98	1222.42	1222.85	CG037
2-399B	USZ	154401.55	2145652.21	05-Jun-98	1222.51	1222.85	CG037
2-39A	LSZ	156823.14	2150829.24	30-Nov-93	1253.78	1253.8	ST008
2-39B	USZ	156834.94	2150828.73	13-Dec-93	1253.83	1253.81	ST008
23A	LLSZ	153962.42	2155796.38	19-Jun-84	1270.22	1268.5	OF059
23BR	USZ	153959.97	2155874.76	11-Nov-93	1269.85	1269.85	OF059
2-4	USZ	158394.44	2148761.38	11-Feb-87	1243.16	1241.49	CG037
2-400A	LSZ	154748.79	2147870.19	15-Mar-13	1229.19	1229.54	CG037
2-400B	USZ	154736.46	2147887.25	12-Jun-98	1228.74	1229.23	CG037
2-400BU	USZ	154743.25	2147876.57	15-Mar-13	1229.19	1229.65	CG037
2-401B	USZ	156023.24	2150325.02	09-Jun-98	1247.74	1248.33	ST007
2-402A	LSZ	156832.86	2147818.73	10-Jul-98	1231.48	1231.61	ST008
2-402B	USZ	156832.22	2147829.94	16-Jun-98	1231.73	1231.85	ST008
2-403A	LSZ	157252.33	2148590.21	09-Jun-98	1237.92	1238.27	ST008
2-403B	USZ	157261.09	2148589.73	13-Aug-99	1237.85	1238.44	ST008
2-404A	LSZ	157055.68	2149214.62	28-Jul-98	1245.16	1245.57	ST008
2-404B	USZ	157064.99	2149215.66	19-May-98	1245.1	1245.65	ST008
2-405B	USZ	151737.78	2149554.39	15-Jun-98	1246.28	1246.63	CG039
2-406B	USZ	152303.2	2146477.09	21-May-98	1232.81	1233.26	CG037
2-407B	USZ	157575.54	2144998.05	01-Jun-98	1217.24	1217.82	CG037
2-408B	USZ	158007.61	2146416.15	18-May-98	1224	1220.12	CG037
2-409A		154366.98	2145238.43	12-Jun-98	1224.29	1224.83	CG037
2-409B		154367.12	2145250.63	05-Jun-98	1224.15	1224.76	CG037
2-40A	LSZ	156560.17	2150479.83	01-Dec-93	1250.06	1250.18	ST008
2-40B	USZ	156567.06	2150479.97	17-Dec-93	1250.01	1250.24	ST008
2-410B	USZ	150974.77	2149477.22	22-Jun-98	1241.84	1242.31	CG039
2-411A	LSZ	155615.48	2146050.65	15-Jul-98	1222.55	1223.11	CG037
2-412A	LSZ	153597.34	2146400.47	07-Jul-98	1229.39	1229.87	CG037
2-413A	LSZ	156425.33	2148001.35	01-Jun-98	1233.95	1234.42	ST008
2-414A	LSZ	157009.93	2145672.03	13-May-98	1221.66	1221.96	ST123
2-415A	LSZ	156721.53	2145675.63	15-May-98	1224.5	1225.05	ST123
2-416A	LSZ	157123.63	2149719.62	21-May-98	1245.81	1246.33	ST007

2-417A	LSZ	156400.6	2149568.42	17-Jul-98	1244.34	1244.68	ST007
2-418B	USZ	151271.91	2149131.53	23-Jun-98	1239.32	1239.93	OF060
2-419A	LSZ	155597.7	2149183.24	13-Feb-13	1241.24	1241.5	OF060
2-419B	USZ	155594.58	2149167.86	09-Jun-98	1240.65	1241.12	OT062
2-419BU	USZ	155600.46	2149190.64	13-Feb-13	1241.23	1241.65	OF060
2-41A	LSZ	156458.73	2150462.64	02-Dec-93	1248.04	1248.2	ST008
2-41B	USZ	156459.11	2150455.83	30-Dec-93	1248.11	1248.22	ST008
2-420B	USZ	155935.81	2147448.17	17-Mar-98	1224.57	1224.89	ST122
2-421B		155318.27	2150261.63	11-Jun-98	1244.06	1244.73	OF060
2-421BU	USZ	155326.56	2150251.72	11-Feb-13	1244.81	1245.15	OF060
2-422B	USZ	158492.72	2144783.39	12-Aug-99	1218.2	1218.84	CG037
2-423A	LSZ	154704.05	2149581.45	26-Jul-00	1242.47	1242.99	OF060
2-423B	USZ	154708.02	2149592.67	16-Sep-99	1242.45	1243.03	OF060
2-424B	USZ	148402.83	2150065.53	10-Sep-99	1262.74	1263.34	CG039
2-425B	USZ	154709.35	2149908.3	16-Sep-99	1245.9	1246.57	OF060
2-426A	LSZ	157422.81	2151427.33	19-Aug-99	1253.72	1254.36	OF060
2-426B	USZ	157422.94	2151434.07	20-Aug-99	1253.77	1254.4	OF060
2-427B	USZ	153958.17	2152976.85	31-Aug-99	1268.76	1269.31	OT001
2-428B	USZ	152814.96	2152955.49	31-Aug-99	1269.11	1269.7	OT001
2-429A	LSZ	154267.35	2151501.83	02-Sep-99	1253.33	1253.91	OT001
2-429C	LLSZ	154267.55	2151490.37	09-Sep-99	1253.31	1253.83	OT001
2-42A	LSZ	156493.65	2150603.43	29-Nov-93	1252.75	1250.5	ST008
2-42B	USZ	156501.97	2150603.74	15-Dec-93	1252.64	1250.38	ST008
2-430A	LSZ	150685.24	2154501.26	20-Sep-99	1289.41	1289.86	CG039
2-431B	USZ	157622.16	2151176.67	16-Aug-99	1255.02	1255.64	OF060
2-432A	LSZ	157573.25	2145603.47	23-May-99	1218.78	1219.03	ST123
2-433A	LSZ	157014.46	2145400.52	24-May-99	1221.42	1221.81	ST123
2-434A	LSZ	156607.5	2145549.07	21-May-99	1224.4	1224.4	ST123
2-435B	USZ	157463.6	2145977.4	18-May-99	1222.18	1222.43	ST123
2-436B	USZ	156895.87	2146150.14	19-May-99	1223.95	1224.34	ST123
2-437B	USZ	152742.35	2152244.65	17-Jul-00	1262.94	1263.58	OT001
2-438B	USZ	157534.67	2148612.47	14-Jul-00	1239.58	1240.22	ST008
2-439B	USZ	157314.52	2148118.21	06-Jul-00	1235.17	1235.84	ST008
2-43B	USZ	157313.88	2150802.11	03-Nov-93	1252.93	1252.93	ST007
2-440B	USZ	155225.98	2144152.77	29-Jun-00	1220.47	1221.09	CG037
2-441B	USZ	153457.01	2144802.85	12-Jul-00	1217.08	1217.86	CG037
2-442B	USZ	150551.96	2147383.75	11-Jul-00	1235.91	1236.53	CG038
2-443B	USZ	149890.16	2147615.98	07-Jul-00	1245.47	1246.1	CG038
2-444A	LSZ	153858.82	2150921.57	17-Jul-00	1248.2	1248.81	OT001
2-445B	USZ	150219.31	2144208.77	26-Jun-00	1271.94	1268.95	CG038
2-446B	USZ	149983.09	2144214.74	22-Jun-00	1272.58	1270.08	CG038
2-446BU	USZ	149995.36	2144215.66	04-Sep-02	1272.08	1270.04	CG038
2-447B	USZ	149058.29	2145200.14	02-Aug-00	1264.2	1264.72	CG038
2-448B	USZ	148835.44	2145245.32	02-Aug-00	1264.62	1265.17	CG038
2-449B	USZ	149408.92	2145134.87	07-Nov-01	1262.01	1262.56	CG038
2-453A	LSZ	154393.01	2148109.94	19-Mar-13	1232.26	1232.59	OF060
2-453B	USZ	154402.14	2148101.58	24-Sep-02	1231.45	1232.04	OF060

2-453BU	USZ	154409.59	2148093.4	19-Mar-13	1231.89	1232.45	OF060
2-454B	USZ	154711.2	2150318.77	11-Oct-02	1250.3	1250.77	OF060
2-455A	LSZ	155329.23	2147871.65	28-Feb-13	1230.51	1230.92	OF060
2-455B	USZ	155340.67	2147865.13	09-Oct-02	1230.22	1230.51	OF060
2-456A	LSZ	156346.26	2155843.7	21-Aug-02	1242.65	1240.54	OT005
2-457A	LSZ	156575.32	2155251.47	27-Aug-02	1273.43	1271.21	OT002
2-458C	LLSZ	157054.29	2155101.2	21-Nov-02	1275.71	1276.11	OT002
2-460A	LSZ	147616.68	2162182.86	28-Aug-02	1270.46	1270.96	CG040
2-461A	LSZ	147304.63	2161831.37	05-Sep-02	1275.28	1275.76	CG040
2-462B	USZ	148247.11	2161312.95	17-Sep-02	1302.83	1303.22	CG040
2-463B	USZ	153992.16	2149518.99	25-Sep-02	1242.5	1242.88	OF060
2-464B	USZ	149399.89	2147257.65	11-Dec-02	1240.94	1238.62	CG038
2-465B	USZ	149332.75	2147164.37	13-Dec-02	1238.69	1235.2	CG038
2-466B	USZ	149385.57	2147220.27	18-Dec-02	1240.03	1237.23	CG038
2-467B	USZ	149342.86	2147216.13	19-Dec-02	1239.33	1237.18	CG038
2-468B	USZ	149300.22	2147246.3	09-Jan-03	1240.49	1237.73	CG038
2-469B	USZ	155363.04	2144358.32	03-Dec-02	1217.47	1217.64	CG037
2-46B	USZ	156947.57	2150661.2	02-Nov-93	1251.31	1251.31	ST007
2-470A	LSZ	155239.21	2144141.3	05-Dec-02	1221.12	1221.38	CG037
2-471B	USZ	153644.73	2145442.5	05-Dec-02	1226.84	1227.1	CG037
2-472B	USZ	155203.5	2143297.63	06-Dec-02	1205.63	1205.72	CG037
2-473B	USZ	155744.85	2143089.92	06-Dec-02	1209.27	1209.44	CG037
2-474B	USZ	156078.56	2142865.99	07-Dec-02	1201.59	1201.85	CG037
2-475A	LSZ	156460.93	2145261.61	07-Dec-02	1230.13	1230.46	CG037
2-476B	USZ	151895.33	2145482.03	09-Dec-02	1222.06	1222.55	CG037
2-477A	LSZ	157653.28	2145235.87	09-Dec-02	1216.99	1217.08	CG037
2-478B	USZ	156593.56	2145558.36	09-Dec-02	1223.88	1224.31	CG037
2-479A	LSZ	156484.58	2145912.1	10-Dec-02	1227.78	1228.14	CG037
2-47B		156905.06	2151093.8	04-Nov-93	1255.64	1255.64	ST007
2-480B	USZ	156799.33	2145787.81	10-Dec-02	1224.69	1224.95	CG037
2-481B	USZ	156914.82	2145784.54	10-Dec-02	1223.58	1223.78	CG037
2-482B	USZ	152208	2145091.07	11-Dec-02	1222.6	1222.9	CG037
2-483A	LSZ	153602.32	2144628.16	11-Dec-02	1213.67	1213.94	CG037
2-484A	LSZ	153697.81	2144907.03	16-Dec-02	1217.3	1217.47	CG037
2-485B	USZ	151053.89	2146707.81	14-Aug-03	1228.29	1228	CG038
2-486B	USZ	151054.07	2146082.3	18-Aug-03	1227.68	1227.4	CG038
2-487B	USZ	151039.25	2145751.15	14-Aug-03	1229.68	1230.08	CG038
2-488B	USZ	150911.64	2145507.48	18-Aug-03	1236.43	1236.75	CG038
2-489B	USZ	149277.39	2147915.72	12-Aug-03	1258.65	1259.01	CG038
2-48B	USZ	156812.77	2151030.82	16-Dec-93	1254.93	1254.93	ST007
2-490B	USZ	149810.47	2148127.51	15-Aug-03	1244.27	1244.84	CG038
2-491B	USZ	149761.46	2147453.45	11-Aug-03	1244.48	1244.66	CG038
2-492B	USZ	150584.82	2144237.02	17-Dec-03	1266.24	1263.8	CG038
2-493B	USZ	150406.68	2144261.42	20-Dec-03	1268.12	1265.66	CG038
2-494B	USZ	150188.63	2144289.4	20-Dec-03	1270.6	1268.3	CG038
2-495B	USZ	150186.22	2144350.66	09-Jan-04	1269.35	1267.12	CG038
2-496B	USZ	150404.03	2144325.17	11-Jan-04	1267.97	1265.52	CG038

2-497B	USZ	150584.33	2144303.4	12-Jan-04	1262.91	1260.37	CG038
2-498B	USZ	150292.98	2144277.47	13-Jan-04	1269.76	1267.15	CG038
2-499B	USZ	150485.22	2144245.73	14-Jan-04	1268.77	1265.91	CG038
2-49B	USZ	156840.74	2150975.68	16-Dec-93	1253.85	1253.85	ST007
24A	LSZ	152784.38	2155845.27	20-Jun-84	1287.29	1285	CG039
24B		152752.12	2155845.96	10-Apr-86	1285.35	1282.27	CG039
24CR	LLSZ	152760.33	2155821.58	01-Dec-93	1283.54	1279.95	CG039
2-5	HWBZ	147063.93	2151129	10-Mar-95	1275.4	1275.6	ST107
2-500B	USZ	149477.35	2147299.45	08-Nov-04	1243.76	1244.08	LF012
2-501A	LSZ	151936.2	2154654	20-Oct-04	1277.88	1278.39	CG039
2-501B	USZ	151936.07	2154644.42	13-Oct-04	1277.76	1278.27	CG039
2-502A	LSZ	151892.97	2154474.3	20-Oct-04	1276.47	1277.02	CG039
2-502B	USZ	151891.98	2154482.49	13-Oct-04	1276.86	1277.34	CG039
2-503A	LSZ	147506.08	2161997.11	17-Sep-04	1268.86	1269.4	CG040
2-504A	LSZ	147279.45	2161979.06	21-Sep-04	1268.62	1269.02	CG040
2-504C	LSZ	147295.32	2161979.51	27-Sep-04	1267.62	1267.94	CG040
2-505A	LSZ	147671.93	2161670.76	01-Oct-04	1290.36	1290.77	CG040
2-506B	USZ	150055.62	2144229.8	18-May-04	1269.35	1269.93	CG038
2-507B	USZ	150337.19	2144235.32	18-May-04	1266.71	1266.98	CG038
2-508B	USZ	150446.56	2144223.3	18-May-04	1265.25	1265.64	CG038
2-509B	HWBZ	151132.93	2146460.78	11-Nov-04	1235.5	1236.07	LF013
2-50B	USZ	158488.18	2148603.56	25-Oct-93	1241.38	1241.38	ST033
2-510B	USZ	151904.5	2155155.95	25-Nov-03	1271.53	1271.81	
2-511B	USZ	152088.57	2155477.75	18-Sep-03	1271.83	1272.27	
2-512B	USZ	149658.68	2147155.94	09-Dec-04	1241.24	1241.6	CG038
2-513B	USZ	150259.22	2146179.82	06-Dec-04	1252.75	1253.2	CG038
2-514B	USZ	149885.55	2145939.77	03-Dec-04	1257.73	1258.23	CG038
2-515B	USZ	150022.97	2145808.34	02-Dec-04	1256.83	1257.36	CG038
2-516B	USZ	150384.25	2146218.76	20-Jan-05	1256.8	1257.22	CG038
2-517B	USZ	148618.62	2146541.23	16-Feb-05	1268.09	1268.45	CG038
2-518B	USZ	150190.57	2145729.86	03-Feb-05	1250.43	1250.9	CG038
2-519B	USZ	150276.84	2146388.32	08-Feb-05	1248.39	1248.98	CG038
2-51A	LSZ	158343.4	2148830.13	08-Nov-93	1241.65	1241.77	ST033
2-51B	USZ	158327.5	2148829.99	21-Oct-93	1241.45	1241.45	ST033
2-520B	USZ	149096.18	2146740.71	10-Feb-05	1250.13	1250.38	CG038
2-521B	USZ	149794.39	2147065.63	11-Feb-05	1239.85	1240.31	CG038
2-522B	USZ	150389.41	2146330.37	14-Feb-05	1254.73	1255.18	CG038
2-523B	USZ	150551.5	2146698.4	16-Apr-05	1245.78	1246.13	CG038
2-524B	USZ	150717.76	2147159.24	19-Apr-05	1233.43	1233.78	CG038
2-525B	USZ	148975.66	2154423.47	01-Aug-05	1288.63	1288.81	WP018
2-526B	HWBZ	148185.86	2154342.85	02-Aug-05	1284.5	1284.49	WP018
2-527B	USZ	148804.12	2154041.54	02-Aug-05	1277.92	1278.09	WP018
2-528B	USZ	149194.44	2154547.3	03-Aug-05	1290.45	1290.62	WP018
2-529B	USZ	149390.91	2154538.62	04-Aug-05	1285.22	1285.5	WP018
2-52A	LSZ	158309.97	2148650.38	03-Nov-93	1239.83	1239.83	ST033
2-52B	USZ	158318.86	2148650.15	22-Oct-93	1239.95	1239.95	ST033
2-52C	LLSZ	158330.49	2148650.14	15-Sep-99	1239.46	1240.11	ST033

2-530B	USZ	149895.31	2154398.42	05-Aug-05	1290.7	1291.09	WP018
2-531B	USZ	149583.47	2145290.92	09-Oct-06	1252.64	1252.9	CG038
2-534B	USZ	149891.91	2145255.88	03-Nov-06	1251.32	1251.79	CG038
2-535B	USZ	150579.89	2145913.13	17-Nov-06	1254.87	1255.17	CG038
2-536B	USZ	150872.44	2146043.14	14-Nov-06	1243.87	1244.25	CG038
2-537B	USZ	150085.07	2147403.11	27-Nov-06	1240.36	1240.92	CG038
2-538B	USZ	149467.91	2147684.31	24-Oct-06	1251.71	1252.05	CG038
2-539B	USZ	150270.43	2148570.81	26-Oct-06	1240.8	1241.31	CG038
2-53B	USZ	152179.05	2155280.53	11-Nov-93	1274.4	1270.07	
2-540B	USZ	151761.43	2148986.32	07-Feb-07	1240.8	1241.1	CG039
2-541B	USZ	151320.23	2148579.83	07-Feb-07	1233.42	1233.6	CG039
2-542B	USZ	150948.43	2148877.28	30-Jan-07	1242.47	1243.05	CG039
2-543B	USZ	151213.39	2153001.04	10-Apr-07	1269.25	1269.5	CG039
2-544B	USZ	148066.39	2149477.01	17-Feb-07	1262.73	1263.05	CG039
2-545B	USZ	151038.51	2154893.23	14-Mar-07	1300.73	1300.8	CG039
2-546B	USZ	150258.52	2152322.83	19-Mar-07	1262.79	1263	CG039
2-547B	USZ	147160.65	2150761.98	20-Mar-07	1269.78	1269.95	CG039
2-548B	USZ	150706.81	2154017.31	20-Mar-07	1287.12	1287.25	CG039
2-549B	USZ	150323.4	2145947.13	01-Dec-08	1257.68	1257.95	CG038
2-54B	USZ	152186.26	2155368.96	10-Nov-93	1275.88	1271.51	
2-550H	HWBZ	150475.47	2146494.59	24-Nov-08	1250.32	1250.62	CG038
2-551H	HWBZ	150403.4	2146403.08	24-Nov-08	1253.24	1253.56	CG038
2-552H	HWBZ	150502.33	2146287.13	24-Nov-08	1257.63	1257.99	CG038
2-553H	HWBZ	150416.48	2146278.01	25-Nov-08	1256.53	1256.83	CG038
2-554WB	LSZ	153767.37	2154223.54	26-Jun-09	1275.88	1276.25	OT001
2-555B	USZ	158221.57	2146082.22	01-Jul-09	1223.26	1223.61	
2-556WB	LSZ	155549.71	2153347.78	02-Jul-09	1273	1273.35	OT001
2-557B	USZ	148942.15	2153659.43	30-Jun-09	1276.42	1276.85	WP018
2-558B	USZ	149095.99	2153487.59	30-Jun-09	1275.41	1275.88	CG039
2-559B	USZ	158032.7	2145261.02	01-Jul-08	1211.13	1211.59	CG037
2-55B	USZ	152121.1	2155424.24	10-Nov-93	1276.03	1271.84	
2-560B	USZ	155704.49	2153543.65	03-Feb-10	1275.82	1276.17	OT001
2-561B	USZ	155745.85	2153586.15	04-Feb-10	1275.93	1276.17	OT001
2-562B	USZ	155585.38	2153476.39	04-Feb-10	1275.97	1276.17	OT001
2-563B	USZ	154103.04	2153861.49	06-Feb-10	1275.82	1276.24	OT001
2-564B	USZ	153621.63	2153793.8	10-Feb-10	1275.8	1276.24	OT001
2-565B	USZ	155051.62	2154015.3	10-Feb-10	1275.79	1276.24	OT001
2-566B	USZ	150626.39	2150350.56	01-Jan-15	1250.01	1250	OT001
2-567B	USZ	150857.29	2150281.12	01-Jan-15	1254.01	1254	OT001
2-568B	USZ	153360.97	2153717.25	04-Apr-12	1274.95	1275.38	OT001
2-569A	LSZ	153529.81	2153714.7	02-Apr-12	1275.05	1275.76	OT001
2-569B	USZ	153522.21	2153714.64	02-Apr-12	1275.31	1275.82	OT001
2-56B	USZ	151920.75	2155479.68	11-Nov-93	1277.01	1273.25	
2-570B	USZ	153982.02	2153881.56	09-Apr-12	1275.72	1276.23	OT001
2-571B	USZ	154847.68	2153805.68	10-Apr-12	1275.94	1276.28	OT001
2-572B	USZ	155394.67	2153869.68	11-Apr-12	1275.93	1276.26	OT001
2-573B	USZ	149099.22	2155257.03	04-Oct-12	1296.28	1296.7	OT067

2-574B	USZ	149315.85	2155807.63	25-Oct-12	1295.01	1295.56	OT067
2-575B	USZ	149260.86	2155186.29	29-Oct-12	1295.21	1295.47	OT067
2-576B	USZ	149082.08	2155714.2	25-Oct-12	1295.25	1295.61	OT067
2-577A	LSZ	150375.63	2154073.73	03-Dec-12	1290.75	1290.96	OT069
2-577B	Not Available	150391.65	2154108.66	06-Nov-12	1290.16	1290.69	OT069
2-578B	Not Available	149898.76	2154031.58	09-Nov-12	1290.46	1290.86	OT069
2-579B	USZ	150387.16	2155007.62	13-Nov-12	1293.55	1293.91	OT069
2-57A	LSZ	151897.1	2155025.78	09-Dec-93	1279.75	1272.74	ST032
2-57B	USZ	151897.6	2155020.71	06-Jan-94	1279.56	1272.88	
2-580B	USZ	150385.23	2155533.97	12-Nov-12	1293.73	1294.09	OT069
2-581BU	USZ	156343.05	2148582.05	23-Jan-13	1239.01	1239.34	CG41
2-582BL	USZ	156205.54	2148138.73	10-Jan-13	1238.78	1239.15	CG41
2-582BU	USZ	156208.5	2148138.88	11-Jan-13	1238.9	1239.14	CG41
2-583BL	USZ	155881.66	2148389.94	16-Jan-13	1240.13	1240.62	CG41
2-583BU	USZ	155889.73	2148390.36	16-Jan-13	1240.29	1240.76	CG41
2-584BL	USZ	155784.73	2149122.9	28-Jan-13	1242.82	1243.36	CG41
2-584BU	USZ	155784.66	2149118.45	28-Jan-13	1242.88	1243.39	CG41
2-585A	LSZ	155614.39	2148331.72	19-Feb-13	1235.07	1235.46	CG41
2-585BL	USZ	155614.3	2148335.16	15-Jan-13	1235.14	1235.48	CG41
2-585BU	USZ	155614.19	2148339.02	15-Jan-13	1235.07	1235.49	CG41
2-586BL	USZ	155763.43	2148811.54	25-Jan-13	1242.17	1242.55	CG41
2-586BU	USZ	155768.41	2148811.26	25-Jan-13	1242.03	1242.54	CG41
2-587BU	USZ	155503.89	2147583.69	11-Mar-13	1228.47	1228.85	CG41
2-588BU	USZ	155447.11	2149406.85	07-Feb-13	1243.5	1243.89	CG41
2-589A	LSZ	154906.27	2148347.43	05-Mar-13	1232.96	1233.37	CG41
2-589BL	USZ	154898.15	2148354.45	04-Mar-13	1232.86	1233.27	CG41
2-58A	LSZ	152126.72	2155206.49	10-Dec-93	1275	1270.84	ST032
2-58C	LLSZ	152135.38	2155206.15	23-Sep-99	1270.15	1270.75	ST032
2-59	USZ	148773.6	2155283.8	15-Nov-93	1297.78	1295.44	VI084
2-590BU	USZ	155229.34	2148996	07-Feb-13	1238.97	1239.37	CG41
2-591BU	USZ	155221.27	2149564.78	01-Feb-13	1241.81	1242.27	CG41
2-592BU	USZ	154945.98	2149451.11	11-Feb-13	1239.6	1240.11	CG41
2-593BU	USZ	155124.07	2147787.25	12-Mar-13	1229.26	1229.69	CG41
2-594A	LSZ	154922.83	2150299.3	30-Jan-13	1248.34	1248.92	CG41
2-595BL	USZ	154774.91	2150666.64	14-Mar-13	1252.35	1252.82	CG41
2-595BU	USZ	154769.69	2150662.05	14-Mar-13	1252.38	1252.83	CG41
2-596BL	USZ	154372.58	2149394.3	12-Mar-13	1240.83	1241.26	CG41
2-596BU	USZ	154367.08	2149393.97	12-Mar-13	1241.2	1241.56	CG41
2-597BL	USZ	155910.84	2148580.08	21-Mar-13	1241.92	1242.33	CG41
2-597BU	USZ	155906.87	2148579.73	21-Mar-13	1241.9	1242.3	CG41
2-598BL	USZ	155986	2149154.09	24-Jan-13	1242.58	1242.95	CG41
2-598BU	USZ	155986.11	2149148.96	24-Jan-13	1242.7	1243.02	CG41
2-599BU	USZ	155204.66	2149832.39	05-Feb-13	1242.01	1242.52	CG41
25AR	LSZ	153514.98	2153302.52	19-Nov-93	1278.47	1276.12	ST006
25CR	LLSZ	153502.2	2153299.43	23-Nov-93	1278.33	1276.12	ST006
2-6	HWBZ	147087.22	2151104.87	11-Feb-87	1275.5	1275.75	ST107
2-60	USZ	148743.29	2155093.57	23-Nov-93	1295.59	1295.79	OT055

2-600BU	USZ	155478.72	2148773.95	05-Feb-13	1238.08	1238.57	CG41
2-601BU	USZ	156282.66	2149170.67	17-Jan-13	1243.16	1243.65	CG41
2-602BU	USZ	154969.88	2149757.57	05-Feb-13	1242.01	1242.46	CG41
2-603B	USZ	157011.08	2146196.48	11-Mar-13	1223.45	1223.94	CG042
2-604BU	USZ	155603.64	2147196.03	17-Apr-13	1223.81	1224.24	CG41
2-605B	USZ	153979.53	2153824.69	21-Nov-13	1276.02	1276.16	OT001
2-606B	USZ	153761.89	2153788.4	18-Nov-13	1275.79	1276.22	OT001
2-607B	USZ	153644.6	2153864.41	20-Nov-13	1275.84	1276.24	OT001
2-608B	USZ	153538.32	2153825.6	19-Nov-13	1275.74	1276.25	OT001
2-609B	USZ	153588.91	2153657.14	22-Jan-14	1275.04	1275.64	OT001
2-61	USZ	148679.4	2155135.27	22-Nov-93	1297.67	1295.5	OT055
2-610B	USZ	153249.99	2153676.14	22-Oct-14	1275.16	1275.53	OT001
2-611B	USZ	153424.91	2153846.62	23-Oct-14	1275.66	1275.22	OT001
2-612B	USZ	150495.34	2150527.52	12-May-15	1245.56	1245.97	CG039
2-613A	LSZ	156555.34	2149999.47	09-Jun-14	1247.71	1248.1	OT064
2-613B	USZ	156562.07	2149999.74	09-Jun-14	1247.79	1248.19	OT064
2-614A	LSZ	156835.47	2150166.05	10-Jun-14	1248.12	1248.62	OT064
2-614B	USZ	156827.75	2150165.93	09-Jun-14	1248.3	1248.62	OT064
2-615B	USZ	149076.38	2145604.61	30-Jan-15	1265.83	1266.51	CG038
2-616B	USZ	149249.59	2145601.69	29-Jan-15	1263.56	1264.08	CG038
2-617B	USZ	158632.98	2148538.78	14-May-15	1241.63	1241.96	CG037
2-618B	USZ	158611.7	2148487.81	11-May-15	1241.09	1241.42	CG037
2-619BL	USZ	156162.46	2153310.99	09-Sep-15	1268.94	1269.46	ST003
2-62A	LSZ	150474.28	2150554.69	22-Nov-93	1246.21	1246.41	FT022
2-62BR	Not Available	150467.46	2150542.8	20-Feb-13	1246.35	1246.72	CG039
2-63A	LSZ	150416.35	2150445.54	19-Nov-93	1243.39	1243.63	FT022
2-63B	USZ	150412.49	2150437.88	08-Nov-93	1243.28	1243.36	FT022
2-64A	LSZ	150496.59	2150361.9	18-Nov-93	1246.05	1246.12	FT022
2-64B	USZ	150493.78	2150370.28	09-Nov-93	1245.59	1245.75	CG039
2-65A	LSZ	150724.67	2150592.41	15-Nov-93	1250.98	1251.12	FT022
2-65B	USZ	150739.27	2150585.73	05-Nov-93	1250.81	1250.94	FT022
2-66A	USZ	153510.7	2145894.27	02-Nov-93	1228.21	1228.46	OT050
2-66B	USZ	153501.83	2145894.21	26-Oct-93	1228.42	1228.57	OT050
2-66C	LSZ	153522.82	2145893.3	16-Jul-97	1227.99	1228.4	OT050
2-67A	USZ	153325.66	2145662.91	03-Nov-93	1227.88	1227.99	OT050
2-67B	USZ	153333.11	2145662.43	28-Oct-93	1227.75	1227.94	OT050
2-68A	USZ	153483.32	2145670.3	04-Nov-93	1227.64	1227.77	OT050
2-68B	USZ	153496.79	2145669.99	29-Oct-93	1227.5	1227.74	OT050
2-68C	LSZ	153467.35	2145669.82	16-Jul-97	1227.34	1227.74	OT050
2-69	LSZ	149425.96	2153861.38	20-Oct-93	1287.57	1285.67	WP036
2-7	HWBZ	147100.05	2151153.52	11-Feb-87	1275.33	1275.7	ST107
2-70	LSZ	149353.35	2153898.42	07-Dec-93	1286.67	1284.84	WP036
2-71	LSZ	149320.01	2153995.26	10-Dec-93	1286.2	1284.34	WP036
2-73BL	USZ	156331.23	2153613.75	25-Oct-93	1269.84	1269.84	CG037
2-73BU	USZ	156331.72	2153605.75	25-Oct-93	1270.06	1270.36	ST003
2-74BL	USZ	156221.31	2153346.35	09-Sep-15	1270.36	1270.95	ST003
2-74BU	USZ	156227.7	2153346.29	05-Nov-93	1270.79	1271.12	ST003

2-75BL	USZ	156228.73	2153484.8	28-Oct-93	1271.21	1271.39	ST003
2-75BU	USZ	156228.72	2153454.8	26-Oct-93	1271.2	1271.46	ST003
2-76	USZ	156217.18	2153545.52	03-Nov-93	1271.64	1272.04	ST003
2-77BL	USZ	156169.53	2153701.21	06-Nov-93	1273.49	1273.79	ST003
2-77BU	USZ	156169.79	2153707.51	28-Oct-93	1273.61	1273.77	ST003
2-78	USZ	156166.72	2153546.99	28-Oct-93	1271.93	1271.93	ST003
2-78	USZ	156166.72	2153546.99	28-Oct-93	1271.93	1271.93	ST003
2-79BL	USZ	156115.24	2153436.26	04-Nov-93	1271.99	1272.29	ST003
2-79BU	USZ	156121.61	2153436.51	05-Nov-93	1271.98	1272.23	ST003
2-8	USZ	152107.09	2155293.34	12-Feb-86	1272.68	1271.1	ST032
2-80	USZ	156113.36	2153586.09	10-Nov-93	1272.19	1272.19	ST003
2-80	USZ	156113.36	2153586.09	10-Nov-93	1272.19	1272.19	ST003
2-81	LSZ	156140.79	2153554.33	04-Nov-93	1275.63	1272.19	ST003
2-82BL	USZ	156090.48	2153662.74	06-Nov-93	1274.06	1274.16	ST003
2-83BL	USZ	156044.69	2153624.04	05-Nov-93	1273.8	1274.33	ST003
2-84BL	USZ	156001.76	2153591.7	04-Nov-93	1272.23	1272.23	ST003
2-84BU	USZ	156001.75	2153600.06	27-Oct-93	1272.36	1272.36	ST003
2-85B	USZ	156002.76	2153667	04-Nov-93	1274.11	1274.11	ST003
2-86B	USZ	149276.62	2153752.81	15-Feb-95	1285.86	1282.72	WP018
2-87B	USZ	149150.51	2153887.06	15-Feb-95	1282.86	1279.1	WP018
2-88B	USZ	148993.52	2153946.44	14-Feb-95	1282.42	1279.09	WP018
2-89B	USZ	148948.84	2154073.91	08-Feb-95	1282.16	1278.84	WP018
28B	LSZ	148856.17	2157906.31	24-Apr-95	1272.46	1272.84	LF016
2-9	USZ	152014.92	2155271.88	17-Feb-86	1273.49	1271.6	
2-91A	LSZ	148821.33	2152949.69	14-Feb-95	1263.69	1263.9	WP018
2-91B	USZ	148813.25	2152959.78	14-Feb-95	1263.97	1264.21	WP018
2-92A	LSZ	148599.67	2153207.94	14-Feb-95	1271.44	1268.12	WP018
2-92B	USZ	148590.96	2153218.38	04-Feb-95	1271.39	1268.53	WP018
2-93A	LSZ	148442.09	2153606.55	13-Feb-95	1276.3	1273.68	WP018
2-93B	USZ	148433.16	2153615.78	06-Feb-95	1275.78	1272.99	WP018
2-97A	LSZ	148711.59	2157045.76	08-Feb-95	1288.45	1285	LF016
2-99B	USZ	147403.74	2156506.26	28-Dec-94	1273.85	1271.69	LF016
2AR	USZ	151770.52	2146054.67	29-Mar-95	1222.26	1219.9	LF013
2-S449B	USZ	154729.02	2145300.48	09-Dec-11	1220.33	1220.4	CG037
30	USZ	148438.95	2157782	22-Jun-84	1282.55	1282.96	LF016
3100-MW02	USZ	154423.25	2153381.63	17-Jun-92	1273.01	1273.36	ST216
3100-MW03	USZ	154228.88	2153280.52	17-Jun-92	1272.84	1273.19	ST216
3100-MW04	USZ	154228.01	2153273.78	17-Jun-92	1272.71	1272.97	ST216
33EW-1	LSZ	158451.21	2148667.06	18-Aug-97	1239.12	1241.72	ST033
33EW-2	LSZ	158310.43	2148675.06	18-Aug-97	1238.91	1241.36	ST033
33VEP-01	USZ	158479.25	2148604.16	07-Feb-96	1238.62	1238.62	ST033
33VEP-02	USZ	158441.64	2148601.6	06-Feb-96	1238.39	1238.39	ST033
33VEP-03	USZ	158439.79	2148656.29	06-Feb-96	1236.69	1236.69	ST033
33VEP-04	USZ	158398.28	2148707.97	05-Feb-96	1237.36	1237.69	ST033

33VEP-05	USZ	158367.37	2148697.38	30-Jan-96	1236.77	1236.77	ST033
33VEP-06	USZ	158336.24	2148808.69	01-Jan-01	1239.56	1239.56	ST033
33VEP-07	USZ	158397.49	2148751.27	01-Jan-01	1238.76	1238.76	ST033
33VEP-08	USZ	158321.09	2148727.29	23-Jan-96	1236.87	1236.87	ST033
33VEP-09	USZ	158559.05	2148429.63	26-Mar-97	1240.33	1245.35	ST033
33VEP-10	USZ	158420.43	2148209.46	27-Mar-97	1236.55	1238.54	ST033
33VEP-11	USZ	158360.35	2148341.59	25-Mar-97	1235.96	1238.21	ST033
33VEP-12	USZ	158361.92	2148469.97	02-Apr-97	1236.4	1239.02	ST033
34A	USZ	155017.68	2154179.73	16-Aug-85	1275.36	1274.8	OT001
34B	LSZ	155023	2154180	19-Aug-85	1273.99	1274.83	OT001
34CR	LLSZ	155028.49	2154179.83	29-Jan-94	1275.91	1276.23	OT001
34DR	PZ	155091.13	2154014.91	26-Feb-94	1275.95	1276.24	OT001
35A	USZ	155442.02	2154177.65	22-Aug-85	1275.08	1275.92	OT001
35BR	LSZ	155447.73	2154177.7	11-Nov-93	1275.76	1276.25	OT001
35C	LLSZ	155451.91	2154177.6	27-Aug-85	1275.04	1275.91	OT001
35D	PZ	155404.16	2154166.03	18-Dec-93	1276	1276.29	OT001
36	LSZ	148322.3	2157320	01-Jan-85	1296.2	1293.86	LF016
38	LSZ	147656.34	2157677.25	01-Jan-85	1302.89	1300.58	LF016
39R	USZ	147662.42	2158004.83	03-May-95	1291.68	1291.13	LF016
3A	USZ	151480.59	2146615.42	21-Nov-83	1226.35	1223.79	LF013
3B	LSZ	151463.21	2146624.49	22-Nov-83	1226.62	1224.42	LF013
45AR	USZ	148862.81	2145616.85	27-Mar-95	1269.18	1266.64	CG038
45B	HWBZ	148859.82	2145630.74	07-May-86	1268.88	1266.33	CG038
45CR	LSZ	148848.91	2145617.69	23-Mar-95	1268.91	1266.63	CG038
46AR	USZ	149896.23	2145596.17	20-Mar-95	1258.95	1255.99	CG038
46B	HWBZ	149905.64	2145595.64	08-May-86	1258.21	1255.7	CG038
46C	LSZ	149881.28	2145596.88	28-Mar-95	1258.88	1256.43	CG038
47AR	USZ	148529.81	2147217.7	17-Feb-95	1252.76	1249.92	CG038
47B	HWBZ	148529.35	2147204.71	12-May-86	1251.49	1249.59	CG038
49AR	USZ	146202.02	2150866.22	02-Feb-95	1282.67	1280.04	OF059
49B	HWBZ	146216.07	2150866.45	13-May-86	1282.84	1279.96	OF059
49C	LSZ	146189.89	2150866.92	01-Feb-95	1282.98	1280.29	OF059
49D	LLSZ	146177.81	2150869.22	31-Jan-95	1283.2	1280.55	OF059
4AR	USZ	151145.33	2147008.76	11-Mar-95	1224.39	1222.07	LF013
4BR	HWBZ	151142.95	2147020.35	11-Mar-95	1224.45	1222.14	LF013
4C	LSZ	151148.12	2146997.66	10-Jul-92	1224.37	1222.09	LF013
55A		147668.21	2158417.31	13-May-87	1295.43	1293.2	LF016
55B	USZ	147667.34	2158432.02	25-Nov-86	1296	1293.63	LF016
55C	LSZ	147668.25	2158408.67	13-May-87	1294.85	1293.12	LF016
56A	LSZ	147676.09	2158603.89	19-Sep-86	1301.53	1299.27	LF016
56B	USZ	147679.12	2158612.83	22-Sep-86	1301.66	1299.66	LF016
57A	LSZ	148012.75	2158639.27	21-Aug-86	1301.01	1298.85	LF016
57B	USZ	148025.9	2158639.63	22-Aug-86	1301.28	1298.72	LF016
58AR	LSZ	148909.33	2150740.6	29-Jul-98	1259.4	1256.42	OT005
58BR	USZ	148899.71	2150730.46	18-Jun-98	1259.68	1257.16	OT005
59AR	LSZ	150253.01	2147480.88	23-Feb-95	1243.25	1240.35	LF012
59B	USZ	150267.55	2147474.47	16-Dec-86	1242.92	1240.21	LF012

59C	HWBZ	150277.76	2147469.94	15-Jan-87	1242.62	1240.02	LF012
59D	LLSZ	150241.59	2147486.14	22-Feb-95	1243.43	1240.5	LF012
5AR	USZ	151017.03	2147456.44	09-Mar-95	1226.29	1223.23	LF012
5C	USZ	151003.59	2147451.61	09-Mar-95	1226.99	1223.9	LF012
6	USZ	149535.98	2150856	04-Jun-86	1241.69	1241.06	LF015
60A	HWBZ	149827	2146607.57	23-Dec-86	1244.69	1242.51	LF012
60B	USZ	149840.59	2146591.02	13-Jan-87	1244.83	1242.63	LF012
61A	USZ	152378.95	2145603.91	20-Feb-87	1219.44	1216.36	FT021
61B	LSZ	152374.35	2145614.88	18-Nov-87	1219.52	1216.78	FT021
61PDD1-1	USZ	152243.94	2155023.15	16-Nov-01	1269.48	1271.35	
61PDD1-2	USZ	152244.56	2155155.07	14-Nov-01	1270.31	1271.44	
61PDD1-3	USZ	152340.21	2155144.74	08-Nov-01	1269.76	1270.75	
61PDD1-4	USZ	152186.45	2155303.94	06-Nov-01	1269.67	1271.25	
61PDD1-5	USZ	152106.66	2155260.28	19-Nov-01	1269.31	1270.71	
61PDD1-6	USZ	152021.66	2155259.34	19-Nov-01	1269.19	1270.9	
61PDD2-1	USZ	151889.66	2154804.4	09-Nov-01	1277.3	1278.33	
61PDD2-2	USZ	151827.1	2154814.33	07-Nov-01	1278.17	1279.35	
61PDD2-3	USZ	151937.15	2154634.4	05-Nov-01	1277.18	1278.25	
61PDD3-1	USZ	151842.27	2154351.44	10-Nov-01	1273.68	1275	
61PDD3-2	USZ	152004.63	2154355.38	10-Nov-01	1273.1	1275.14	
62	USZ	152655.63	2145813.5	03-Aug-88	1224.53	1221.62	FT021
62VEP1-1	USZ	156102.42	2149475.6	08-Mar-04	1246.41	1247.78	OT062
62VEP1-2	USZ	156272.13	2149391.24	15-Mar-04	1244.53	1245.95	OT062
62VEP1-3	USZ	156379.03	2149576.11	02-Mar-04	1245.23	1246.76	OT062
62VEP2-1	USZ	156411.17	2149824.19	05-Mar-04	1244.29	1245.71	OT062
62VEP2-2	USZ	156414.18	2149916.87	01-Mar-04	1244.83	1246.25	OT062
62VEP2-3	USZ	156412.62	2149999.43	26-Feb-04	1244.94	1246.58	OT062
62VEP2-4	USZ	156403.97	2150077.4	25-Feb-04	1245.41	1246.74	OT062
64A	LSZ	147699.1	2156857.68	25-Apr-88	1288	1285.11	LF016
64B	USZ	147714.94	2156856.17	26-Apr-88	1287.89	1284.92	LF016
65A	LSZ	147317.68	2156966.36	28-Apr-88	1296.22	1292.68	LF016
65B	USZ	147316.38	2156980.1	29-Apr-88	1296.16	1293.47	LF016
66B	USZ	147174.28	2157384.13	05-May-88	1293	1293.88	LF016
67A	LSZ	147069.23	2157880.25	09-May-88	1296.67	1293.78	LF016
67BR	USZ	147070.99	2157892.05	03-Jan-95	1297.21	1294.31	LF016
69	USZ	158823.56	2143197	22-Oct-87	1198.52	1196.5	OF059
6A	LSZ	149538.3	2150846.47	04-Dec-86	1243.56	1240.95	LF015
7	USZ	149208.55	2151050.75	04-Jun-87	1248.28	1245.65	LF015
70	USZ	158511.52	2149212	29-Oct-87	1246.23	1243.58	OF059
73R	USZ	149529.91	2155787.55	18-Oct-95	1298.5	1295.82	CG039
740-MW1	USZ	157209.36	2146203.98	02-Jun-92	1224.06	1224.26	ST123
740-MW2	USZ	157171.4	2146353.47	02-Jun-92	1225.41	1225.47	ST123
75A	HWBZ	150686.44	2145321.14	03-Aug-88	1246.61	1244.03	LF014
75B	USZ	150674.39	2145323	03-Aug-88	1246.2	1243.56	LF014
76A	USZ	151132.91	2146043.05	09-Aug-88	1230.85	1228.15	LF013
76B	LSZ	151109.46	2146042.12	17-May-88	1230.04	1227.73	LF013
76C	HWBZ	151121.71	2146042.45	15-Mar-95	1230.44	1227.72	LF013

76D	LSZ	151109.89	2146027.22	14-Mar-95	1230.03	1227.4	LF013
77A	USZ	151459.65	2146771.81	19-May-88	1221.74	1219.19	LF013
77C	LSZ	151450.48	2146786.15	05-Apr-95	1221.81	1219.13	LF013
77D	LSZ	151466.69	2146761.69	04-Apr-95	1221.66	1219	LF013
78A	USZ	150680.33	2147788.42	08-Dec-87	1233.33	1231.07	LF012
78B	LSZ	150686.75	2147795.86	08-Dec-87	1233.43	1230.57	LF012
78C	HWBZ	150702.83	2147791.08	16-Mar-95	1233	1230.24	LF012
79A	HWBZ	149350.88	2147259.52	03-Aug-88	1240.18	1237.6	CG038
79BR	USZ	149367.25	2147236.62	17-Feb-95	1239.48	1236.69	CG038
79C	LSZ	149370.15	2147249.65	03-Aug-88	1239.85	1237.09	CG038
79D	LLSZ	149348.44	2147246	06-Mar-95	1240	1237.3	CG038
7RW-1	LSZ	156550.59	2149544.79	28-Nov-00	1244.29	1245.41	ST007
7RW-2	LSZ	156782.01	2149663.09	20-Dec-00	1245.75	1246.83	ST007
7RW-3	LSZ	156752.14	2150839.8	01-Dec-00	1252.92	1253.92	ST007
7RW-4	LSZ	156161.75	2151500.19	02-Dec-00	1256.84	1256.92	ST007
7RW-5	LSZ	156543.67	2151335.98	20-Dec-00	1253.85	1254.84	ST007
7VEP-1	USZ	156519.62	2150620.82	30-Jun-98	1259.23	1251.67	ST007
7VEP1-1	USZ	165556.23	2150833.62	16-Sep-99	1251.9	1253.7	ST007
7VEP-12	USZ	156525.32	2150280.79	09-Jul-98		1248.03	ST007
7VEP1-2	USZ	156632.93	2150833.64	16-Sep-99	1252.09	1253.79	ST007
7VEP1-3	USZ	158715.6	2150833.09	14-Sep-99	1252.32	1253.92	ST007
7VEP-15	USZ	157139.54	2150738.8	19-Sep-99	1248.59	1250.78	ST007
7VEP-16	USZ	157140.12	2150802.35	19-Sep-99	1248.82	1251.2	ST007
7VEP-17	USZ	157140.47	2150928.04	18-Sep-99	1250.32	1262.54	ST007
7VEP-18	USZ	156846.61	2150448.86	23-Aug-07		1248	ST007
7VEP-2	USZ	156602.77	2150622.41	02-Jul-98	1250.34	1251.89	ST007
7VEP2-1	USZ	156689.09	2150888.48	28-Sep-99	1252.34	1253.87	ST007
7VEP2-2	USZ	156778.97	2150887.31	28-Sep-99	1252.15	1253.94	ST007
7VEP2-3	USZ	156914.18	2150958.98	29-Sep-99	1253.69	1254.91	ST007
7VEP2-4	USZ	156861.43	2150889.67	29-Sep-99	1252.07	1253.95	ST007
7VEP-3	USZ	156679.47	2150617.25	01-Jul-98	1250.34	1251.99	ST007
7VEP3-1	USZ	156942.08	2150842.15	23-Sep-99	1253.02	1254.88	ST007
7VEP3-1-2	USZ	156881.73	2150832.44	23-Sep-99	1252.42	1253.96	ST007
7VEP3-2	USZ	156978.08	2150767.64	30-Sep-99	1252.2	1253.79	ST007
7VEP3-3	USZ	157011.07	2150711.36	30-Sep-99	1248.47	1250.66	ST007
7VEP3-4	USZ	156941.05	2150639.78	01-Oct-99	1250.24	1251.71	ST007
7VEP-4	USZ	156756.61	2150641.87	02-Jul-98	1250.71	1252.81	ST007
7VEP4-1	USZ	156649.57	2151287.34	15-Sep-99	1252.84	1254.4	ST007
7VEP4-2	USZ	156741.3	2151275.67	14-Sep-99	1252.67	1254.26	ST007
7VEP4-3	USZ	156658.75	2151493.63	20-Sep-99	1252.56	1254.58	ST007
7VEP-5	USZ	156826.16	2150644.26	06-Jul-98	1251.01	1252.67	ST007
7VEP5-1	USZ	156598.47	2151347.86	21-Sep-99	1252.87	1254.86	ST007
7VEP5-2	USZ	156516.17	2161342.9	22-Sep-99	1252.95	1254.93	ST007
7VEP5-3	USZ	156357.13	2151309.3	21-Sep-99	1254.55	1255.57	ST007
7VEP-6	USZ	156886.13	2150519.69	06-Jul-98	1247.92	1250.22	ST007
7VEP-7	USZ	156792.15	2150539.8	07-Jul-98	1247.79	1250.19	ST007
7VEP-8	USZ	156702.83	2150540.06	08-Jul-98	1247.96	1250.3	ST007

7VEP-9	USZ	156631.89	2150533.43	08-Jul-98	1247.98	1250.32	ST007
80	USZ	146230.11	2154107	10-Mar-89	1292.86	1293.52	WP019
80B	HWBZ	146214.98	2154099.96	24-Mar-95	1296.71	1293.74	VI084
83A	HWBZ	150630.88	2145092.91	16-Jun-89	1254.92	1252.36	LF014
83BR	USZ	150613.55	2145092.15	21-Mar-95	1254.37	1251.95	LF014
83C	LSZ	150599.08	2145091.41	21-Mar-95	1253.91	1251.29	LF014
84A	HWBZ	149592.33	2147818.18	14-Jun-89	1257.74	1254.37	LF012
84B	USZ	149584.56	2147822.8	14-Jun-89	1257.79	1254.63	LF012
84CR	LSZ	149578.9	2147825.97	11-Oct-02	1257.36	1254.8	LF012
84D	LLSZ	149566.45	2147831.8	27-Feb-95	1257.88	1255.01	LF012
85A	USZ	152367.42	2145794.96	23-Aug-89	1220.48	1217.93	WP017
85B	LSZ	152367.71	2145809.31	30-Aug-89	1220.86	1217.86	WP017
85C	USZ	152367.72	2145821.43	29-Mar-95	1220.08	1217.5	WP017
85D	LLSZ	152366.72	2145782.2	28-Apr-95	1220.1	1217.48	WP017
86A	HWBZ	150906.43	2147261.42	10-May-90	1225.52	1222.75	LF012
86B	USZ	150911.36	2147249.55	09-Mar-95	1225.18	1222.6	LF012
9A	USZ	151892.21	2145630.85	14-Nov-83	1223.09	1216.38	LF011
B3001-E105-IW01	USZ	155639.57	2153353.33	04-Aug-14	1272.61	1273.18	OT001
B3001-E105-IW02	USZ	155578.44	2153354.83	06-Aug-14	1272.84	1273.29	OT001
B3001-E105-IW03	USZ	155605.31	2153313.8	02-Oct-14	1272.51	1272.91	OT001
B3001-E105-IW04	USZ	155554.4	2153324.18	01-Oct-14	1273	1273.42	OT001
B3001-E105-IW05	USZ	155621.69	2153280.8	18-Aug-14	1271.76	1272.42	OT001
B3001-E105-IW06	USZ	155578.43	2153279.7	06-Aug-14	1271.74	1272.28	OT001
B3001-E105-IW07	USZ	155616.08	2153220.51	04-Aug-14	1269	1269.71	OT001
B3001-E105-IW08	USZ	155575	2153219.23	12-Aug-14	1269.29	1269.95	OT001
B3001-E105-IW09	USZ	155611.36	2153123.67	12-Aug-14	1264.76	1265.39	OT001
B3001-E105-IW10	USZ	155571.3	2153121.63	29-Jul-14	1265.06	1265.67	OT001
B3001-E105-IW11	USZ	155540.64	2153353.86	13-Aug-14	1272.81	1273.45	OT001
B3001-E105-IW12	USZ	155652.39	2153222.37	14-Aug-14	1268.93	1269.55	OT001
B3001-E105-IW13	USZ	155531.8	2153125	14-Aug-14	1265.11	1265.73	OT001
B3001-E105-IW14	USZ	155508.29	2153337.34	01-Oct-14	1273.12	1273.56	OT001
B3001-E105-IW15	USZ	155516.74	2153278.8	30-Sep-14	1272.08	1272.63	OT001

B3001-E105-IW16	USZ	155667.77	2153278.38	08-Oct-14	1272.33	1272.7	OT001
B3001-E105-IW17	USZ	155515.67	2153221.18	30-Sep-14	1270.09	1270.62	OT001
B3001-E105-IW18	USZ	155481.32	2153117.32	06-Oct-14	1266.35	1266.84	OT001
B3001-E105-IW19	USZ	155529.28	2153060.91	07-Oct-14	1265.78	1266.1	OT001
B3001-E105-IW20	USZ	155617.92	2153061.11	07-Oct-14	1265.48	1265.82	OT001
B3001-E105-IW21	USZ	155664.94	2153112.63	06-Oct-14	1265.14	1265.55	OT001
B3001-E105-IW22	USZ	155348.91	2153325.67	12-Nov-14	1272.48	1273.14	OT001
B3001-E105-IW23	USZ	155447.51	2153280.28	11-Nov-14	1272.19	1272.75	OT001
B3001-E105-IW24	USZ	155443.17	2153345.75	11-Nov-14	1273.14	1273.52	OT001
B3001-E105-IW25	USZ	155671.33	2153043.92	11-Sep-15	1265.46	1265.72	OT001
B3001-E105-IW26	USZ	155522.85	2153023.65	11-Sep-15	1265.57	1265.93	OT001
B3001-E105-IW27	USZ	155685.35	2153007.41	14-Mar-16	1264.8	1265.21	OT001
B3001-E105-IW28	USZ	155497.62	2153046.9	27-Apr-16	1265.77	1266.24	OT001
B3001-E105-IW29	USZ	155725.57	2153022.68	07-Jun-16	1264.79	1265.23	OT001
B3001-H-3	USZ	154025.06	2153358.24	21-Aug-14	1275.55	1276.05	OT001
B3001-H-4	USZ	153549.98	2153366.56	15-Aug-14	1276.06	1276.56	OT001
B3001-H-5	USZ	153337.06	2153714.93	08-Aug-14	1275.29	1275.79	OT001
B3001-Q51-IW01	USZ	154096.85	2153871.67	03-Nov-14	1275.8	1276.24	OT001
B3001-Q51-IW02	USZ	154115	2153840.5	04-Nov-14	1275.85	1276.28	OT001
B3001-Q51-IW03	USZ	154084.5	2153835.77	05-Nov-14	1275.78	1276.27	OT001
B3001-Q51-IW04	USZ	154040.7	2153861.93	06-Nov-14	1275.79	1276.25	OT001
B3001-Q51-IW05	USZ	154010.65	2153843.12	07-Nov-14	1275.68	1276.24	OT001
CG037-IW01	USZ	156909.11	2148602.76	02-Mar-13	1238.85	1238.91	CG037
CG037-IW02	USZ	156948.07	2148602	01-Mar-13	1239.5	1239.26	CG037
CG037-IW03	USZ	156989.43	2148602.04	01-Mar-13	1239.41	1239.31	CG037

CG037-IW04	USZ	157028.05	2148601.59	28-Feb-13	1239.66	1239.43	CG037
CG037-IW05	USZ	157068.38	2148596.14	27-Feb-13	1239.58	1239.76	CG037
CG037-IW06	USZ	157107.7	2148601.2	02-Mar-13	1239	1238.96	CG037
CG037-IW07	USZ	157144.98	2148583.2	02-Mar-13	1238.93	1238.69	CG037
CG037-IW08	USZ	157239.29	2148679.29	05-Mar-13	1239.64	1239.73	CG037
CG037-IW09	USZ	157280.18	2148680.68	05-Mar-13	1239.92	1240.11	CG037
CG037-IW10	USZ	157317.3	2148680.92	27-Feb-13	1240.83	1240.39	CG037
CG037-IW11	USZ	156986.39	2148662.69	03-Mar-13	1240.04	1240.15	CG037
CG037-IW12	USZ	157026.49	2148663.18	16-Mar-13	1240	1240.11	CG037
CG037-IW13	USZ	157065.72	2148662.63	16-Mar-13	1239.89	1239.94	CG037
CG037-IW14	USZ	157113.41	2148665.84	04-Mar-13	1240.37	1240.11	CG037
CG037-IW15	USZ	157142.82	2148660.54	04-Mar-13	1239.88	1239.63	CG037
CG037-IW16	USZ	157244.94	2148589.53	08-Aug-16	1238.15	1238.5	CG037
CG037-IW17	USZ	157261.73	2148610.99	08-Aug-16	1238.42	1239.05	CG037
CG037-IW18	USZ	157273.96	2148593.79	10-Aug-16	1238.1	1238.41	CG037
CG037-IW20	USZ	158320.44	2148802.88	01-Mar-13	1240.7	1240.93	CG037
CG037-IW21	USZ	158359.5	2148795.23	02-Mar-13	1240.4	1240.56	CG037
CG037-IW22	USZ	158389.17	2148785.99	01-Mar-13	1240.23	1240.28	CG037
CG037-IW23	USZ	158442.08	2148693.64	03-Mar-13	1241.56	1241.34	CG037
CG037-IW24	USZ	158482.21	2148697.09	01-Mar-13	1242.16	1242	CG037
CG037-IW30	LSZ	154760.89	2145334.6	04-Mar-13	1219.83	1219.58	CG037
CG037-IW31	LSZ	154786.92	2145270.39	03-Mar-13	1219.87	1219.64	CG037
CG037-IW32	LSZ	154702.15	2145331.28	17-Mar-13	1221.06	1220.83	CG037

CG037-IW38	USZ	158615.43	2148558.63	09-Dec-14	1241.94	1242.24	CG037
CG037-IW39	USZ	158620.32	2148583.06	11-Dec-14	1242.23	1242.67	CG037
CG037-IW40	USZ	158619.98	2148607.57	01-Mar-13	1242.42	1242.3	CG037
CG037-IW41	USZ	158635.76	2148623.66	01-Mar-13	1242.36	1242.48	CG037
CG037-IW42	USZ	158645.54	2148637.94	28-Feb-13	1242.45	1242.68	CG037
CG037-IW43	USZ	158654.7	2148659.08	28-Feb-13	1242.43	1242.57	CG037
CG037-IW44	USZ	158662.24	2148675.5	27-Feb-13	1242.29	1242.52	CG037
CG037-IW45	USZ	158670.31	2148693.54	27-Feb-13	1242.52	1242.58	CG037
CG037-IW46	USZ	158654.42	2148578.2	11-Dec-14	1242.27	1242.66	CG037
CG037-IW47	USZ	158662.43	2148592.8	09-Dec-14	1242.28	1242.65	CG037
CG037-IW48	USZ	158673.98	2148624.46	10-Dec-14	1242.06	1242.63	CG037
CG038-IW001	USZ	150619.43	2144819.4	14-Feb-13	1261.13	1261.2	CG038
CG038-IW002	USZ	150578.6	2144822.11	15-Feb-13	1259.82	1259.7	CG038
CG038-IW003	USZ	150539.86	2144830.61	14-Feb-13	1258.54	1258.37	CG038
CG038-IW004	USZ	150500.42	2144835.82	16-Feb-13	1257.24	1257.05	CG038
CG038-IW005	USZ	150467.88	2144846.17	17-Feb-13	1255.98	1255.88	CG038
CG038-IW006	USZ	150436.48	2144861.51	13-Feb-13	1254.93	1254.86	CG038
CG038-IW007	USZ	150686.9	2145092.41	18-Feb-13	1253.95	1253.82	CG038
CG038-IW008	USZ	150650.23	2145106.56	19-Feb-13	1252.26	1252.17	CG038
CG038-IW009	USZ	150612.44	2145123.22	18-Feb-13	1250.11	1250.11	CG038
CG038-IW010	USZ	150586.14	2145141.17	12-Feb-13	1248.88	1248.76	CG038
CG038-IW011	USZ	150936.72	2145556.02	18-Dec-12	1235.96	1236.2	CG038
CG038-IW012	USZ	150901.17	2145557.77	19-Dec-12	1235.04	1235.4	CG038

CG038-IW013R	USZ	150865.32	2145546.8	06-Nov-12	1235.34	1235.47	CG038
CG038-IW014R	USZ	150828.09	2145547.85	08-Nov-12	1235.27	1235.41	CG038
CG038-IW015R	USZ	150802.46	2145548.85	10-Nov-12	1235.16	1235.25	CG038
CG038-IW016	USZ	150777.53	2145557	04-Jan-13	1234.44	1234.72	CG038
CG038-IW017	USZ	150752.58	2145558.08	05-Jan-13	1234.7	1234.75	CG038
CG038-IW018	USZ	150728.17	2145558.21	06-Jan-13	1234.81	1235.02	CG038
CG038-IW019	USZ	150703.21	2145559.06	07-Jan-13	1234.98	1235.21	CG038
CG038-IW020	USZ	150677.47	2145559.81	09-Jan-13	1235.11	1235.38	CG038
CG038-IW021	USZ	150650.49	2145559.58	09-Jan-13	1234.89	1235.14	CG038
CG038-IW022	USZ	150616.03	2145560.77	15-Jan-13	1235.25	1235.42	CG038
CG038-IW023	USZ	150579.13	2145562.3	15-Jan-13	1236.04	1236.15	CG038
CG038-IW024	USZ	150542.13	2145563.48	16-Jan-13	1236.91	1236.84	CG038
CG038-IW025	USZ	151049	2146408.9	20-Feb-13	1232.01	1231.77	CG038
CG038-IW026	USZ	151050.86	2146504.24	20-Feb-13	1230.82	1230.67	CG038
CG038-IW027	USZ	150213.66	2145819.27	09-Jan-13	1251.4	1251.63	CG038
CG038-IW028	USZ	150183.89	2145844.63	16-Jan-13	1252.73	1252.86	CG038
CG038-IW029	USZ	150153.6	2145870.18	17-Jan-13	1254	1253.83	CG038
CG038-IW030	USZ	150121.63	2145896.79	18-Jan-13	1254.4	1254.63	CG038
CG038-IW031	USZ	150090.47	2145922.26	16-Jan-13	1255.41	1255.52	CG038
CG038-IW032	USZ	150048.03	2145955.75	17-Jan-13	1255.24	1255.45	CG038
CG038-IW033	USZ	150166.94	2145693.77	18-Dec-12	1250.59	1250.94	CG038
CG038-IW034	USZ	150130.37	2145692.87	19-Dec-12	1251.55	1251.73	CG038
CG038-IW035	USZ	150090.84	2145691.83	25-Oct-12	1253.18	1253.12	CG038

CG038-IW036	USZ	150054.71	2145693.2	25-Oct-12	1255.26	1255.36	CG038
CG038-IW037	USZ	150034.3	2145693.54	30-Oct-12	1256.29	1256.29	CG038
CG038-IW038	USZ	150015.91	2145695.09	20-Dec-12	1256.35	1256.39	CG038
CG038-IW042	USZ	149967.12	2145710.32	21-Dec-12	1256.18	1256.42	CG038
CG038-IW043	USZ	149912.89	2145710.88	19-Jan-13	1258.19	1258.23	CG038
CG038-IW044	USZ	149863.68	2145709.65	18-Jan-13	1260.12	1260.24	CG038
CG038-IW045	USZ	149829.37	2145694.13	19-Jan-13	1260.29	1260.67	CG038
CG038-IW046	USZ	149795.62	2145671.31	09-Jan-13	1260.32	1260.37	CG038
CG038-IW047	USZ	149760.04	2145670.7	21-Dec-12	1261.06	1261.36	CG038
CG038-IW048	USZ	149720.42	2145670.55	19-Dec-12	1261.42	1261.52	CG038
CG038-IW049	USZ	149677.84	2145669.31	19-Dec-12	1261.67	1261.84	CG038
CG038-IW050	USZ	149639.27	2145673.27	02-Feb-13	1262.71	1262.49	CG038
CG038-IW051	USZ	149585.73	2145681.88	15-Jan-13	1264.21	1264.44	CG038
CG038-IW052	USZ	149545.14	2145681.23	16-Jan-13	1264.41	1264.44	CG038
CG038-IW053	USZ	149509.79	2145681.37	14-Jan-13	1264.39	1264.57	CG038
CG038-IW054	USZ	149468.49	2145688.31	16-Jan-13	1264.99	1265.1	CG038
CG038-IW055	USZ	149433.96	2145688.46	14-Dec-12	1265.21	1265.28	CG038
CG038-IW056R	USZ	149406.28	2145688.07	19-Jan-13	1265.44	1265.55	CG038
CG038-IW057	USZ	149355.84	2145688.83	15-Dec-12	1265.98	1265.81	CG038
CG038-IW058	USZ	149316.08	2145687.94	15-Dec-12	1266.16	1266.11	CG038
CG038-IW059	USZ	149276.07	2145688.26	13-Dec-12	1266.29	1266.28	CG038
CG038-IW060	USZ	149235.62	2145687.55	14-Dec-12	1266.77	1266.63	CG038
CG038-IW061	USZ	149202.06	2145688.35	14-Dec-12	1266.86	1266.82	CG038

CG038-IW062	USZ	149140.76	2145677.01	05-Jan-13	1266.39	1266.5	CG038
CG038-IW063	USZ	149104.64	2145689.12	03-Jan-13	1266.73	1266.84	CG038
CG038-IW064	USZ	149064.7	2145692.24	06-Jan-13	1266.82	1266.86	CG038
CG038-IW065	USZ	149023.21	2145702.05	04-Jan-13	1266.85	1267.03	CG038
CG038-IW066	USZ	148984.02	2145716.09	05-Jan-13	1267.11	1267.29	CG038
CG038-IW067	USZ	148946.19	2145732.63	03-Jan-13	1267.27	1267.35	CG038
CG038-IW068	USZ	148911.19	2145752.97	04-Jan-13	1267.3	1267.44	CG038
CG038-IW069	USZ	148870.84	2145782.5	17-Dec-12	1267.3	1267.64	CG038
CG038-IW070	USZ	148840.83	2145809.56	15-Dec-12	1267.9	1267.9	CG038
CG038-IW071	USZ	148812.06	2145826.92	16-Dec-12	1268.21	1268.24	CG038
CG038-IW072	USZ	148786.66	2145857.6	15-Dec-12	1268.53	1268.46	CG038
CG038-IW073	USZ	148760.23	2145881.35	15-Dec-12	1268.62	1268.75	CG038
CG038-IW074	USZ	148734.11	2145905.01	18-Dec-12	1269.32	1269.34	CG038
CG038-IW075	USZ	148671.17	2145987.22	07-Jan-13	1270.14	1270.34	CG038
CG038-IW076	USZ	148655.37	2146018.87	06-Jan-13	1269.67	1269.77	CG038
CG038-IW077	USZ	148634.77	2146059.08	08-Jan-13	1269.99	1270.06	CG038
CG038-IW078	USZ	148634.83	2146099.95	07-Jan-13	1270.08	1270.19	CG038
CG038-IW079	USZ	148634.53	2146147.2	08-Jan-13	1270.17	1270.35	CG038
CG038-IW093	USZ	148771.73	2146742.33	29-Jan-13	1263.01	1262.91	CG038
CG038-IW094	USZ	148739.69	2146783.1	30-Jan-13	1262.22	1262.32	CG038
CG038-IW095	USZ	148711.92	2146819.86	31-Jan-13	1261.64	1261.87	CG038
CG038-IW096	USZ	148680.86	2146864.28	31-Jan-13	1260.64	1260.93	CG038
CG038-IW097	USZ	148649.68	2146901.81	30-Jan-13	1260.73	1260.91	CG038

CG038-IW098	USZ	148620.12	2146943.99	29-Jan-13	1258.78	1258.85	CG038
CG038-IW099	USZ	149616.36	2146822.69	22-Jan-13	1237.61	1237.8	CG038
CG038-IW100	USZ	149602.33	2146856.27	21-Jan-13	1237.12	1237.37	CG038
CG038-IW101	USZ	149570.22	2146877.96	20-Jan-13	1237.08	1236.82	CG038
CG038-IW102	USZ	149529.89	2146892.99	29-Nov-12	1236.15	1236.39	CG038
CG038-IW103	USZ	149493.67	2146885.68	29-Nov-12	1236.44	1236.42	CG038
CG038-IW104	USZ	149474.01	2146889.18	29-Nov-12	1236.63	1236.93	CG038
CG038-IW105	USZ	149416.3	2146906.95	20-Jan-13	1238.33	1238.31	CG038
CG038-IW106	USZ	149400.24	2146935.47	20-Jan-13	1239	1238.93	CG038
CG038-IW107	USZ	149388.63	2146969.15	21-Jan-13	1239.05	1239.12	CG038
CG038-IW108	USZ	149377.61	2147008.72	22-Jan-13	1238.18	1237.91	CG038
CG038-IW109	USZ	149359.64	2147043.23	22-Jan-13	1236.86	1236.86	CG038
CG038-IW110	USZ	149346.91	2147083.4	23-Jan-13	1236.33	1236.3	CG038
CG038-IW111	USZ	149347.69	2147133.25	01-Feb-13	1236.33	1236.26	CG038
CG038-IW112	USZ	149296.85	2147157.14	05-Feb-13	1236.73	1236.71	CG038
CG038-IW113	USZ	149284.45	2147195.25	01-Feb-13	1238	1237.71	CG038
CG038-IW114R	USZ	149284.82	2147229.06	06-Feb-13	1238.05	1237.88	CG038
CG038-IW115	USZ	149262.03	2147267.36	05-Feb-13	1239.14	1238.88	CG038
CG038-IW116	USZ	149253.28	2147307.85	03-Feb-13	1239.65	1239.47	CG038
CG038-IW117	USZ	149238.24	2147346.14	01-Feb-13	1240.73	1240.51	CG038
CG038-IW118	USZ	149225.74	2147384.68	23-Jan-13	1241.72	1241.12	CG038
CG038-IW119	USZ	149210.99	2147413.29	23-Jan-13	1242.63	1242.51	CG038
CG038-IW121	USZ	150274.86	2147510.53	20-Feb-13	1239.07	1238.75	CG038

CG038-IW122	USZ	149648.98	2147799.41	19-Feb-13	1253.09	1253.02	CG038
CG038P0601	USZ	149130.29	2146991.75	20-Oct-06	1243.13	1243.12	CG038
CG038P0602	USZ	149449.42	2146680.17	16-Oct-06	1241.24	1241.73	CG038
CG038P0603	USZ	149809.67	2145492.81	17-Oct-06	1254.86	1255.02	CG038
CG039-EX01	Not Available	150464.48	2150492.44	06-Mar-13	1244.22	1244.75	CG039
CG039-IW01	USZ	149457.14	2154182.14	20-Mar-13	1286.84	1286.65	CG039
CG039-IW02	USZ	149419.1	2154178.92	20-Mar-13	1286.14	1286.07	CG039
CG039-IW03	USZ	149448.7	2154232.97	19-Mar-13	1286.4	1286.14	CG039
CG039-IW04	USZ	149401.5	2154238.93	19-Mar-13	1286.13	1285.93	CG039
CG039-IW05	USZ	149116.83	2154448.12	13-Mar-13	1291.18	1291.03	CG039
CG039-IW06	USZ	149087.02	2154484.09	14-Mar-13	1292	1292.01	CG039
CG039-IW07	USZ	149061.28	2154515.4	14-Mar-13	1292.81	1292.89	CG039
CG039-IW08	USZ	149037.83	2154545.32	15-Mar-13	1293.42	1293.53	CG039
CG039-IW09	USZ	149012.23	2154577.47	18-Mar-13	1293.58	1293.52	CG039
CG039-IW10	USZ	148986.02	2154607.53	18-Mar-13	1293.51	1293.37	CG039
CG039-IW11	USZ	148959.91	2154638.61	18-Mar-13	1293.3	1293.24	CG039
CG039-IW12	USZ	148934.83	2154668.72	13-Mar-13	1293.45	1293.22	CG039
CG039-IW13	USZ	150474.17	2150455.45	23-Jan-13	1244.33	1244.48	CG039
CG039-IW14	USZ	150503.85	2150450.97	23-Jan-13	1244.64	1245.03	CG039
CG039-IW15	USZ	150477.38	2150396.31	23-Jan-13	1244.74	1245.07	CG039
CG039-IW16	USZ	150507.14	2150401.25	23-Jan-13	1245.19	1245.28	CG039
CG039-IW17	USZ	150512.43	2150578.28	12-Mar-13	1247.37	1247.24	CG039
CG039-IW18	USZ	150481.13	2150573.8	13-Mar-13	1246.94	1246.77	CG039
CG039-IW20	USZ	149089.09	2153508.69	18-May-13	1275.38	1276.02	CG039

CG039-IW21	USZ	149102.91	2153468.31	17-May-13	1276.05	1276.26	CG039
CG039-IW22	USZ	149133.34	2153395.04	14-May-13	1276.06	1276.57	CG039
CG039-IW23	USZ	149151.75	2153355.83	14-May-13	1273.26	1273.85	CG039
CG039-IW24	USZ	149125.86	2153521.81	18-May-13	1277.02	1277.37	CG039
CG039-IW25	USZ	149141.97	2153478.75	17-May-13	1276.55	1276.84	CG039
CG039-IW26	USZ	149154.31	2153447.07	17-May-13	1276.77	1277.01	CG039
CG039-IW27	USZ	149170.61	2153410.78	17-May-13	1276.86	1277.18	CG039
CG39B9741		149890.94	2155182.99	28-Aug-97	1245.2	1245.57	CG039
CG39B9743D	USZ	150893.32	2150179.57	29-Jul-97	1252.54	1252.56	CG039
CG39B9743S	USZ	150887.9	2150172.61	30-Jul-97	1252.42	1252.72	CG039
CG39B9745	USZ	151111.98	2149570.15	31-Jul-97	1241.82	1242.24	CG039
EX-A01	USZ	150509.74	2144246.89	22-Jul-97	1259.09	1266.21	CG038
EX-A02	USZ	150191.9	2144232.15	30-Jul-97	1263.23	1270.4	CG038
EX-A03	USZ	150061.81	2144449.2	21-Aug-97	1262	1268.33	CG038
EX-A04	USZ	150188.99	2145143	28-Aug-97	1248.33	1255.51	CG038
EX-A05	USZ	150251.74	2145526.84	13-Aug-97	1235	1242.11	CG038
EX-A06	USZ	149785.5	2145486.19	27-Aug-97	1247.93	1255.1	CG038
EX-A07	USZ	149604.81	2145667.1	15-Aug-97	1257.57	1264.63	CG038
EX-A08	USZ	149204.48	2145673.01	02-Aug-97	1259.68	1266.71	CG038
EX-A09	USZ	148816.58	2145665.86	02-Sep-97	1261.8	1268.88	CG038
EX-A10	USZ	148491.56	2145759.9	29-Aug-97	1263.02	1270.04	CG038
EX-A11	USZ	148473.25	2146064.98	29-Aug-97	1265.74	1272.86	CG038
EX-A12	USZ	148393.31	2146444.47	02-Sep-97	1263.02	1270.24	CG038
EX-B01	USZ	150661.01	2144596.52	25-Aug-97	1257.24	1264.24	CG038
EX-B02	USZ	150423.65	2144839.25	18-Aug-97	1248.85	1256.1	CG038
EX-B03	USZ	150457.53	2145162.11	18-Aug-97	1237.18	1244.2	CG038
EX-B04	USZ	150720.87	2145523.31	28-Aug-97	1230.61	1237.7	CG038
EX-B05	USZ	149302.08	2146559.35	09-Sep-97	1238.94	1246.02	CG038
EX-B06	USZ	148879.32	2146552.91	04-Sep-97	1258	1264.19	CG038
EX-B07	USZ	148788.2	2146933.17	05-Sep-97	1251.37	1258.43	CG038
EX-B08	USZ	149367.26	2147325.77	03-Sep-97	1235.24	1242.45	CG038
F1-12	USZ	152644.06	2145612.85	26-Jun-89	1218.83	1216.11	FT021
F1-20	USZ	152634.22	2145705.1	27-Jun-89	1220.15	1217.62	FT021
F1-24	USZ	152526.94	2145711.24	22-Aug-89	1220.57	1217.84	FT021
F1-9	USZ	152567.03	2145593.29	26-Jun-89	1219.02	1216.46	FT021
GTR-EX	LSZ	147523.47	2161676.84	26-Aug-99	1283.21	1286.59	CG040
GTR-IW01	USZ	148156.58	2161607.45	28-Nov-12	1302	1303	CG040
GTR-IW02	USZ	148117.21	2161607.36	27-Nov-12	1302.5	1303	CG040

GTR-IW03	USZ	148074.47	2161604.31	27-Nov-12	1301.5	1302	CG040
GTR-IW04	USZ	148034.72	2161605.24	27-Nov-12	1301.5	1302	CG040
GTR-IW05	USZ	148006.45	2161646.36	18-Oct-12	1299	1300	CG040
GTR-IW06	USZ	148043.29	2161643.11	29-Nov-12	1300.5	1301	CG040
GTR-IW07	USZ	147975.26	2161600.71	10-Dec-12	1299.5	1300	CG040
GTR-IW08	USZ	147976.91	2161633.38	29-Nov-12	1299.5	1300	CG040
GTR-IW09	USZ	147949.52	2161597.81	12-Dec-12	1299.5	1300	CG040
GTR-IW10	USZ	147944.11	2161634.7	10-Dec-12	1297.5	1298	CG040
GTR-IW11	USZ	147910.27	2161561.17	15-Dec-12	1298.5	1299	CG040
GTR-IW12	USZ	147904.67	2161598.62	11-Dec-12	1296.5	1297	CG040
GTR-IW13	USZ	147878.22	2161570.13	01-Dec-12	1297	1298	CG040
GTR-IW14	USZ	147862.37	2161540.52	17-Oct-12	1297	1298	CG040
GTR-IW15	USZ	147809.59	2161530.06	15-Dec-12	1296.5	1297	CG040
GTR-IW16	USZ	147820.67	2161565.28	01-Dec-12	1295	1296	CG040
GTR-IW17	USZ	147854.02	2161607.81	11-Dec-12	1296.5	1297	CG040
GTR-IW18	USZ	147879.96	2161630.51	11-Dec-12	1296.5	1297	CG040
GTR-IW19	USZ	147857.57	2161656.37	01-Dec-12	1294	1295	CG040
GTR-IW20	USZ	147813.79	2161659.15	12-Aug-12	1292.5	1293	CG040
GTR-IW21	USZ	147806.3	2161613.66	16-Dec-12	1294.5	1295	CG040
GTR-IW22	USZ	147789.3	2161577.4	16-Dec-12	1294.5	1295	CG040
GTR-IW23	USZ	147764.34	2161589.24	16-Dec-12	1293.5	1294	CG040
GTR-IW24	USZ	147760.68	2161706.72	19-Dec-12	1288.5	1289	CG040
GTR-IW25	USZ	147697.02	2161763.3	11-Aug-16	1288.12	1288.39	CG040
GTR-IW26	USZ	147664.83	2161781.27	11-Aug-16	1286.06	1286.38	CG040
GTR-IW30R	LSZ	147694.5	2161682.4	17-Feb-13	1286.5	1287	CG040
GTR-IW31	LSZ	147668.77	2161718.7	13-Feb-13	1283	1284	CG040
GTR-IW32	LSZ	147642.19	2161751.05	04-Feb-13	1280.5	1281	CG040
GTR-IW33	LSZ	147610.77	2161783.35	03-Feb-13	1277.5	1278	CG040
GTR-IW34	LSZ	147576.32	2161802.44	23-Jan-13	1276	1277	CG040
GTR-IW35	LSZ	147548.26	2161764.92	15-Oct-12	1276	1277	CG040
GTR-IW36	LSZ	147549.59	2161821.64	20-Jan-13	1274.5	1275	CG040
GTR-IW37	LSZ	147479.63	2161805.18	17-Jan-13	1274.5	1275	CG040
GTR-IW38	LSZ	147509.23	2161801.05	15-Jan-13	1275	1276	CG040
GTR-IW39	LSZ	147532.46	2161774.56	03-Oct-13	1281.58	1281.68	CG040
GTR-IW40	LSZ	147519.08	2161784.97	04-Oct-13	1280.7	1280.85	CG040
GTR-IW41	LSZ	147684.01	2161658.19	22-Aug-16	1292.7	1292.96	CG040
GTR-IW42	LSZ	147685.49	2161685.57	17-Aug-16	1290.53	1290.88	CG040
GTR-IW43	LSZ	147654.19	2161680.27	18-Aug-16	1289.6	1289.9	CG040
GTR-IW44R	LSZ	147654.03	2161655.4	24-Aug-16	1291.06	1291.51	CG040
GTR-NSUMP	USZ	148076.22	2161486.07	01-Aug-98		1306.15	CG040
GTR-P1	USZ	148258.85	2161490.71	17-Aug-99	1307.58	1305.77	CG040
GTR-P10	USZ	147681.64	2161773.33	18-Aug-99	1289.13	1287.26	CG040
GTR-P2	USZ	148147.64	2161586.18	17-Aug-99	1309.7	1307.31	CG040
GTR-P3	USZ	148068.87	2161373.24	17-Aug-99	1305.7	1303.78	CG040
GTR-P4	USZ	147974.75	2161424.48	04-Oct-99	1306.34	1304.41	CG040
GTR-P5	USZ	147996.76	2161533.36	04-Oct-99	1307.03	1305.1	CG040

GTR-P6R	USZ	148002.37	2161598.53	08-Oct-12	1303.5	1304	CG040
GTR-P7	USZ	147832.35	2161541.9	17-Aug-99	1302.09	1300.08	CG040
GTR-P8	USZ	147862.12	2161634.9	18-Aug-99	1301.58	1299.64	CG040
GTR-P9	USZ	147579.94	2161666.13	27-Apr-00	1288.83	1289.25	CG040
GTR-SSUMP	USZ	147567.26	2161768.96	01-Aug-98		1282.94	CG040
I-55	USZ	154599.19	2153592.67	08-Mar-90	1275.44	1275.9	OT001
I-56		154154.98	2153600.09	08-Mar-90	1275.71	1275.99	OT001
I-57	USZ	154332.55	2153807.5	20-Mar-90	1275.9	1276.24	OT001
L2-15H1		150548.46	2146708.23	17-Jun-95	1246.68	1246.38	LF012
L2-15H2	HWBZ	150548.79	2146708.25	17-Jun-95	1246.43	1246.38	LF012
L2-15U	USZ	150545.56	2146715.06	17-Jun-95	1245.66	1246.38	LF012
L2-16H1	HWBZ	150819.59	2146827.27	24-May-95	1237.46	1238.23	LF012
L2-16H2	HWBZ	150819.24	2146826.96	24-May-95	1237.27	1238.23	LF012
L2-16U	USZ	150822.33	2146816.09	23-May-95	1237.04	1238.62	LF012
L2-18H	USZ	151140.6	2147494.65	02-Jun-95	1225.03	1223.2	LF012
L3-14H	USZ	151629.55	2147224.85	02-Jun-95	1225	1225	LF013
L3-14U	USZ	151614.9	2147222.62	01-Jun-95	1227.57	1225.07	LF013
L3-15H	USZ	151268.73	2147083.77	23-May-95	1223.94	1221.55	LF013
L3-15U	USZ	151261.67	2147080.08	23-May-95	1224.11	1221.61	LF013
L4-30H1	HWBZ	150597.21	2146164.4	03-Jun-95	1258.61	1259.34	LF014
L4-30H2	HWBZ	150597.14	2146164.13	03-Jun-95	1258.54	1259.34	LF014
L4-30H3	HWBZ	150596.77	2146164.1	03-Jun-95	1258.45	1259.34	LF014
L4-30U	USZ	150598.7	2146172.33	07-Jun-95	1259.01	1259.34	LF014
LF2-SUMP		150977.06	2146979.69	01-Dec-98			CG038
LF4-SUMP		150957.63	2145713.21	01-Dec-98			CG038
M-1AR	LSZ	156182.38	2152116.59	30-Dec-93	1257.3	1257.46	OT001
M-1BR	USZ	156181.71	2152105.73	23-Dec-93	1257.19	1257.24	OT001
M-1CR	LLSZ	156184.6	2152124.88	28-Dec-93	1257.65	1257.66	OT001
M-2AR	LSZ	155185.63	2152191.13	06-Jan-94	1259.9	1260.11	OT001
M-2BR	USZ	155183.88	2152178.36	29-Dec-93	1260.01	1260.1	OT001
M-2C	LLSZ	155184.92	2152198.88	10-Jul-92	1260.18	1260.15	OT001
M-2D	PZ	155184.13	2152166.29	21-Jun-94	1259.71	1259.96	OT001
M-2R	USZ	153304.07	2153192.27	15-Jun-95	1268.75	1269.14	ST006
M-3	USZ	153392.85	2153276.12	25-Oct-85	1275.28	1275.72	ST006
M-3A	LSZ	154185.03	2152191.8	27-Apr-92	1261.74	1261.95	OT001
M-3BR	USZ	154184.76	2152181.9	29-Dec-93	1261.63	1261.84	OT001
M-3CR	LLSZ	154185.37	2152201.75	05-Jan-94	1261.91	1262.06	OT001
M-4AR	LSZ	153444.3	2152194.38	06-Jan-94	1261.8	1261.95	OT001
M-4B	USZ	153444.66	2152183.81	10-Jan-92	1261.83	1261.75	OT001
M-4CR	LLSZ	153445.25	2152204.23	10-Jan-94	1261.86	1261.93	OT001
MATLOCK-WELL	LSZ	148258.04	2161373.72	05-Dec-02			CG040
MF-12	USZ	157117.78	2150932.48	05-Nov-85	1256.66	1252.51	ST007
MF-15AR	LSZ	157249.42	2151017.14	07-Jun-95	1255.93	1253.56	ST007
MF-15B	USZ	157257.39	2151020.58	05-Jun-86	1253.1	1253.47	ST007
MF-15C	USZ	157256.96	2151015.1	11-Jun-86	1255.1	1253.43	ST007
MF-16AR	USZ	157037.53	2151123.07	05-Jun-95	1253.41	1253.84	ST007

MF-16BR	USZ	157049.45	2151123.11	05-Jun-95	1253.32	1253.76	ST007
MF-16CR	LSZ	157027.61	2151123.17	03-Jun-95	1253.43	1253.93	ST007
MF-17AR	LSZ	156942.64	2150813.29	08-Dec-93	1255.27	1255.27	ST007
MF-17B	USZ	156941.57	2150788.89	19-Jun-86	1254.06	1246.43	ST007
MF-1AR	LSZ	157059.92	2150527.22	27-Oct-93	1250.7	1250.7	ST007
MF-1BR	USZ	157070.49	2150527.09	06-Jun-95	1252.16	1249.77	ST007
MF-1C	USZ	157081.27	2150532.49	02-Nov-85	1251.98	1249.44	ST007
MF-4	USZ	157119.43	2150803.62	05-Nov-85	1254.56	1250.7	ST007
MW-118	LSZ	155702.05	2155405.06	07-May-95	1242.03	1242.13	OT005
OT034-VEP1-1	LSZ	155644.5	2155337.99	16-Dec-99	999.5	1000	OT034
OT034-VEP1-2	LSZ	155707.55	2155432.64	16-Dec-99	999.5	1000	OT034
OT034-VEP1-3	LSZ	155640.31	2155531.24	16-Dec-99	999.5	1000	OT034
OT034-VEP2-1	LSZ	155659.87	2155250.21	16-Dec-99	999.5	1000	OT034
OT034-VEP2-2	LSZ	155751.21	2155249.94	16-Dec-99	999.5	1000	OT034
OT034-VEP-6	USZ	156061.87	2155251.4	12-Nov-01	1258.83	1259.9	OT005
OT034-VEP-7	USZ	156114.66	2155249.87	12-Nov-01	1259.65	1261.03	OT005
OT034-VEP-8	LSZ	155843.66	2155291.2	23-Oct-02	1246.72	1248.12	OT005
OT034-VEP-9	LSZ	155931.23	2155283.82	23-Oct-02	1250.12	1251.67	OT005
P0901	HWBZ	149148.66	2153570.29	29-Jun-09	1278.55	1278.97	CG039
P0902	HWBZ	149149.65	2153559.27	30-Jun-09	1278.38	1278.78	CG039
P-1	USZ	156000.43	2152973.5	10-Jun-92	1259.18	1263.66	OT001
P-10	USZ	153927.43	2153248.51	17-Apr-92	1269.92	1274.97	OT001
P-11	USZ	153451.43	2153246.52	07-Apr-92	1270.35	1275.33	OT001
P-12	USZ	152953.43	2153220.52	23-Apr-92	1269.38	1274.38	OT001
P-13	USZ	155530.94	2153207	08-Mar-93		1273.57	OT001
P-14R	USZ	155416.45	2154864.51	29-Sep-94	1262.98	1267.82	OT001
P-15		155135.94	2153310	08-Mar-93		1273.76	OT001
P-16R	USZ	154941.45	2154863.51	30-Sep-94	1264.65	1269.92	OT001
P-17		154724.44	2153296.83	08-Mar-93		1272.55	OT001
P-18	USZ	154278.44	2154214.51	14-May-92	1271.47	1275.7	OT001
P-19	USZ	153784.44	2154209.52	14-May-92	1271.01	1276.1	OT001
P-2	USZ	155827.43	2153234.5	06-Apr-92	1265.58	1270.53	OT001
P-3	USZ	155593.43	2152972.5	16-Apr-92	1260.27	1265.09	OT001
P-4	USZ	155356.43	2153234.5	06-Apr-92	1266.99	1271.92	OT001
P-5	USZ	155116.43	2152973.5	01-Apr-92	1261.82	1266.86	OT001
P-6	USZ	154877.43	2153248.51	21-Apr-92	1267.47	1272.41	OT001
P-7	USZ	154640.43	2152972.51	01-Apr-92	1263.38	1267.77	OT001
P-8	USZ	154408.43	2153251.51	16-Apr-92	1267.41	1272.19	OT001

P-9	USZ	154167.43	2152972.51	01-Apr-92	1263.6	1268.62	OT001
PN-01	USZ	148136.99	2161486.71	04-Oct-99	1308.69	1305.99	CG040
PN-02	USZ	148076.25	2161455.94	04-Oct-99	1306.96	1304.57	CG040
PN-03	USZ	148020.64	2161484.62	04-Oct-99	1307.57	1305.07	CG040
PR1-7	LSZ	156356.61	2154777.53	01-Jul-03	1269.62	1271.98	OT001
PR2-7	LSZ	156098.23	2155018.72	06-Jun-03	1259.81	1264.47	OT005
PR3-7	LSZ	155589	2155161.69	02-Jul-03	1251.07	1256.07	OT005
PS-01	USZ	147614.03	2161711.42	04-Oct-99	1290.51	1288.07	CG040
R-1	LLSZ	155806.43	2153234.5	30-Apr-92	1265.88	1270.89	OT001
R-2	LLSZ	155333.43	2153235.5	29-Apr-92	1267.17	1272.01	OT001
R-3	LLSZ	154856.43	2153254.27	13-Apr-92	1267.43	1272.24	OT001
R-4	LLSZ	154384.43	2153247.51	07-Apr-92	1267.68	1272.77	OT001
R-5	LLSZ	153908.43	2153248.51	08-Apr-92	1270.64	1275.4	OT001
R-6	LLSZ	153433.43	2153246.52	07-Apr-92	1270.62	1275.44	OT001
R-7	LSZ	155095	2153309.75	08-Mar-93		1273.65	OT001
RC-3	USZ	156111.02	2153548	12-Sep-92	1274.31	1271.91	ST003
RC-4	USZ	156148.55	2153599.75	14-Sep-92	1275.61	1272.61	ST003
RC-5	USZ	156058.14	2153624.5	11-Sep-92	1271	1271.65	ST003
RC-6	USZ	156205.31	2153549.75	11-Sep-92	1274	1274.09	ST003
SP-1	USZ	152420.14	2145768.69	24-Aug-89	1222.05	1219.22	WP017
SP-11	USZ	152490.45	2145771.79	28-Aug-89	1222.29	1219.53	WP017
SP-12	USZ	152450.8	2145878.2	30-Aug-89	1222.34	1219.5	WP017
SP-5	USZ	152513.59	2145881.64	24-Aug-89	1222.2	1219.46	WP017
SP-6	USZ	152534.24	2145785.96	24-Aug-89	1222.93	1220.24	WP017
TOB-10AR	LSZ	156502.39	2155047.03	13-Mar-95	1271.66	1272.11	OF060
TOB-10BR	USZ	156499.67	2155056.32	11-Mar-95	1271.49	1271.82	OF060
TOB-10CR	LLSZ	156498.48	2155076	14-Jun-94	1271.65	1271.78	OF060
TOB-1AR	LSZ	156767.11	2153962.84	26-Oct-93	1265.01	1262.14	OF060
TOB-1B	USZ	156766.96	2153936.7	11-Jan-91	1264.62	1261.6	OF060
TOB-1C	LLSZ	156768.07	2153917.93	14-Jan-91	1265	1261.99	OF060
TOB-3BR	LSZ	157079.05	2154052.45	02-Jul-09	1254.33	1254.83	OF060
TOB-4A	LSZ	156660.62	2154471.9	06-Feb-91	1266.76	1267.05	OF060
TOB-4C	LLSZ	156668.84	2154472.52	04-Feb-91	1266.4	1266.77	OF060
TOB-5A	LSZ	156493.66	2154162.78	16-Jan-91	1265.74	1266.27	OF060
TOB-5B	USZ	156493.69	2154149.91	15-Jan-91	1265.89	1266.35	OF060
TOB-5CR	LLSZ	156493.8	2154174.53	01-Dec-93	1266.17	1266.6	OF060
TOB-6A	LSZ	156610.74	2154876.25	05-Feb-91	1271.12	1271.37	OF060
TOB-6C	LLSZ	156602.86	2154874.82	02-Feb-91	1271.01	1271.29	OF060
TOB-8A	LSZ	157501.92	2155121.15	19-Jan-91	1274.15	1271.66	OF060
TOB-8B	USZ	157511.47	2155121.88	16-Jan-91	1274.25	1271.68	OF060
TOB-8CR	LLSZ	157511.25	2155122.05	17-Jun-94	1274.39	1271.78	OF060
TOB-9A	LSZ	157045.94	2155734	01-Feb-91	1269.63	1270.5	OF060
TOB-9BR	USZ	157064.55	2155733.53	02-Nov-93	1270.39	1270.66	OF060
TOB-9C	LLSZ	157043.97	2155732.7	30-Jan-91	1269.23	1269.8	OF060
TOR-1	LSZ	155817.43	2153234.5	21-Apr-92	1265.86	1270.72	OT001
TOR-2	LSZ	155344.43	2153234.5	14-Apr-92	1266.93	1271.94	OT001
TOR-3	LSZ	154867.43	2153247.51	29-Apr-92	1267.35	1272.33	OT001

TOR-4	LSZ	154395.43	2153246.51	24-Jun-92	1267.5	1272.5	OT001
TOR-5	LSZ	153917.43	2153248.51	01-May-92	1270.12	1275.28	OT001
TOR-6	LSZ	153441.43	2153246.52	07-Apr-92	1270.79	1275.45	OT001
TOR-7	LLSZ	155139.73	2153311	08-Mar-93		1273.86	OT001
UI380801	USZ	150259.15	2146158.24	13-Nov-08	1252.8	1253.14	CG038
UI380802	USZ	150241.1	2146166.05	14-Nov-08	1251.25	1251.6	CG038
UI380803	USZ	150241.11	2146142.48	02-Dec-08	1252.04	1252.3	CG038
UI380804	USZ	150202.14	2146038.02	18-Nov-08	1253.29	1253.53	CG038
UI380805	USZ	150184.22	2146046.13	17-Nov-08	1253.36	1253.59	CG038
UI380806	USZ	150186	2146023.31	20-Nov-08	1253.73	1253.89	CG038
UM380801	USZ	150246.2	2146150.88	21-Nov-08	1252.11	1252.5	CG038
UM380802	USZ	150236.27	2146132.94	03-Dec-08	1251.86	1252.1	CG038
UM380803	USZ	150189	2146032.26	19-Nov-08	1253.41	1253.68	CG038
UM380804	USZ	150181.81	2146014.4	04-Dec-08	1253.5	1253.7	CG038
WS-1	PZ	158731.64	2145592.75	01-Aug-41	1217.59	1222.52	OF060
WS-11	PZ	151127.96	2154896.29	01-Sep-42		1246.34	OF060
WS-12	PZ	152135.6	2154890.44	05-Sep-42		1271.89	OF060
WS-13	PZ	153151.13	2154885.75	01-May-42		1268.81	OF060
WS-2	PZ	157735.52	2145598.63	04-Dec-41		1221.91	OF060
WS-20	PZ	150625.66	2155776.48	23-May-43	1293.99	1295.25	OF060
WS-21	PZ	149646.72	2155576.42	19-Jun-43	1298.66	1299.6	OF060
WS-22	PZ	149638.89	2154331.98	09-Jun-43		1289.6	OF060
WS-23	PZ	148665.73	2155272.49	06-Aug-43		1299.26	OF060
WS-24	PZ	147402.05	2155905.65	28-Sep-43	1279.7	1279.45	OF060
WS-25	PZ	146201.7	2155914.2	09-Nov-43	1257.18	1258.97	OF060
WS-26	PZ	145212.09	2155893.2	18-Nov-43		1244.14	OF060
WS-27	PZ	147366.78	2159349.82	01-Dec-53		1324.4	OF060
WS-29	PZ	147431.17	2148217.26	01-Jul-89	1274.75	1275	OF060
WS-3	PZ	156643.38	2145606.18	11-Sep-42		1221.52	OF060
WS-30	PZ	157294.67	2142775.58	12-Dec-91	1206.39	1220	OF060
WS-31	PZ	153614.94	2142886.28	17-Dec-91	1220.47	1220	OF060
WS-32	PZ	158741.99	2148897.65	09-Sep-93	1250.01	1250	OF060
WS-33	PZ	152060.47	2157245.18	09-Jan-92	1285	1283.55	OF060
WS-34	PZ	151118.96	2144620.85	09-Apr-08	1257	1256.74	OF060
WS-5	PZ	154736.01	2145615.59	01-Jun-42	1215.3	1250.39	OF060
WS-7	PZ	152751.63	2146099.38	15-Aug-43	1229.99	1230	OF060