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Pennsylvanian through Triassic Sedimentary Provenance
of the Phosphoria Formation and Bounding Strata,
as Told by Detrital Zircons

by

Cody Wayne Allen

A thesis

submitted in partial fulfillment

of the requirements for the degree of

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To the Graduate Faculty:

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List of Abbreviations/ Symbols

A.R.M.	Ancestral Rocky Mountain
DZ's	Detrital Zircon- zircon grains moved in sedimentary systems
U-Pb	Uranium – Lead

Pennsylvanian through Triassic Sedimentary Provenance of the
Phosphoria Formation and Bounding Strata,
as Told by Detrital Zircons
Thesis Abstract – Idaho State University (2021)

Pennsylvanian Wells Formation, Permian Meade Peak Member of the Phosphoria Formation and Triassic Dinwoody Formation were analyzed for U-Pb detrital zircon (DZ) age populations. The Wells Formation contains interpreted abundant Yavapai-Mazatzal grains 1,600-1,800 Ma sourced from southern provenance in the ARM (Ancestral Rocky Mountains). The Lower Ore Zone in the Meade Peak Member Phosphoria Formation contains a higher percentage of mid-Paleozoic zircons interpreted to have been sourced from the northeast through eolian processes. The Center Waste Shale and Upper Ore Zone of the Meade Peak Member have greater percentages of Grenville-age grains (900-1,200 Ma), interpreted to be derived from basement rocks of the Appalachian orogen. The Permian Meade Peak contains 3 times more mid Paleozoic grains than the Pennsylvanian Wells Formation. The overlying Triassic Dinwoody Formation contains the largest population of mid-Paleozoic 350-450 Ma grains.

Key Words: Detrital Zircons, U-Pb, Pennsylvanian, Permian, Triassic, upwelling, Phosphoria, Meade Peak, eolian, Paleozoic, U-Pb,

Introduction

Nestled in ridges and valleys of the southeastern highlands of Idaho the Meade Peak Member of the Phosphoria Formation is mined for its high concentration of phosphate bearing strata. Since the early 1900's southeastern Idaho has been one of the most productive phosphate mining districts (Lee, 2000), and the focus of countless scientific studies (Hein, 2004). The Meade Peak Member of the Permian Phosphoria Formation contains several phosphate bearing sedimentary units that are extracted and used in the agricultural industry (Petrus, 1999; Lee, 2000). Concentrated in southeastern Idaho, western Wyoming, and northern Utah numerous mines are actively extracting phosphate from the Meade Peak Member or Retort Member of the Phosphoria Formation. Bayer (formally Monsanto) began mining in southeastern Idaho in the 1950's and their current 5th mine (the Blackfoot Bridge Mine) began operation in 2013. (Figure 1)

Phosphates are not only used for fertilizers and herbicides, but numerous other products which require phosphate as a main ingredient (phosphatesfacts.org). Through industrial activities associated with extracting ore-bearing layers, the Meade Peak Member has been an economic powerhouse for numerous communities through southeastern Idaho, northern Utah, and western Wyoming. Millions of tons of phosphate rock from southeastern Idaho and western Wyoming are processed each year to support agricultural operations throughout the world (USGS, 2021; Carroll et al., 1998).

Comprising what is now southwestern Montana, eastern Idaho, western Wyoming, and northern Utah, the Phosphoria Sea covered a vast area and represents a significant reserve of

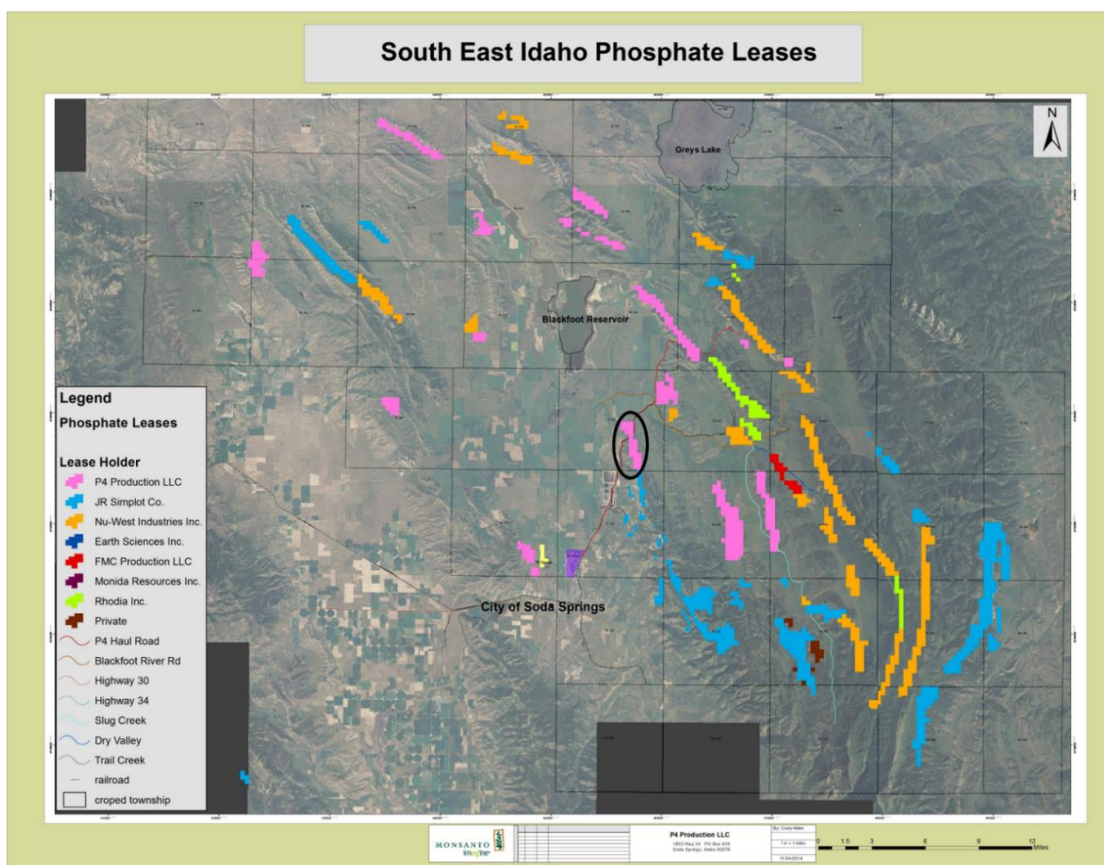


Figure 1: Lease map depicting phosphate mineral reserves in Caribou County Idaho. Map generated by publicly available state and federal lease documents. Bayer's Blackfoot Bridge Mine is indicated by a circle near the center of the map. Detrital zircon samples for provenance study were collected in this active mine. The phosphate reserves are held by numerous companies or entities. Further phosphate resources can be found in northern Utah, southwestern Montana, and western Wyoming. Caribou County represents a substantial population of known phosphate reserves.

phosphate resources (Glenn et al., 1994; Piper and Link, 2002). Globally, phosphate mined from the Phosphoria Formation contributes roughly 4.5% of total phosphate produced. Strong evidence also exists that the carbonaceous organic strata of the Phosphoria Formation are the primary source rock for the petroleum system in western Wyoming (Maughan, 1983; Kirschbaum et al., 2007; Whidden et al., 2011). Organic-rich layers of the Phosphoria formation were deformed during the Late Cretaceous Sevier orogeny. Maturation and transportation are thought to have occurred prior to Paleocene time. Transportation of kerogen eastward to the

wind River basin is hypothesized to have occurred within permeable sandstones of the Pennsylvanian Tensleep Formation (Kirschbaum et al., 2007).

No conversation revolving around the phosphate reserves and economic impact of the Phosphoria is complete without mention of characteristics that made the Phosphoria Sea unique in its deposition of phosphorites. This is discussed in further detail below, but three main elements are necessarily linked in explaining the phosphorite production. A strong productive biologic ecosystem acted as the source of phosphorus, deep, cool, nutrient-rich water fed the biological ecosystem, and dust-bearing NE-derived trade winds drove the upwelling water and provided detritus in the form of fine-grained, siliciclastic sediments (Glen et al., 1994; Stephens and Carrol, 1999; Piper and Link, 2002; Hiatt and Budd, 2003). The Phosphoria Sea was sediment-starved and eolian processes were the main source for clastic input into the basin (Carroll et al., 1998; Piper and Link, 2002; Perkins et al., 2003).

There have been several studies of Permian sedimentary rocks and their detrital zircon (DZ) content in the western United States (Carroll et al, 1998; Soreghan et al., 2002; Barbeau, 2003; Link et al., 2014; Leary et al., 2020). These studies do not specifically target strata from the Permian Phosphoria Sea, but many of the results are pertinent to the DZ provenance story and the sedimentation into the Phosphoria Sea.

The observed lack of terrestrial sediments preserved through the Permian uniquely set the fine grained marine sediments within the Phosphoria Formation as a target for provenance research. Furthermore, siliciclastic supply to the Phosphoria Sea was by primarily eolian processes; the Phosphoria Sea was starved of sediments. Detrital zircons were derived largely

from distal sources by aeolian transport. These marine rocks provide for provenance information on western Laurentia, during Permian time.

U-Pb zircon age distributions of aeolian grains have the potential to constrain Permian wind directions in the Phosphoria Sea and link them to regions of productive regions of phosphate deposition. Detrital zircons extracted from strata of the Wells and Dinwoody formations, stratigraphically adjacent and deposited in the same geographic area, contextualize the Phosphoria DZ content. The primary contribution of this thesis is the sampling for detrital zircons of fine-grained marine siltstones and mudstones with the intent of illuminating provenance variations and paleo winds within the Permian, western Pangean, Phosphoria Sea.

Geologic Setting

The Phosphoria Formation was deposited during mid-Permian time on the heels of the Late Pennsylvanian and Early Permian Ancestral Rocky Mountain (ARM) orogeny (Hiatt and Bud, 2003). The Phosphoria Sea covered a shallow marine epicontinental successor basin, semi restricted from open Panthalassa Ocean currents (Carroll et al., 1998; Hiatt and Bud, 2003; Hein, 2004; Kirschbaum et al., 2007; Johnson et al., 2007) (Figure 2). Remnant ARM highlands separated the Phosphoria Basin from direct interaction with open ocean currents to the west, north and south, but they did not preclude the entering of upwelled cooler deep nutrient rich waters from the western ocean into the basin (Perkins et al., 2003; Stephens and Carroll, 1999).

In general, a productive phosphorus factory requires nutrient-rich upwelling, a productive biological ecosystem, euxinic basal conditions, transgressive sequences, little clastic input, and some level of episodic eustatic winnowing (Glenn et al., 1994; Meyers and Kump, 2008; Filippelli, 2011). Within the Phosphoria Sea (Figure 2), upwelling of nutrient-rich ocean water from the western Antler orogenic belt, reduced outflow due to remnant ARM highlands, and presence of an evaporitic flood plain to the east in Wyoming allowed a euxinic environment to develop at depth in the Phosphoria Basin. This was optimal for the production and

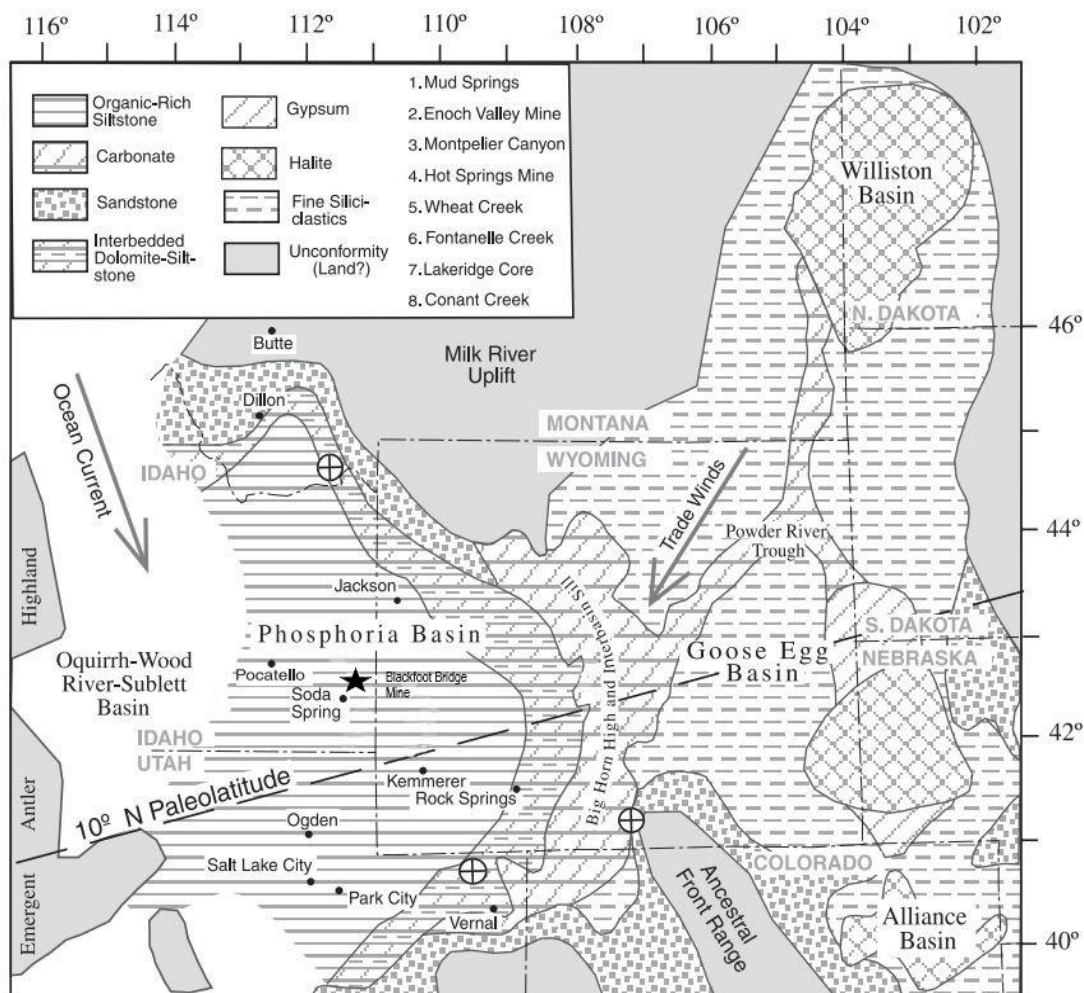


Figure 2: Map depicting the equatorial Permian Phosphoria Basin on the western edge of Pangea continent in present day southeast Idaho, western Wyoming, and northeastern Utah. Adopted from Piper and Link, 2002. Various orogenic structures surrounding the basin restricted ocean circulation and offered an ideal environment for upwelling, euxinic conditions and concentration of phosphate bearing muds.

preservation of phosphorites. As it pertains to the Phosphoria Basin, Carroll et al. (1998) proposed periodic eolian transport of sand and silt grains into the basin through northerly-derived trade winds in an arid setting. Ekman transport fueled by these trade winds drove upwelling by producing a negative pressure gradient that promoted upwelling of cooler, nutrient-rich waters into the basin from the west (Hiatt and Budd, 2003). As it pertains to the eolian sediments deposited in the Phosphoria, determining the provenance source of these grains may be the only way to determine provenance shifts and climatic conditions during Permian time. Eolian loessites from southeastern Utah, southeastern Arizona and northeastern New Mexico have been sampled for detrital zircon with the intent of constraining atmospheric circulation (Soreghan et al., 2002). Based on age population of DZs and suspected provenance terranes, wind directions have been constrained from Late Pennsylvanian Desmoinesian (310 m.y.) to Early Permian Wolfcampian (280 m.y.) Results show that Late Pennsylvanian loess was supplied by easterly-derived winds, and during the Early Permian, fine-grained loess was transported from the north easterly direction (Soreghan et al., 2002). A summary of sampled ages collected throughout many of the western Pangean ARM strata constrain sediment transport via winds or longshore drift from the north (Leary et al., 2020). However, these loessites predate the Phosphoria Basin by approximately 30 Ma given that the Meade Peak Member was deposited during the Roadian 270 m.y.-269 m.y. (Figure 3)

Evaporite beds deposited synchronously with the Phosphoria Formation are present in central Wyoming (Carroll et al., 1998). Their presence is suggestive of drier climatic conditions and periodic flooding and evaporation, which may have aided in upwelling pulling more oxygenated water into the Phosphoria Sea (Stephens and Carroll, 1999; Piper and Link, 2002).

Figure 3: Correlation Chart for Upper Paleozoic rocks in eastern Idaho. The Green shaded Meade Peak Member of the Phosphoria Formation contains minable phosphate. Hatched section indicates unconformities between Pennsylvanian, Permian, and Triassic strata. Orogenic events are events occurring on the western edge of the Cordillera during the time periods discussed. Blue rectangles indicate primary sediment transportation model as being non aeolian, while yellow indicates eolian process. Arrows indicate main direction of provenance as pertaining to DZ age analysis from this study. For directional reference top of figure represents north of modern North America. (Kummel, 1954; Geslin, 1998; Piper and Link, 2002; Dickinson, 2004; Wardlaw, 2015, Leary et al, 2017; Walker et al., 2018; Leary et al, 2020)

Ekman transport fueled by northeasterly trade winds is considered the main driver for upwelling waters into the restricted sea (Hiatt and Bud, 2003)

Located near 10 degrees north paleolatitude (Figure 2), the Phosphoria sea was the focus of a biologically productive ecosystem (Wardlaw and Collinson, 1986; Glenn et al 1994). Spiculitic sponge, brachiopod, and bryozoan fossils can be observed throughout (Matheson and Frank, 2020). Numerous vertebrate fossils have also been recovered in phosphate mines and donated to the Idaho Museum of Natural History, most recently a large ancient shark known as the *Helicoprion* (Tapanila and Pruitt, 2013). (Figure 4) High biological activity was the source for phosphorus within the sea and optimal basal water conditions allowed for deposition and diagenetic precipitation of phosphate.

A transgressive systems tract is required for production and deposition of the phosphorites, as it would promote siliciclastic sediment starvation within phosphatic deep parts of the basin (Glenn et al., 1994). It has been documented that during Permian time there was also an increase of global glaciation that caused cyclical, cooler equatorial climatic conditions (Soreghan et al., 2008; Tabor and Poulsen, 2008; Soreghan et al., 2014). During the deposition of the Permian Phosphoria Formation, little siliciclastic sediment accumulated during deposition of the Meade Peak member and basin conditions were at a transgressive high stand (Piper and Perkins, 2004). The little clastic input into the basin allowed for a productive phosphate factory. Production of phosphate-rich hardground surfaces are thought to have corresponded with winnowing of unconsolidated muddy sediments during sea-level low stands thereby concentrating phosphate rich layers (Glenn et al., 1994). The lack of fluvial input into the sea

likely would have limited the ability of progradation of shoreline facies and maintained a productive phosphate factory within the sea.



Figure 4. A roughly 0.4 m wide Helicoprion tooth whorl fossil found during mining operation in the Enoch Valley mine. Fossil sample is approximately 2.5 feet in diameter and found in the center waste shale unit of the Permian Phosphoria Formation. Numerous other fossils have been found in active phosphate mines throughout southeast Idaho and have contributed to the understanding of how this ancient monster lived. The size of these creatures is indicative of the productive biotic environment. Featured on an episode of Animal Planet's River Monsters, host Jeremy Wade investigates the Helicoprion with ISU professor Dr. Leif Tapanila. The video was filmed at the Blackfoot Bridge Mine where samples for this study were collected.

The preservation of phosphorites also necessitates some space for the accommodation of deposited sediments. Analysis of two different Ancestral Rocky Mountain basins demonstrates local variations in post-Ancestral Rocky Mountains subsidence (Geslin, 1998, May et al., 2013; Jones, 2019). Subsidence in the Oquirrh-Wood River Basin to the west slowed during the Permian. The Big Horn Basin in Central Wyoming also demonstrates slower subsidence during the Permian (Figure 5). This relationship suggests Ancestral Rocky Mountains tectonism ceased on a coarse scale, but some tectonic activity continued throughout the Permian, creating accommodation space. This continued tectonic activity may have caused a flexural response in the depocenter of the Phosphoria Basin by waning isostatic loading by Ancestral Rockies uplifts. Furthermore, sinistral movement along the western edge of Pangea is

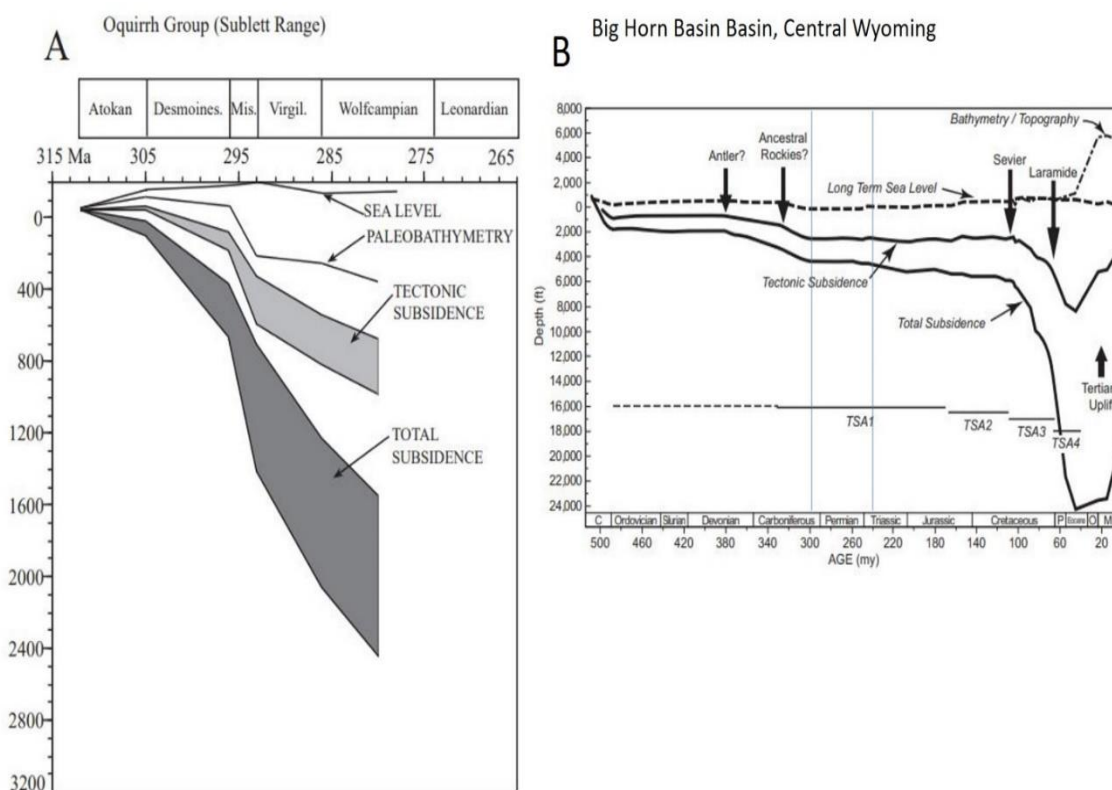


Figure 5: Subsidence curves developed by Geslin (1998) of the Ancestral Rocky Mountain Oquirrh Basin, and May et al., 2013 of the Ancestral Rocky Mountain Big Horn Basin in Wyoming. These graphics indicate a difference in tectonic subsidence post Ancestral Rocky Mountain tectonism. For the majority of Ancestral Rocky Mountain basins subsidence slowed from Pennsylvanian to Permian time. (A) Oquirrh Basin Subsidence curve Pennsylvanian and Permian time. (B) Subsidence analysis in the Bighorn Basin. A flattening of tectonic subsidence occurred during the Permian with the cessation of Ancestral Rocky Mountain tectonism. Beyond isostatic loading from Ancestral Rocky Mountain uplifts, subsidence on the west was influenced by sinistral motion (Trexler et al., 2004; Cashman et al., 2011, and 2004 Whitmore, 2011).

considered to have been active from the Pennsylvanian through the onset of the Sonoma orogeny in the Late Permian (Trexler et al., 2004; Cashman et al., 2011; Whitmore, 2011).

General stratigraphy of rocks deposited in the Phosphoria Sea are shown in Figure 6. The formation contains phosphate-bearing siltstones, siliceous shales, cherts, limestones, and dolostones (Johnson et al., 2007; Matheson and Frank, 2020). The deposition of the members of the Phosphoria Formation began during the Leonardian (late Kungurian stage) 260 m.y. and continued through the Guadalupian (Wordian stage) 265 m.y. The Meade Peak Member was

deposited during the Roadian stage from 260 Ma to 256 Ma. (Piper and Link, 2002, Wardlaw, 2015) (Figure 5). This roughly 5 m.y. depositional time span has allowed accumulation rates of $0.98 \text{ mg cm}^{-2} \text{ yr}^{-1}$ to be determined and further indicates the Phosphoria Formation lacking terrestrial sediments (Piper and Link, 2002; Piper and Perkins, 2004).

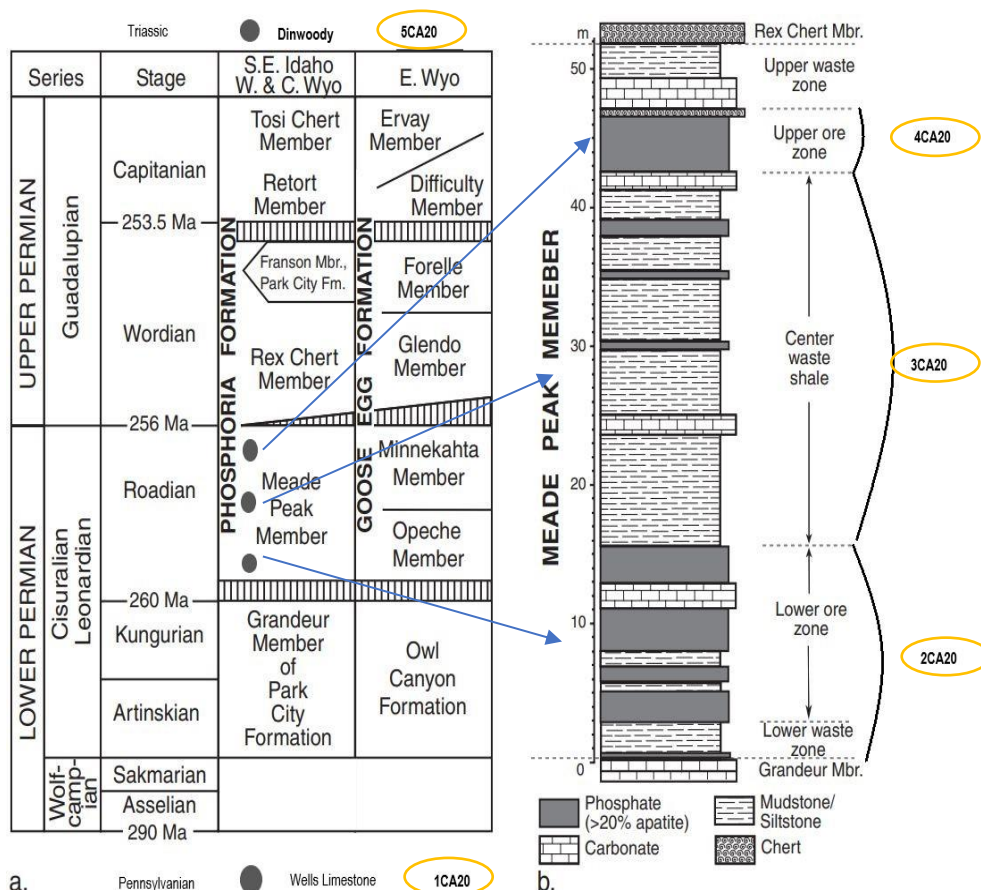


Figure 6: Stratigraphic column of the Permian Phosphoria Basin showing samples taken for this paper. The alternating lithologies are associated with shifting marine environments. Adopted from Piper and Link (2002). Stratigraphic locations of the 5 samples collected for this study are indicated by dark circles starting from the bottom with 1CA20 in the Pennsylvanian Wells Formation, 2CA20–4CA20 within the Meade Peak Member, and 5CA20 in the Triassic Dinwoody Formation. Each sample is highlighted by the yellow oval. Further description of Wells Limestone and Dinwoody formation can be found in sample description. The Dinwoody Formation unconformably overlies the Phosphoria Formation which unconformably overlies the Pennsylvanian Wells Formation. The difference in stratigraphic thickness between phosphate-rich strata in the Lower Ore Zone and the Upper Ore Zone is discussed in the discussion section.

The Phosphoria Formation unconformably overlies the Pennsylvania Wells Limestone, which consists of brownish-yellow, calcareous siltstone. Between the Permian Lower Ore and Wells Formation Limestone resides the Grandeur Tongue Member of the Phosphoria Formation that is typically fossiliferous, massive gray limestone (Petrus, 1999). Yellowish grey siltstone of the Wells Limestone deposited within a shallow marine subtidal environment (Rankey, 1997; Blanchard et al., 2016)

The Triassic Dinwoody Formation unconformably overlies the Phosphoria and is characteristically fine-grained, thinly bedded greenish gray mudstone. The Dinwoody Formation was deposited in early Triassic time and unconformably overlies the Rex Chert Member of the Phosphoria Formation. Deposited during an early Triassic transgression, the Dinwoody intertongues with concurrent strata due to eustatic variations within in a ramp configuration and included inner, outer, and deep shelf environments (Kummel, 1954; Paull and Paull, 1993; Hofmann et al., 2013).

Ancestral Rocky Mountains Orogeny

The Ancestral Rocky Mountains (A.R.M.) are an inboard region of diffuse, basement-involved crustal shortening near the western edge of the North American Plate (Dickinson, 2004). Their tectonism occurred within the Pangean supercontinent. A.R.M. orogenic activity postdates the Acadian Orogeny that occurred on the eastern edge of the Laurentian continent along the Appalachians during the Silurian; it also postdates the Antler Orogeny along the western Cordillera during Early Mississippian time. Sonoma orogenic activity occurred later during the Late Permian to Early Triassic along the northern U.S. Cordillera.

The A.R.M. Orogeny was a series of orogenic events that spanned Late Mississippian, through Pennsylvanian, and into Early Permian time. It deformed the cratonic interior (Dickinson, 2004; Leary et al., 2017; Leary et al., 2020). A.R.M. basement exposures are bounded by north- to northwest-striking structures (Hoy and Ridgeway, 2002; Barbeau, 2003; Lawton et al., 2015). Asymmetric basins adjacent to these uplifts show influx of proximal arkosic sediments that thicken toward uplifts (Kluth and Cooney, 1981; Ye et al., 1986; Barbeau, 2003; Lawton et al., 2015).

At about the same time as the ARM, the Alleghenian orogeny was occurring along the Appalachian Mountains of eastern Laurentia from Mississippian through Pennsylvanian time (Hatcher et al., 1989; Dickinson and Lawton, 2003; Dickinson, 2004; Murphey and Keppie, 2005). Its southwestern extent, called the Ouachita-Marathon orogen, is a northeast to southwest-trending orogenic belt that marks the suturing of the Laurentian and Gondwanan continents to form the supercontinent Pangea (Hatcher and Thomas, 1989; Kluth and Coney, 1981; Dickinson and Lawton, 2003). Strain and deformation imparted during this suturing are proposed to have led to basement uplifts and northwest-trending asymmetric basins. Basins proximal to A.R.M. uplifts get younger from northeast to southwest, parallel with Ouachita-Marathon suturing to the southwest (Kluth and Coney, 1981; Ye et al., 1996). After the Ouachita- Marathon orogeny, subsidence continued in many Ancestral Rocky Mountain basins as a result of isostatic compensation (Barbeau, 2003; Soreghan et al., 2012).

A recent synthesis suggested that the Ancestral Rocky Mountains and associated sedimentary basins formed as a consequence of three adjacent regions of orogenic activity (Leary et al., 2017; 2020). In relation to these basins, Figure 7 depicts where the Permian

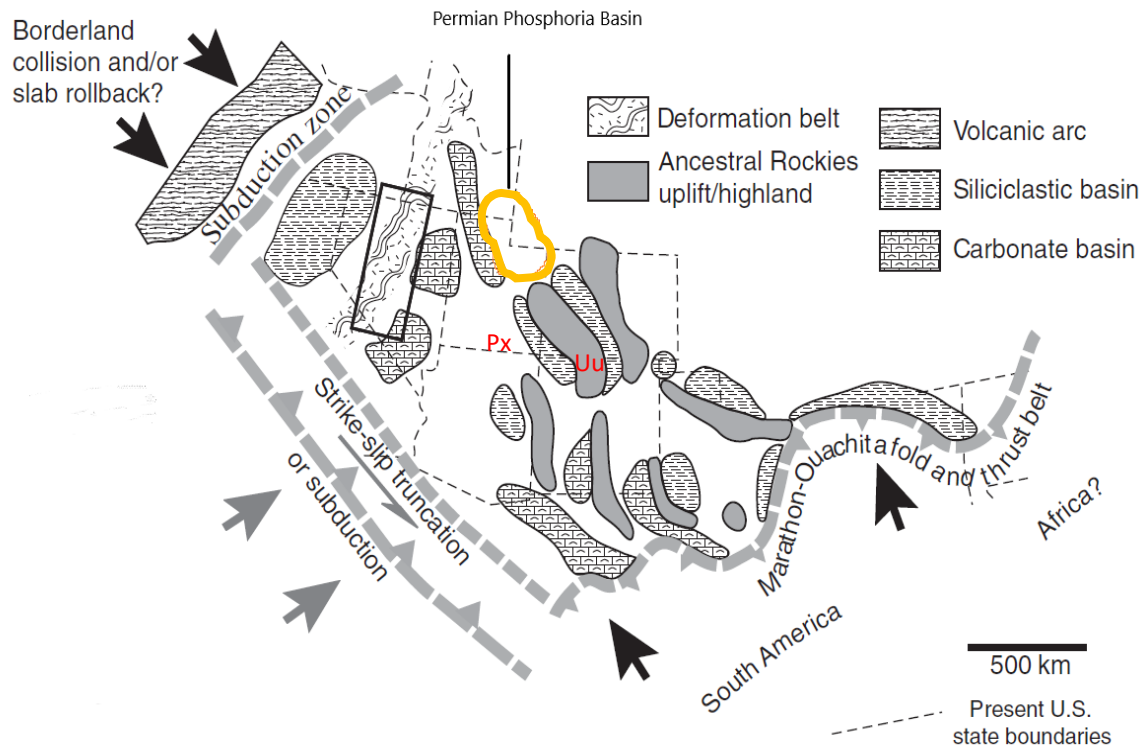


Figure 7: Regional Ancestral Rocky Mountain map indicating tectonic events deforming craton interior. Marathon-Ouachita suturing on the lower right, strike slip sinistral movement along the lower left edge of Pangea, and collision along the western edge of Pangea. Numerous A.R.M. uplifts with adjacent depositional basins are shown. Future position of the Phosphoria basin is indicated in the light orange circle. Adopted from Cashman et al. (2011). Square indicates areas where tectonism along the western continental margin overlaps in time with development of the Phosphoria Basin. Px indicates the Paradox Basin, Uu indicates Uncompahgre Uplift.

Phosphoria Formation would later be deposited just east of the Pennsylvanian Oquirrh – Wood River Basin (Dickinson and Lawton, 2003). (Figure 7)

Observations in the Paradox Basin of southeastern Utah suggest flexural response due to loading from the Uncompahgre Uplift to the east. This flexural response created accommodation space and the basin was periodically (cyclically) restricted, producing evaporitic shale. In the Paradox Basin, Pennsylvanian strata were overlain by Lower Permian siliciclastic

sediments (Barbeau, 2003; Lawton et al., 2015). These siliciclastic sedimentary facies were primarily derived from eastern fluvial sources and northerly-derived winds.

Tectonic activities of the Sonoma orogeny along the southwestern margin of Pangea are not well understood, but two models have been proposed. Geometric relationships between folding, thrusting, and strike slip displacement along northwest-trending asymmetric basins and uplifts, coupled with northeast-southwest displacement observed along Ancestral Rocky Mountains faults suggest a potential for a subducting slab beneath the continental edge along the southwest Sonoma margin. This geometric relationship has been interpreted to cause shortening associated with oceanic subduction along the southwestern edge of the continent (Ye et al., 1996). Proposed subduction may answer questions as to basin geometries and strike slip displacement, however the lack of evidence for magmatism is problematic (Barbeau, 2003; Dickinson and Lawton, 2003), and conflicts with plate motion models. Plate reconstructions completed in 2014 demonstrate a left lateral oblique motion of the Panthalassan against the North American Plate not consistent with orthogonal plate convergence, but transpressional motion as the Panthalassan plate moved easterly chasing the North American plate (Domeier and Torsvik, 2014; Leary et al., 2017).

An alternate tectonic model for the southwestern margin holds that Mississippian to early Permian sinistral translation of the Sonoma margin may explain numerous geologic questions, including strike slip displacement in Ancestral Rocky Mountain basins (Lawton et al., 2017). Sinistral transpression along the western edge of the Laurentian continent was important during the Late Devonian as reactivation of Antler orogenic structure may have caused continued deformation through Permian time (Link et al., 1996; Geslin, 1998; Trexler et

al., 2004; Beranek et al., 2016). This continued deformation would have provided mechanisms for continued accommodation space in Permian time in the Phosphoria basin on perhaps a muted scale as previously mentioned.

Samples Analyzed

Samples Collection

In the context of the above geologic setting, U-Pb detrital zircon samples were collected from the open pit Blackfoot Bridge Mine located north of the town of Soda Springs, Idaho (see Table 1 for locations) in order to evaluate the provenance of detrital grains deposited within the Phosphoria sea. The mining operation became active in 2013 and is expected to be productive into 2024. All samples except 5CA20 were collected within overturned strata within the active pit, and until recent excavation, were covered by 50-100 meters of strata. The pit limits expose Pennsylvanian Wells Limestone through Permian Rex Chert, with unconformably overlying Triassic Dinwoody geographically proximal to the pit (Figure 8). Samples represent a composite of numerous layers within each general unit. Sampling targeted beds composed of siltstone, sandstone, and silty mudstone, avoiding limestone. The Rex Chert Member was sampled but not processed as the expectation of recoverable detrital zircon grains was minimal. Table 1 details elements for samples collected.

Sample descriptions

1CA20- *Pennsylvanian Wells Formation*. Sample is interbedded yellow brown and light gray, calcareous, muddy siltstone. Roughly 70 Kg of sample were collected in a 5-gallon bucket

and capped to prevent contamination. The Wells Formation was deposited during the Late Pennsylvanian and is correlative with the Weber Sandstone of the Park City Formation.

2CA20- Permian Lower Ore Zone of the Meade Peak Member. Sample contains pelitic, phosphatic silty mudstone, and gray to black, pelitic phosphatic siltstone. Roughly 70 Kg of sample were collected in a 5-gallon bucket and capped to prevent contamination.

The middle Permian Lower Ore Zone was deposited during the Lower Roadian about 258 Ma. The Lower Ore Zone is composed of the following stratigraphic beds A-bed (ore), A-Cap (waste), B1 Bed (ore), Lower Waste (waste), B2 Bed (ore), False Cap (waste), Big Red Mud (waste), and C-Bed(ore). These bed names are not exclusively described in literature, but nomenclature is closely utilized between mining companies to reference ore and waste seams within each lower and upper ore zone. The Lower Ore Zone contains the thickest succession of phosphate rich strata in the Meade Peak, and the A Bed contains on average the most % P of any Meade Peak ore seam.

3CA20- Permian Center Waste Shale. Sample consists of interbedded yellow-brown shale with yellow brown, silty mudstone collected throughout the Center Waste Shale. This bed was deposited in mid Roadian time. Only minor phosphate is present.

4CA20- Permian Upper Ore. Sample was merged from three distinct layers: interbedded gray pelitic siltstone, yellowish red silty mudstone, and phosphatic brown mudstone. Approximately 70kg of sample were collected in 6 1-gallon buckets. Deposited during the late Roadian, the Upper Ore Zone is composed of two phosphatic, ore-bearing units and a brown siliceous mudstone. Respective names are D2 (ore), D-mud (waste), and D3 (ore).

5CA20- *Triassic Dinwoody Formation*. The lowest sandy bed was sampled. The sample consists of greenish gray mudstone collected just east of the active mine pit. Approximately 70 kg of sample was collected in a 5-gallon bucket. The Dinwoody was deposited in the Early Triassic and unconformably overlies the Permian Rex Chert, which was deposited throughout the Wordian of the Guadalupian.

Sample ID	Lat	Long	Height	Time	Stage	Unit
5CA20	42489.68	111319.57	6343	Triassic	Early Triassic	Dinwoody
4CA20	454651.3016	1113111.1	6556	Permian	Upper Roadian	Upper Ore
3CA20	424656.4766	1113114.5	6491	Permian	Mid Roadian	Center Waste Shale
2CA20	424652.7966	1113114.1	6534	Permian	Lower Roadian	Lower Ore
1CA20	424658.4072	1113119.9	6571	Penn	Late Pennsylvanian	Wells Limestone

Table 1: Displays samples collected in or near the Blackfoot Bridge Mine. Sample locations were surveyed in mine grid coordinates as a modified NAD83 State Plane and translated into UTM coordinates. Samples organized from youngest Triassic to oldest Pennsylvanian strata Height units are U.S. survey feet.

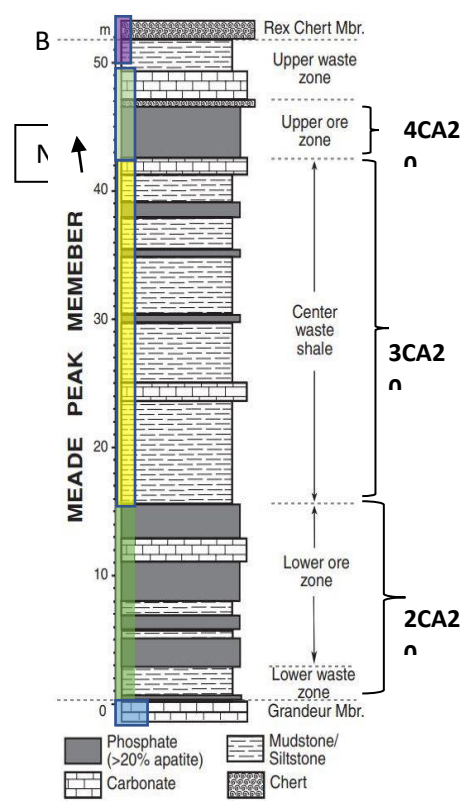


Figure 8: Figure A is an aerial imagery of the Mid Pit of the Blackfoot Bridge Mine. Contact between stratigraphic units is a general outline and may not match exactly with actual contacts. Structural geology of this pit is an anticline with the overturned limb in the upper 1/3 of the pit. For this reason, colored contacts do not match topography further to the south. Stratigraphy is color coded with that from the stratigraphic column (B) from Piper and Link, 2002. Pennsylvanian Wells Limestone and Triassic Dinwoody are not shown on the stratigraphic column. Phosphoria Formation unconformably overlies Pennsylvanian Wells Limestone and is overlain unconformably by Triassic Dinwoody. No outcrop of Triassic Dinwoody is located proximal to the pit outline. Sample was taken from nearby outcrop about 500 feet to the northwest of Mid Pit. Thickness in the stratigraphic section are relative to the Lower Ore, Center waste Shale, and Upper Ore Members. Sample 2CA20 was a composite of all phosphatic silt to mudstones within the Lower Ore Zone. 3CA20 is composite of various stratigraphic units within the Center Waste Shales, 4CA20 is a composite of Upper Ore Zone containing all three sedimentary layers. 1CA20 Pennsylvanian Wells Limestone was sampled from gray calcareous limey siltstone, and 5CA20 was sampled from mudstone of the Triassic Dinwoody Formation.

Sample Processing & Additional Separations

Sample processing for detrital zircons followed procedures outlined in Fedo et al. (2003). Samples collected were fine-grained siltstone – mudstone; thus, it was not necessary to process them through the jaw crusher. A Bico UA disc mill was used, but due to the fine-grained nature of the rock, the disk spacing was increased to approximately 3 mm wide to reduce clay build up. Samples 1CA20, 2CA20, and 3CA20 were then processed through a Wilfley table for separation of dense mineral grains. Samples 4CA20 and 5CA20 underwent ultrasonic separation, as described in greater detail below. Only 5CA20 was processed through the Wilfley table after ultrasonic separation. 4CA20 was not processed through the Wilfley table given that ultrasonic separation proved sufficient.

Each sample processed through the Wilfley table yielded a larger sample than expected. Because of the fine-grained nature of the samples, most contained sand-sized grains as well as clays and silts; this heterogenous distribution of particle sizes presented a challenge because larger grains impeded travel of finer grains and the high water flow required to move larger grains prematurely washed out finer grains and yielded a buildup of larger grains. Physically removing larger grains was required to keep finer grained particles traveling freely through Wilfley Table rows. Each sample yielded more than sufficient material for continued mineral separation.

1CA20 was processed through the Frantz barrier separator 3 times. On each subsequent run the magnetic force was increased to separate all magnetically susceptible grains from the sample. A very minor percentage of the sample was magnetically separated, leaving an almost

unchanged sample size for processing in the methylene iodide. This observation caused all subsequent samples to first be processed through the methylene iodide separation prior to the Frantz barrier separator. This allowed for more effective separation of DZ grains from bulk sample and less processing time through the Frantz barrier separator. Phosphorus contained in the Phosphoria Formation is bound in apatite (Johnson et al., 2007). Thus, a large percentage of the samples processed through the methylene iodide were dark grains of apatite. The Frantz barrier separator acted as a final cleanup of magnetic grains in the resulting sample. This change took more processing with methylene iodide but yielded a much smaller sample as a result. This smaller sample was easily and quickly processed through the Frantz barrier separator for removal of magnetic grains through the same 3 run process. Each sample processed after this manner resulted in recoverable detrital zircons.

Fine-grained samples are very challenging to separate using traditional detrital zircon separation methods. As such, we used a modified separation technique. (Figure 9) The following are the steps used in processing samples through ultrasonic separation, which was modified from Hoke et al. (2014) after personal communication with Dr. Alex Pullen at Clemson University.

5CA20 and 4CA20 were composed of green gray mudstone and med brown fine grained phosphatic silty mudstones. Figure 9 depicts the alternate/ additional method to separate fine-grained clay particles from these samples. 5CA20 was processed through the disc mill for a size homogeneity. 4CA20 contained substantial clays that retained moisture from collection. Rather than grinding the sample, it was prudent to crush the sample by hand. Both samples were then subjected to the following experimental separation procedures.

Approximately 100-300 grams of sample were processed at a time through an ultrasonic separation method aimed at removing clay particles from the sample. The following steps outlined the trial process of separating clay particles from silts.

1. Add 100-300 grams of sample subset into ~3.5-liter container of water placed within an ultrasonic bath.
2. Aggressively agitate sample by a suspended speed-controlled metal stirring rod.
Duration of this step typically took 10-15 minutes per 100-300-gram sample subset.
3. When satisfactory sample suspension in the water is accomplished, reduce agitation to a soft mixing motion.
4. Add approximately 300-500 ml/min of clean water flow into container.
5. Sediment-laden water freely will flow through a $\frac{3}{4}$ " clear plastic tube near the top of the container. Water will flow into 2 subsequent collection containers with similar outlets until main container water is clear.
6. Remove clean water flow.
7. Repeat steps 2-6 until satisfactory separation has occurred.
8. Clean retained sample from container.
9. Add fresh water, and repeat steps 1-8.

This experimental procedure yielded, as expected, finer and finer grained sediments in each subsequent container throughout the process. The denser, silty portions of the sample remained in the primary container while clay particles were entrained. Results were more favorable for phosphatic silty mudstone of 4CA20 than for mudstone of 5CA20. This is related to the hardness and more cohesive grains in 5CA20. Disc grinder spacing was set further apart

to avoid build up and pulverization of sample. However, this also yielded a higher fraction of larger 3-5 mm clasts. Smaller grain fractions respond to the processing method, and clay particles were successfully separated from silt and sand sized particles. 4CA20 was not processed through Wilfley Table separation. 5CA20 was processed through Wilfley Table separation due large sample size, and unsatisfactory separation of lighter cohesive grains. Additional processing steps to ultrasonically separate grains were successful, but increased sample preparation by a factor of 4-5 times per sample. From the two samples processed, this method worked efficiently with the finer grained silty mudstone of 4CA20. This perhaps could be due to the homogeneity of the sample, and finer grains that were ultrasonically separated. 5CA20 had an increased fraction of larger grains, and hand crushing would have been more difficult. Mechanical grinding was required, but due to disc spacing did not yield an ideal size homogeneity.

Further sample processing was required by the University of Arizona lab staff because Permian samples 2CA20, 3CA20, and 4CA20 contained grains of mainly barite and some pyrite. 1" diameter epoxy detrital zircon mounts were then made for each sample, followed by backscattered electron imaging using a scanning electron microscope prior to analysis.

Experimental Separation Method Ultrasonic Separation

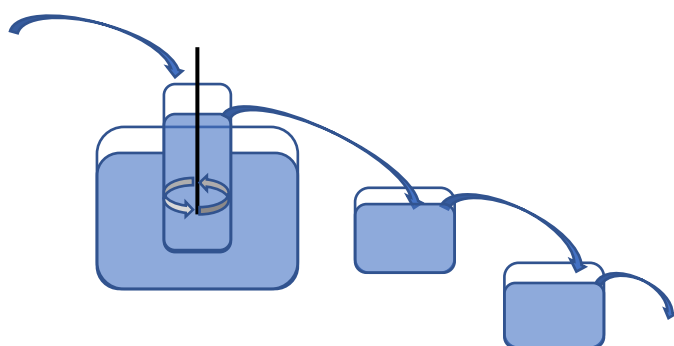


Figure 9: Graphic and image displaying concept of ultrasonic separation of clay grains from collected samples. Ultrasonic vibrations tend to separate fine grained sediments from clay grains. These separated clay grains become entrained and exit the container through the drain hose mounted near the top. Coarser/ denser grains fall out of suspension on collect at the bottom of the container.

Detrital Zircon Grain Textures

During final separation of grains in the process described above, a qualitative observation was made that zircons in the Triassic Dinwoody differed in appearance (zircon grains were clear rather than colored) from those in the Pennsylvanian and Permian samples. This observation caused the following qualitative summary for each sample through SEM reflected light image and discussion about grain physical characteristics.

1CA20- Pennsylvanian Wells Limestone yielded the most detrital zircons of all 5 samples with 269 grains analyzed. Grain population is well-sorted, sub-rounded to rounded, sub-

spherical to spherical. Grains range in size from 75um to 150um. Colors of grains observed ranged from purplish, pinkish, clear, red. Well sorted and rounded distribution of DZ grains would be consistent with expected marine environment deposition sourced from longshore drift from the north, and perhaps fluvial transport from the southeast (Leary et al., 2020). This texture indicates recycled DZ grain population. (Figure 10)

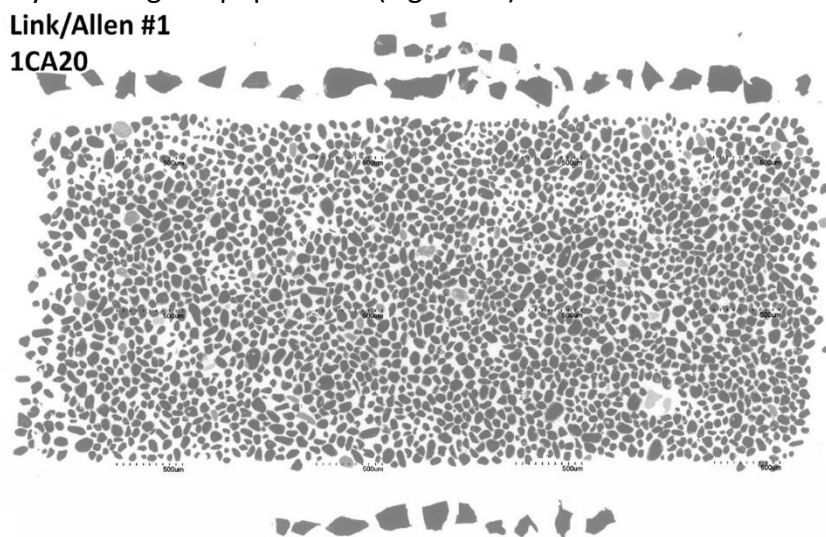


Figure 10: Sample 1CA20 Pennsylvanian Wells Limestone contains substantial recovered zircon population. Scale bars along inverted SEM images are at 500um scale. Some observations can be made about population texture throughout sample. Larger grains on top and bottom are those standards placed in each sample for statistical constraints. Texture between the two is vastly differ with sampled population demonstrating fine grained sub rounded to rounded.

2CA20- Permian Lower Ore detrital zircon grain yield was less than 1CA20, with 203 grains analyzed. Grains are fairly well-sorted, sub-rounded to rounded, and sub-spherical to spherical. Grain size ranging from 50 um to 100 um. Grain colors observed were purplish, pinkish, clear, and red. Sampled grains compared to standards embedded within the mount demonstrate a much finer grained population. The observed elongate, sub-rounded DZ grains suggest recycling and is consistent with a shift to primarily eolian transportation. (Figure 11)

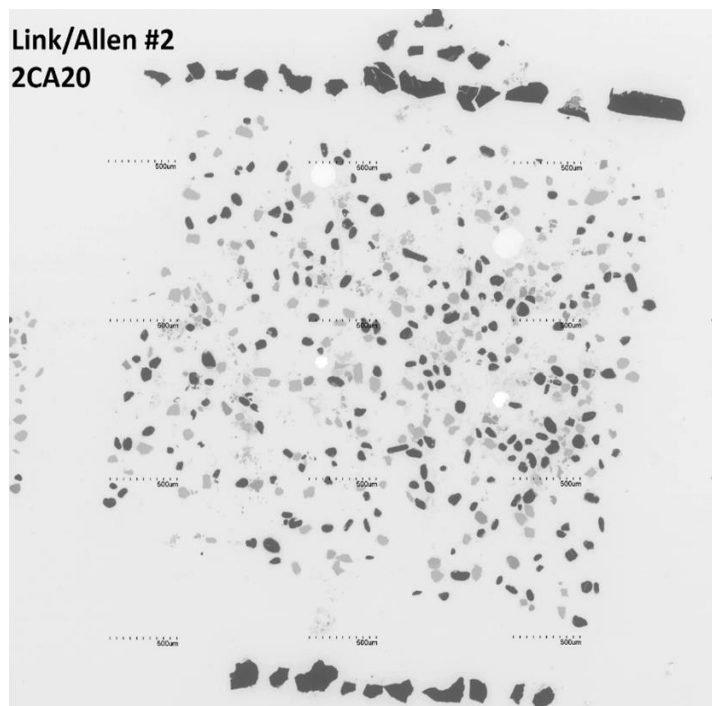


Figure 11: Sample 2CA20 Permian Lower Ore of the Meade Peak Member. First fine-grained marine sediment sample processed for detrital zircon. Larger grains on top and bottom are standards.

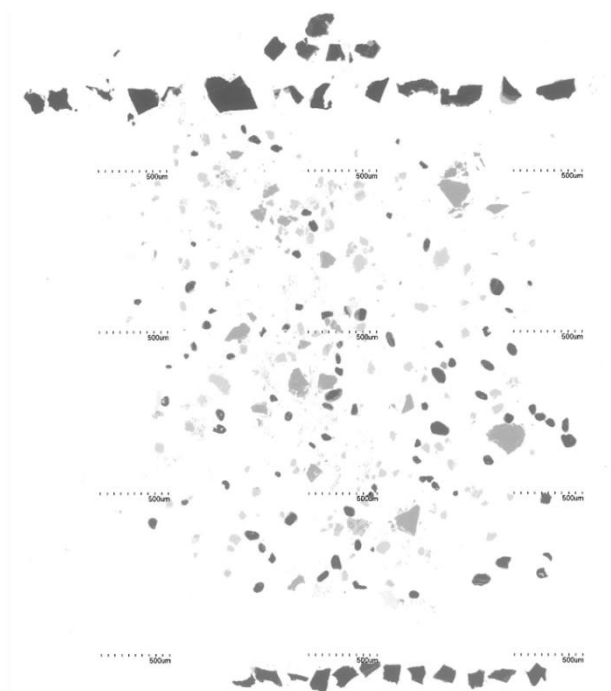


Figure 12: Sample 3CA20 Permian Center Waste Shale DZ extracted grains. Larger grains above and below are standards embedded into mount for statistical constraints. Zircon grains are poorly sorted in the extracted population exhibiting Sub rounded to Sub angular, sub spherical shapes.

3CA20- Permian Center Waste Shale detrital zircon grain population is reduced to 72 grains analyzed. Grains are moderately sorted, sub rounded to sub angular, sub- rounded to rounded, sub-spherical to spherical texture. Grain size ranged from 25 um to 75 um. Grain colors observed were purplish, pinkish, clear, and red. Center Waste Shale is predominantly shale to fine grained mudstone or claystone, and less abundant siltstone. (Figure 12)

4CA20—Permian Upper Ore detrital zircon population was the smallest recovered with 31 grains analyzed. Grains are moderately sorted with more homogenous texture of sub-rounded and sub-spherical shape. Grain size ranged from 50 um to 100 um. Grain colors observed were purplish, pinkish, clear, and red. DZs within this population exhibit textures of recycled zircon grains. The Upper Ore Zone is composed of the D2 phosphatic mudstone on the bottom, D-mud med brown mudstone in the center, and D3 gray phosphatic siltstone on the top. (Figure 13)

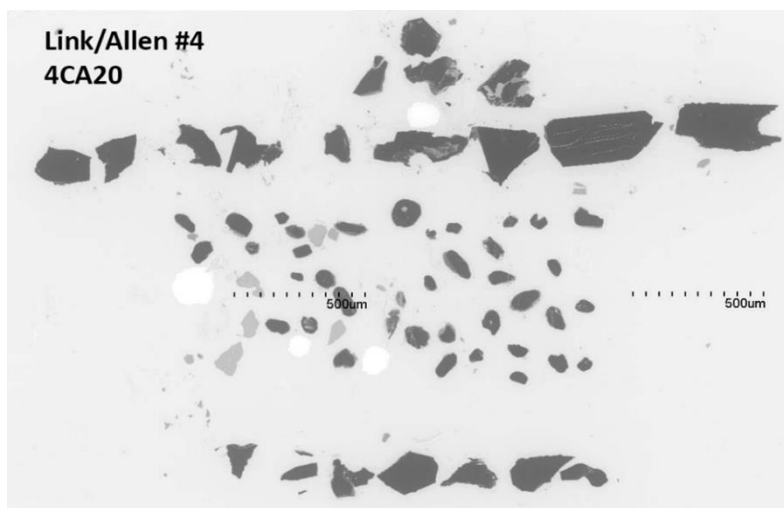


Figure 13: Sample 4CA20 Permian Upper Ore Zone extracted DZ's. DZ population was the lowest of any sample. Larger grains above and below are analytical standards. Zircons in this sample are fine grained, well sorted, sub rounded to rounded, and sub spherical to spherical.

5CA20- Triassic Dinwoody Formation detrital zircon yield was significantly larger than Upper Ore Zone. A population of 184 grains passed the analysis filter criteria. Moderately sorted grains were sub-rounded sub-spherical. Grain sizes were from 25 μm to 100 μm . Grain colors observed are almost exclusively clear grains that are difficult to see with no magnification. The Dinwoody is thinly bedded greenish gray claystone with interbedded greenish fine-grained siltstones. (Figure 14)

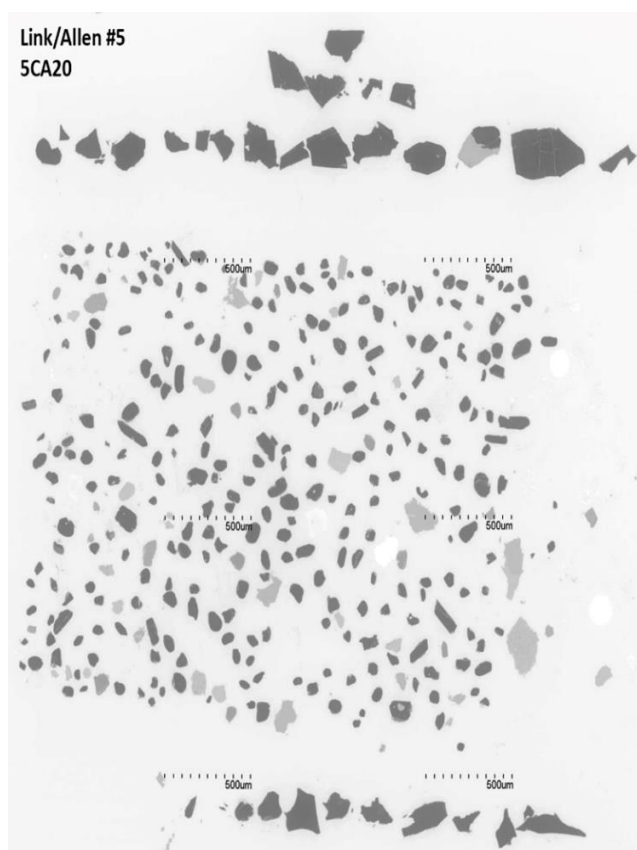


Figure 14: Sample 5CA20 Triassic Dinwoody DZ population extracted. Larger grains above and below are standards. The sample contains a large population of fine grained DZ's that are fairly well sorted, sub rounded to rounded, spherical to sub spherical.

Grain texture and sizes change slightly between samples. Color is a distinguishing characteristic. There is a stark contrast in colors of grains between Pennsylvanian, Permian, and Triassic samples. Colors observed in Pennsylvanian through Permian samples ranged from pinks, purples, and yellows. Coloration of zircon grains is believed to occur after grains are subjected to radiation damage from the radioactive decay of isotopes. There may be some significance to clear DZ grains as it pertains to their diagenesis, namely that their source may have been more deeply buried and thus radiation damage was annealed prior to erosion (Garver and Kamp, 2002). Triassic DZ sample age show similar age distribution as Pennsylvanian through Permian samples. However, almost exclusively the grains are clear and colorless. This relationship will need further investigation.

Geochronological Methods

U-Pb Detrital Zircon Analysis

Detrital zircons from each of the collected 5 samples were analyzed at the University of Arizona LaserChron Laboratory in Tucson, Arizona. The Photon Machines Analyte G2 Excimer Laser was used to sample individual grains of zircons, and a Thermo Element2 HR ICPMS was used to analyze particles carried by argon gas from the laser (Pullen et al., 2018). Operational settings associated with Excimer Laser and the Element 2 ICPMS can be found in the Appendix tables 1&2 (Gehrels et al., 2008). Backscatter Electron image of each sample was used for laser target selection for DZ grains. Laser width of 30-micron spot size was used and manually assigned to DZ grains in each sample. Target placement on DZ grains on 1CA20 was randomly

selected as sample size was over 300 grains. Samples 2CA20-5CA20 contained less than 300 grains so every zircon grain present was selected for analysis.

Three standards of known ages were added to each sample and analyzed during the process. Roughly every 5th unknown DZ grain was followed by sampling all three standards. The standards used are, FC (1,099 Ma) from the Duluth Gabbro Complex. SL (563 Ma) from Sri Lanka, and R33 (419 Ma) (Black et al., 2004; Gehrels et al., 2008). Systematic uncertainty associated with the standard age results through the entire run are reported in table 2 as % deviation from expected ages. Lower % deviation represents smaller levels of uncertainty. Larger % deviation reflect larger levels of uncertainty. Percent deviation is a comparison from sampled aged to expected ages listed above.

Detrital geochronology is dependent on the decay from U and Th to Pb and their relative ratios. Half-lives of three isotopic decays are important in determining DZ ages; ^{238}U to ^{206}Pb , ^{235}U to ^{207}Pb , and ^{232}Th to ^{208}Pb . Respectively 4,468 Ma, 704 Ma, and 1,410 Ma half lives are used. For ages younger than 1,000 Ma the ratio of $^{238}\text{U}/^{206}\text{Pb}$ is best used for age determination, while the ratio of $^{206}\text{Pb}/^{207}\text{Pb}$ is best used for grains older than 1,000 Ma. Table 3 details filter that are applied to each unknown DZ age result automatically by the Matlab software to ensure that data presented meet a certain level of concordance and represent the 95th percentile statistically. Filters are used to remove bias and error associated with variance in U/Pb isotopic concentrations caused by grain diagenesis, background Pb concentration and natural occurrence of Uranium isotopic variances. Should ages reported by both ratios be similar to expected ages it is referred to as concordant, while dissimilar ages are discordant (Pullen et al., 2018; Milton, 2020).

Isotopic Age Uncertainties	Pennsylvanian 1CA20	Permian 2CA20	Permian 3CA20	Permian 4CA20	Triassic 5CA20
6/8	1.19 %	2.41 %	2.19 %	0.96 %	1.22 %
6/7	1.02 %	0.84 %	1.05 %	1.01 %	0.96 %

Table 2: Reported systematic uncertainties for standard samples as reported by MATLAB. Each standard set reports deviations from expected ages found in text by % deviation. The systematic uncertainty is a gauge for how uncertain age results are through the entire sampling set. Lower percentages reflect lower levels of uncertainty while larger percent deviation reflect larger levels of uncertainty of reported ages for standards throughout the sampling. Unknown DZ ages report random uncertainties that pertain to the uncertainties for each individual analysis, while systematic uncertainties are reported for samples throughout the sampling set.

6/8 6/7 Best age (Ma)	6/8 Uncertainties (%)	6/7 Uncertainties (%)	Discord ance Cutoff (Ma)	Discordance Filter (%)	Rev Dis Cutoff (%)	204 Pb Filter (Ma)	206/204 Factor	206/238 OD factor	207/207 OD factor	Reject
400	10	10	700	20	5	600	1	0.6	1.0	20

Table 3: Shows statistical settings used in MATLAB software for data reduction. These are standard discussed in Gehrels et al., (2008), and applied by default within MATLAB. Maximum uncertainty for 206/207 age default 10% applied to ages older than cutoff (400 Ma) for 206/238 ages. Maximum discordance that is accepted for each sample, in comparison of 206/238 and 206/207; 20% applied to ages older than 206/238 cutoff. Maximum acceptable reverse discordance in comparing 206/238 and 206/207 of 5% applied to analysis of 206/238 ages older than cutoff. There is rejection of maximum of 20% discordance in standard ages. Factors are used to account for bias in 206/204 errors due to high background values. Division between 206/238 vs 206/207 for best age default of 400 Ma. (Pullen et al., 2018,

Results

Sampled zircon age results below were grouped by relative provenance age constraints adopted from Link et al., (2005). A complete age distribution breakdown for samples can be found in Table 3 in the appendix. Permian samples are reported individually and combined as there is concern with the significant sample size decrease between samples. Individual samples may demonstrate shifts in DZ content of the sediments during time of productive versus non-productive phosphate production. Combined Permian samples allow for meaningful comparison between the formations and time periods present.

Pennsylvanian Wells Limestone

Sample 1CA20 contains 269 zircon grains that passed the discordance filters. Age distribution are as follows: 3% Mid Paleozoic grains from 440-450 Ma with spike at 430 Ma (possibly Antler Orogenic grains); 16% Mesoproterozoic grains from ages 930-1,190 Ma with spike from 1,030-1,050 Ma spiking at 1,150 Ma (recycled Grenville grains); 8% of Mesoproterozoic grains range in age from 1,470-1,600 Ma spiking at 1,480-1,500 Ma (interpreted as derived from A.R.M. basement); 35% Mesoproterozoic grains from 1,600-1,800 Ma with spike around 1,730 Ma (interpreted as Yavapai Mazatzal provinces within the A.R.M); 12% Paleoproterozoic 1,800-1,990 Ma (interpreted as recycled from Ordovician sands ultimately derived from the Peace River Arch), 6% Neoarchean 2,660-2,780 Ma; and 3% Mesoarchean 2,800-2,900 Ma.

Proterozoic grains show two main populations by age grouping. Presence of the Mesoproterozoic grains ranging in ages from 1,450- 1,600 Ma are interpreted as recycled Appalachian grains. Grains 1,500 to 1,600 Ma are uncommon in the Cordillera. Leary et al. (2020) propose that these are sourced in a theoretical sediment transfer conduit from Baltican basement to the north (Colpron and Nelson, 2009; Evans and Mitchell, 2011; Beranek et al., 2016). Proterozoic population of grains spiking at 1.6 Ga is likely derived from Yavapai- Mazatzal Ancestral Rocky Mountain basement recycled from Colorado to the south. Archean grains were sourced from the Wyoming Craton and Superior Craton to the north. (figure 15)

Permian

Lower Ore Zone

2CA20 Lower Ore Sample yielded 201 zircons grains that passed concordance filters. Age distributions are as follows: 9% mid-Paleozoic grains from 330-440 Ma with a 17 grain spike at 420 Ma ; 15% Mesoproterozoic Grenville age population 900-1,200 Ma with spike at 1,080 Ma; 12% Mesoproterozoic grains 1,480-1,590 Ma spiking at 1,490 Ma; 23% Paleoproterozoic Yavapai Mazatzal grains have a bimodal distribution around 1,600-1,680 spiking at 1,650 Ma and 1,700-2,000 spiking at 1,720 Ma; 8% Neoarchean 2,550-2,580 Ma, 2,650-2,770 Ma; 2% Mesoproterozoic 2,800-,2900 Ma. (Figure 16)

This sample exhibits a slight increase in the younger population of the mid-Paleozoic grains interpreted to have been derived from the northwest. Grenville age grains remained in the same percentage. However, there is an increase in the percentage of recycled non-North American grains (1500 to 1600 Ma) theorized to have derived from Baltican basement to the north west. There is a decreased percentage of 10% Yavapai Mazatzal grains 1,600-1,800 Ma. There is a decreased percentage of recycled Peace River Arch grains from 1,800-2,000 Ma. Both samples exhibit nearly the same spike age of Neoarchean and Mesoarchean 1,980-1,990 Ma.

Center Waste Shales

3CA20 yielded 70 sampled zircon grains that passed the filters. Age distribution are as follows: 9% Mid Paleozoic grains from 390-400 Ma, and 430-450 Ma, 26% Grenville-age grains 950-1,030 Ma spiking at 1,020 Ma, and 1,110-1,180 Ma to spiking at 1,120 Ma, 4% Mesoproterozoic from 1,490 Ma and 1,580 Ma, 20% Paleoproterozoic Yavapai Mazatzal with ages 1,620-1,650 Ma spiking at 1,620 Ma and 1,690-1,790 Ma spiking at 1,700 Ma., 13% Neoarchean aged 2,520-2,770 Ma, 3% Mesoarchean grains aged 2,830 Ma. (Figure 17)

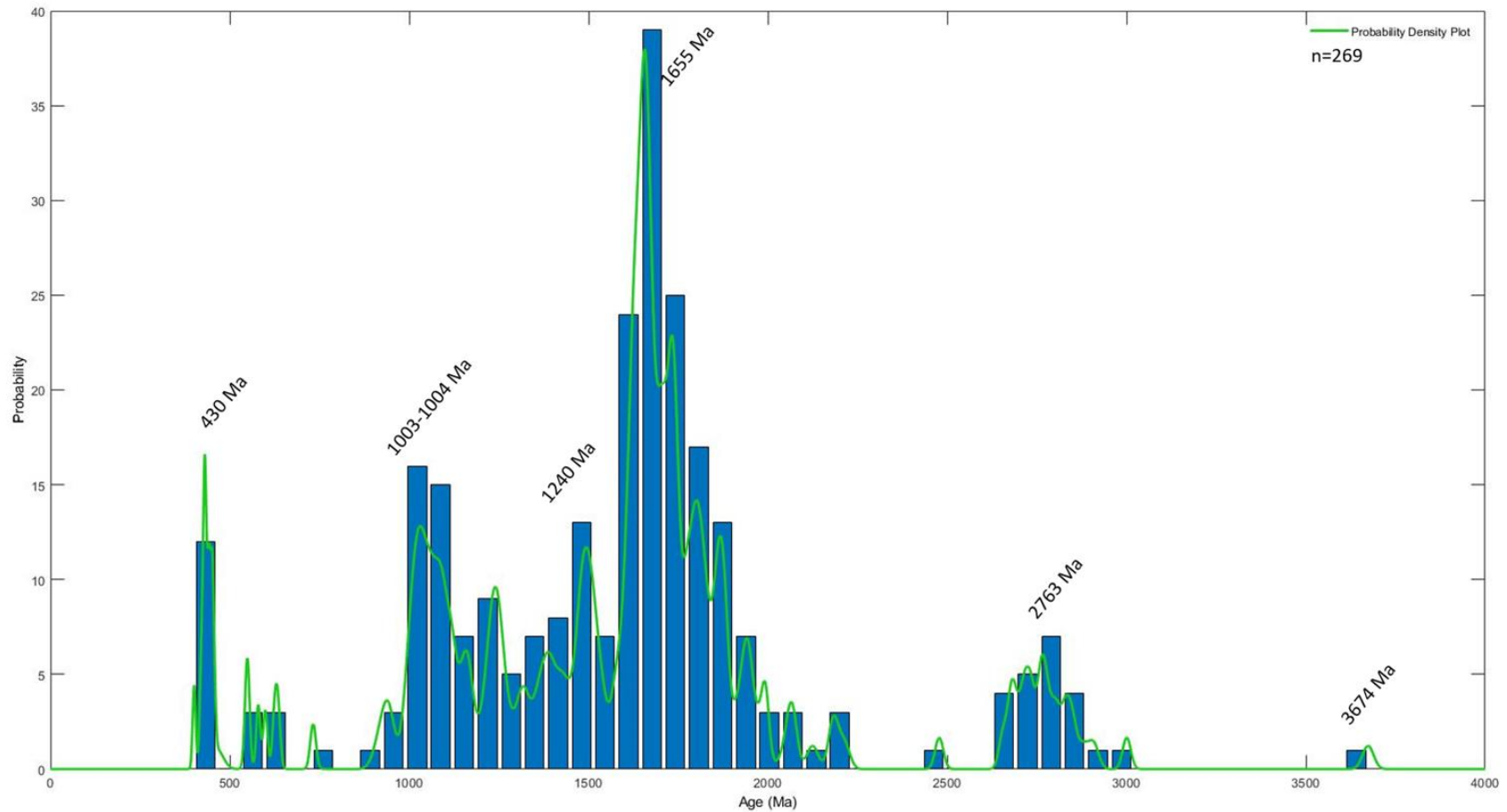


Figure 15: Pennsylvania Wells Limestone DZ age population graph. Histogram bins are 50 Ma. Total DZ samples analyzed equates to 269. Probability Density Plot are also illustrated by green lines. Important populations of DZ distributions are the Mid-Paleozoic 330-450 Ma, Grenville grains 900-1,200 Ma. Mesoproterozoic 1,450-1,600 Ma. Paleoproterozoic Yavapai Mazatzal grains 1,600-1,800 Ma. Neoproterozoic 2,400-2,800. Distribution of DZ grains would indicate a strong influence of sediment sourcing to the east north east of basin within the late Pennsylvanian epicontinental seaway.

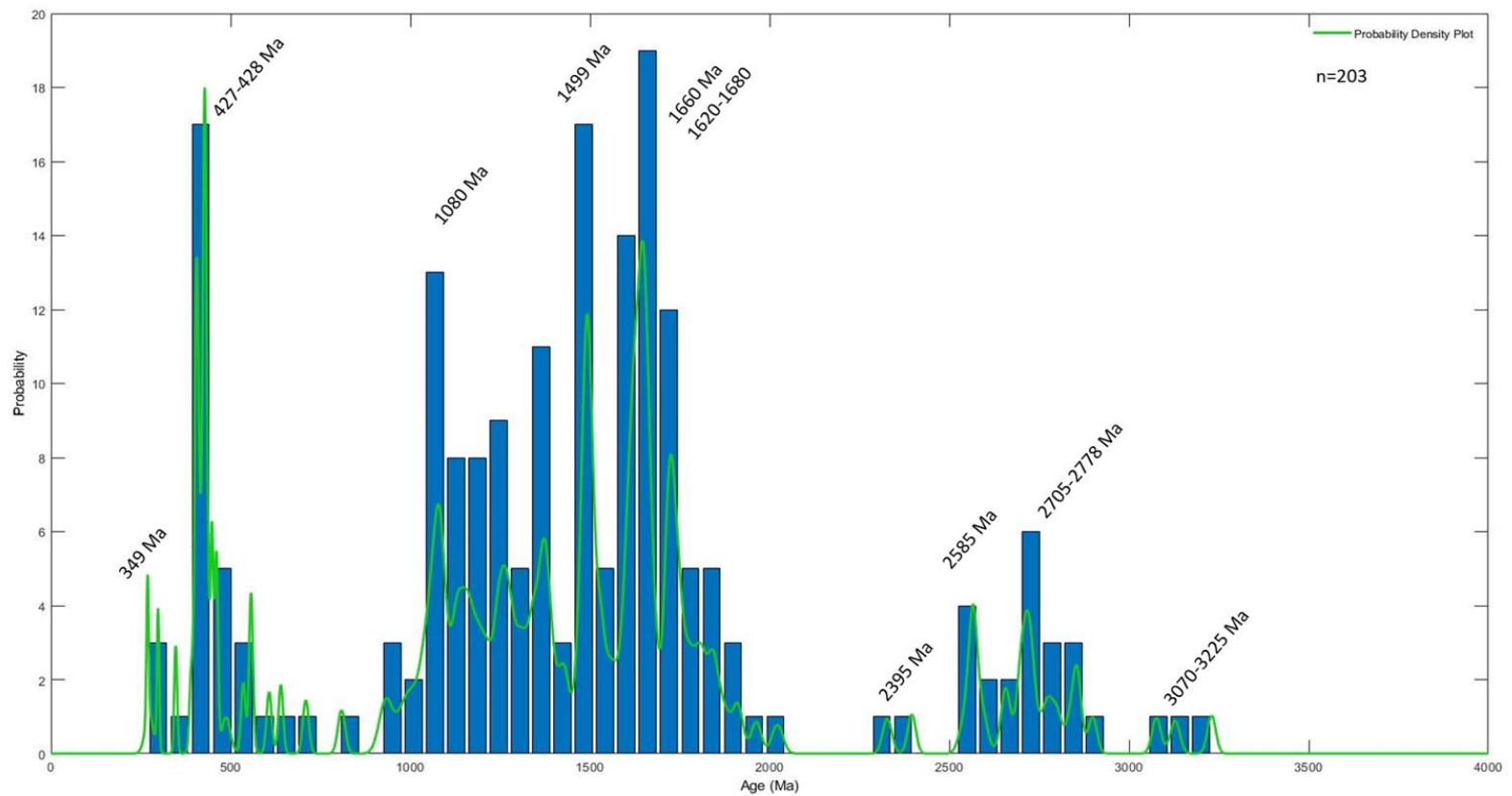


Figure 16: Permian Lower Ore Zone 2CA20 containing 203 DZ grain. With respect to the Wells Formation age distribution for Lower Ore Zone has Larger percentages of younger Mid Paleozoic grains. There is a proportionate decrease in Paleoproterozoic Yavapai Mazatzal grains, and an increase in Neoproterozoic grain and Grenville age grains.

Upper Ore Zone

4CA20 displays the least number of sampled zircon grains at 31. Age distribution are as follows: 5% Mid Paleozoic from 350 Ma and 380 Ma, 25% Neoproterozoic grains aged from 990 Ma-1,020 Ma spiking at 1,010 Ma and 1,100-1,170 Ma spiking at 1,110 Ma, 6% Mesoproterozoic grains at 1,500 Ma, 23% Yavapai Mazatzal grains aged 1,600 -1,630 Ma and 1,680-1,790 Ma, 13% Paleoproterozoic grains aged 1,810-1,920 Ma, 16% Archean 2,520-2,750 Ma. (Figure 18)

Despite the Upper Ore Zone yielding the smallest sample size, relative percentage distribution between age groups changes little from the Center Waste Shale. For comparative purposes the Permian Samples were lumped into one Permian distribution. Within this grouping the relative changes in percent distribution between the Permian samples is relatively similar.

Permian Combined

The combined Permian grain population is distributed as such: 9% of Mid Paleozoic 330-450 Ma grains; 19% Grenville 900-1,200 Ma; 10% grains 1,450-1,600 Ma; 23% Yavapai Mazatzal 1,600-1,800 Ma; 6% Paleoproterozoic 1,800-2,000 Ma; 10% lumped Neo Archean 2,400-2,800 Ma and Mesoarchean 2,800-3,000 Ma.

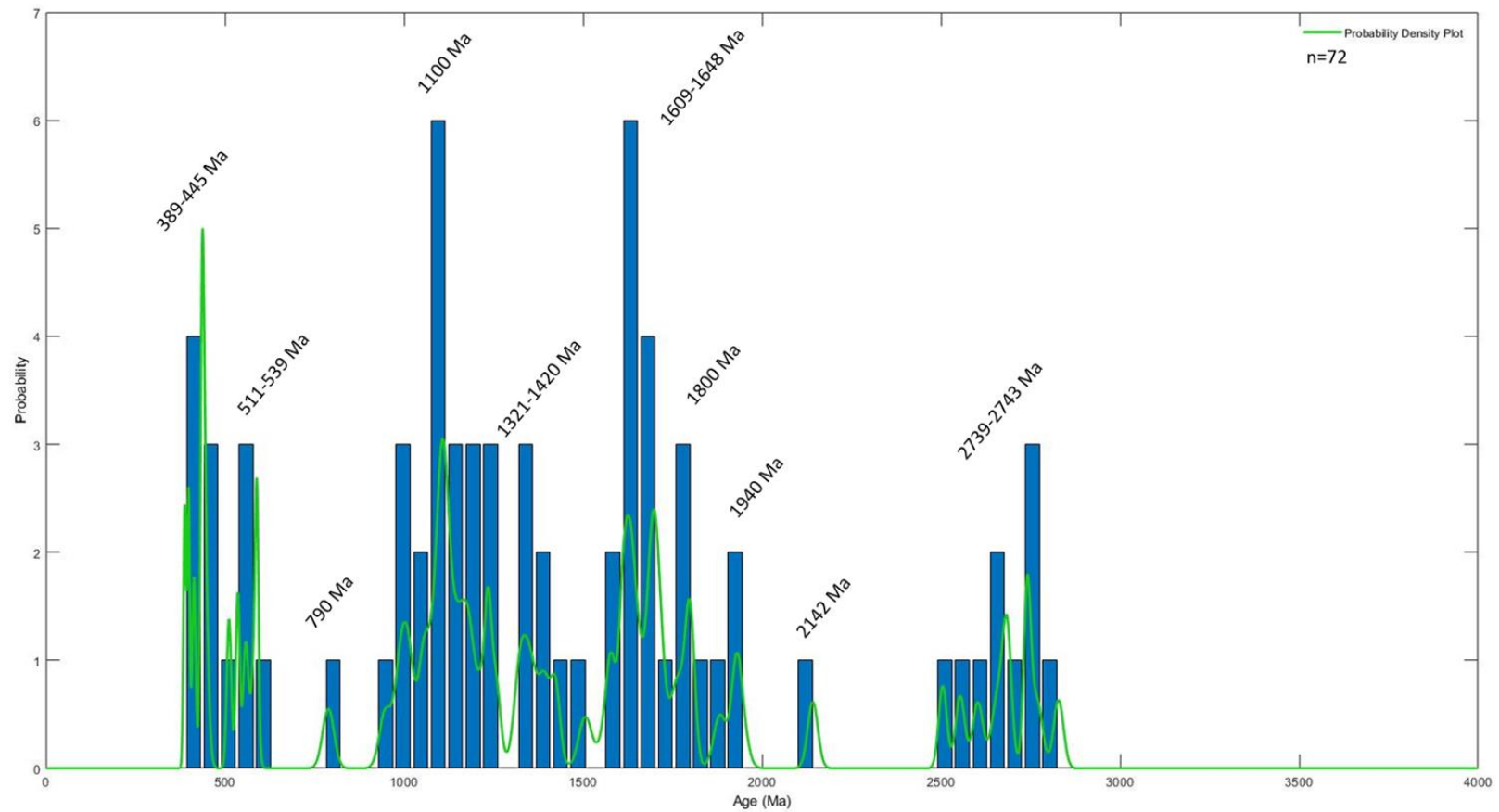


Figure 17: Permian Center Waste Shale 3CA20 DZ population are similar to the Lower Ore Zone as compared to Pennsylvanian 1CA20. Increase in Grenville grains 900-1,200 Ma and Neoproterozoic 2,400-2,800

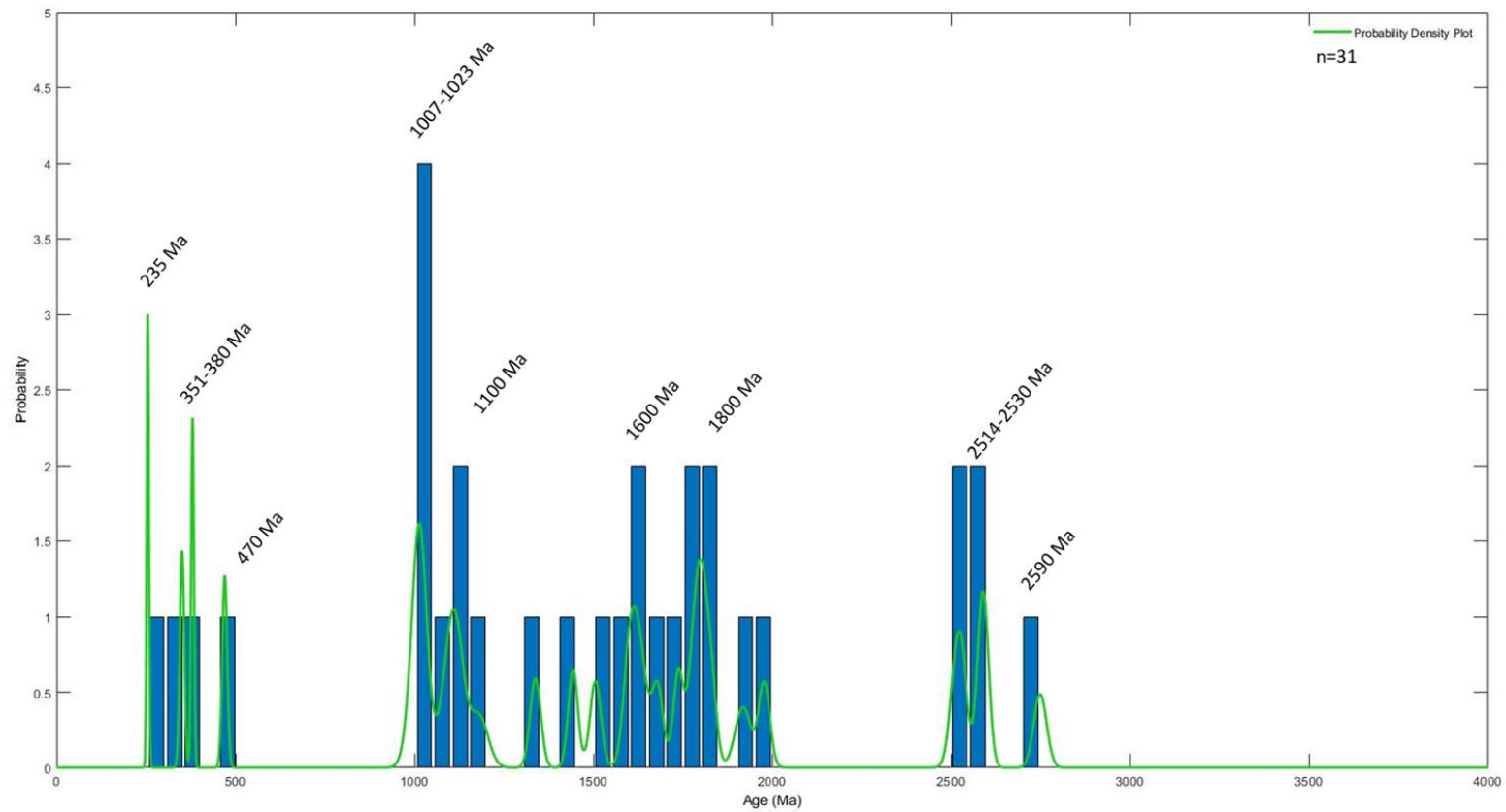


Figure 18: Permian Upper Ore Zone 4CA20 resulted in lowest sampled grains to 31. Age distributions of these grains are very similar to those of the Center Waste Shale 3CA20. Increased Neoproterozoic 2,400-2,800 Ma and Grenville grains 900-1,200.

In a comparison to the Pennsylvanian Wells Limestone 1CA20, mid Paleozoic grains aged 330-450 Ma increase 3x from Pennsylvanian to Permian. Grenville-age grains increase slightly from 16% to 19%. 1450 to 1600 Ma grains remain relatively consistent with 8% to 10%. Yavapai Mazatzal grains show a decrease from 35% in the Pennsylvanian to 21% in the Permian. Neoproterozoic grains increase from 6% to 10% from Pennsylvanian to Permian.

Triassic Dinwoody

184 zircon grains passed discordance filters in sample 5CA20. Sample distribution is as follows: 10% mid Paleozoic grains aged 360-460 Ma with a spike at 410 and 430; 16% Grenville aged 990-1,190 Ma spiking 1,070 Ma; 12% concentration 1,470-1,600 Ma with two spikes at 1,500 Ma and 1560 Ma; 18% grain Yavapai Mazatzal from 1,610-1,790 Ma spiking 1,760 Ma; 5% Paleoproterozoic from 1,800-2,140 Ma; 8% Archean grains from ages 2,500-2,790 Ma with two spikes at 2,690 Ma and 2,780 Ma. (Figure 19)

Comparing Triassic to Permian DZ percentages reveal a slight increase in concentrations of mid-Paleozoic grain 330-450 Ma. Prevalence of 900-1,200 Ma Grenville-age grains decreases. Similarly, there is a decrease in grains from 1,600-1,800 Ma. The Triassic Dinwoody contains more younger grains than Permian strata.

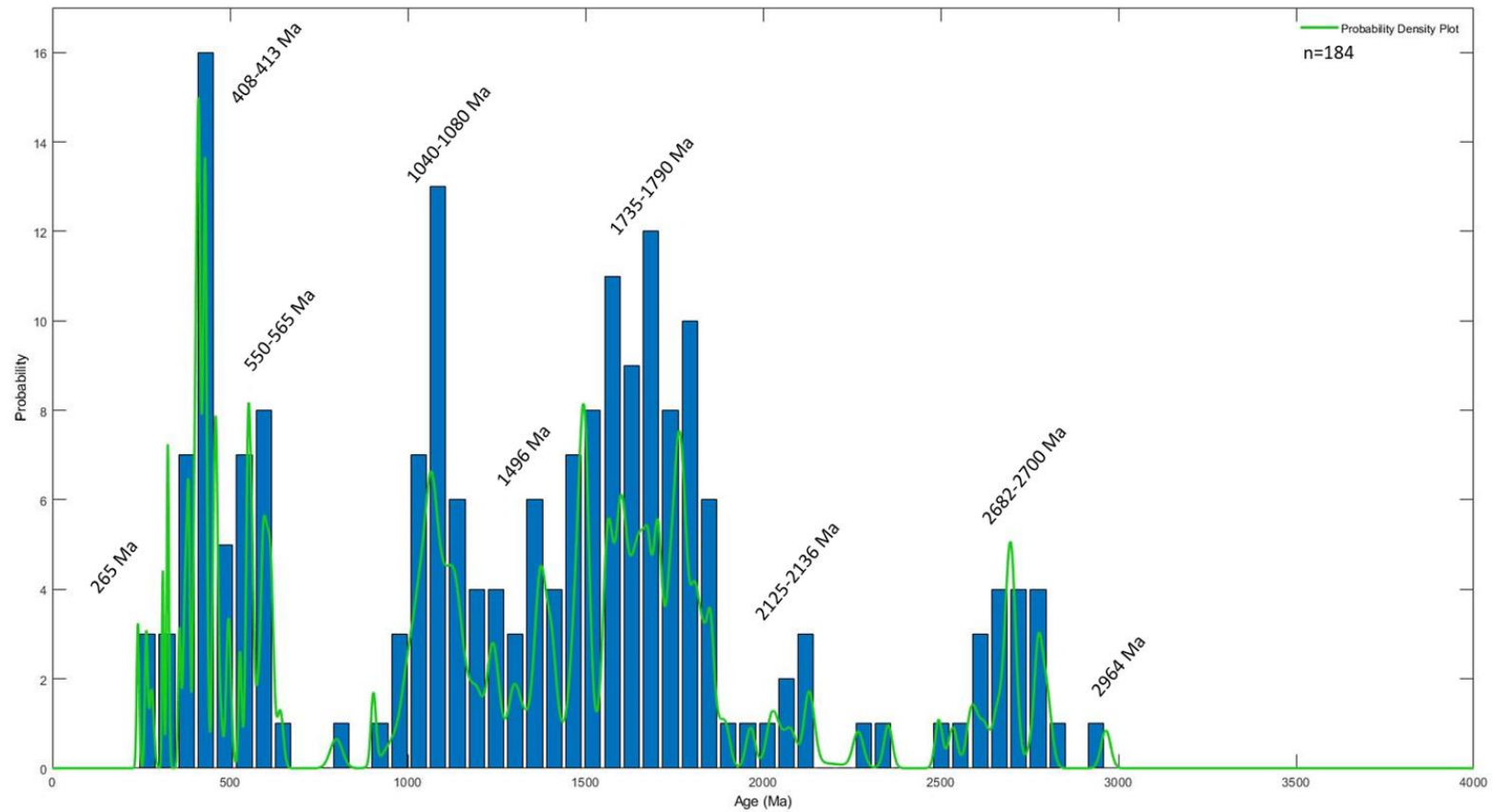


Figure 19: Triassic Dinwoody 5CA20 contains 202 DZ grain primarily of clear color. Sample distributions show most prevalent grains coming from younger Mid-Paleozoic terranes. This prevalence and grain color being similar between all sampled DZ grains, indicate a singular source that may have been buried and achieved temperatures around 400°C to reset DZ colors to clear (Garver and Kamp, 2002).

Discussion

Detrital zircon age distributions among samples indicate shifts in sediment sources feeding the geographic areas of the Phosphoria Basin. Age populations are broken up into significant populations to observe changes through time (Figure 20) and provenance visualization in (Figure 21). Data are shown in Table 3 in the Appendix. As mentioned earlier, Permian samples are combined into one plotted Probability Density Function. This allows for a more significant comparison of age distributions for the three represented geologic times. It is important to note the Permian detrital zircon samples are eolian-derived grains whereas the Pennsylvanian and Triassic grains are marine and climatic conditions were different (Gehrels and Pecha, 2013; Leary et al., 2020).

In Pennsylvanian 1CA20, the largest percentage of detrital zircon ages are Mesoproterozoic Yavapai-Mazatzal ages, most likely sourced from the south. Late Pennsylvanian and early Permian eustatic conditions began to shift, and a series of transgressive sequences occurred (Barbeau, 2003; Lawton et al., 2015). Observed longshore drift and eolian processes existed during this time as observed by Leary et al. (2020). They documented that DZ age distributions in the Grand Canyon more closely resembled those from grains collected in numerous Ancestral Rocky Mountain strata to the north. This would be consistent with marine deposition with enough energy to shape rounded and well sorted DZ grains. This was accomplished by a longshore transport of grains into the Pennsylvanian coastal margin.

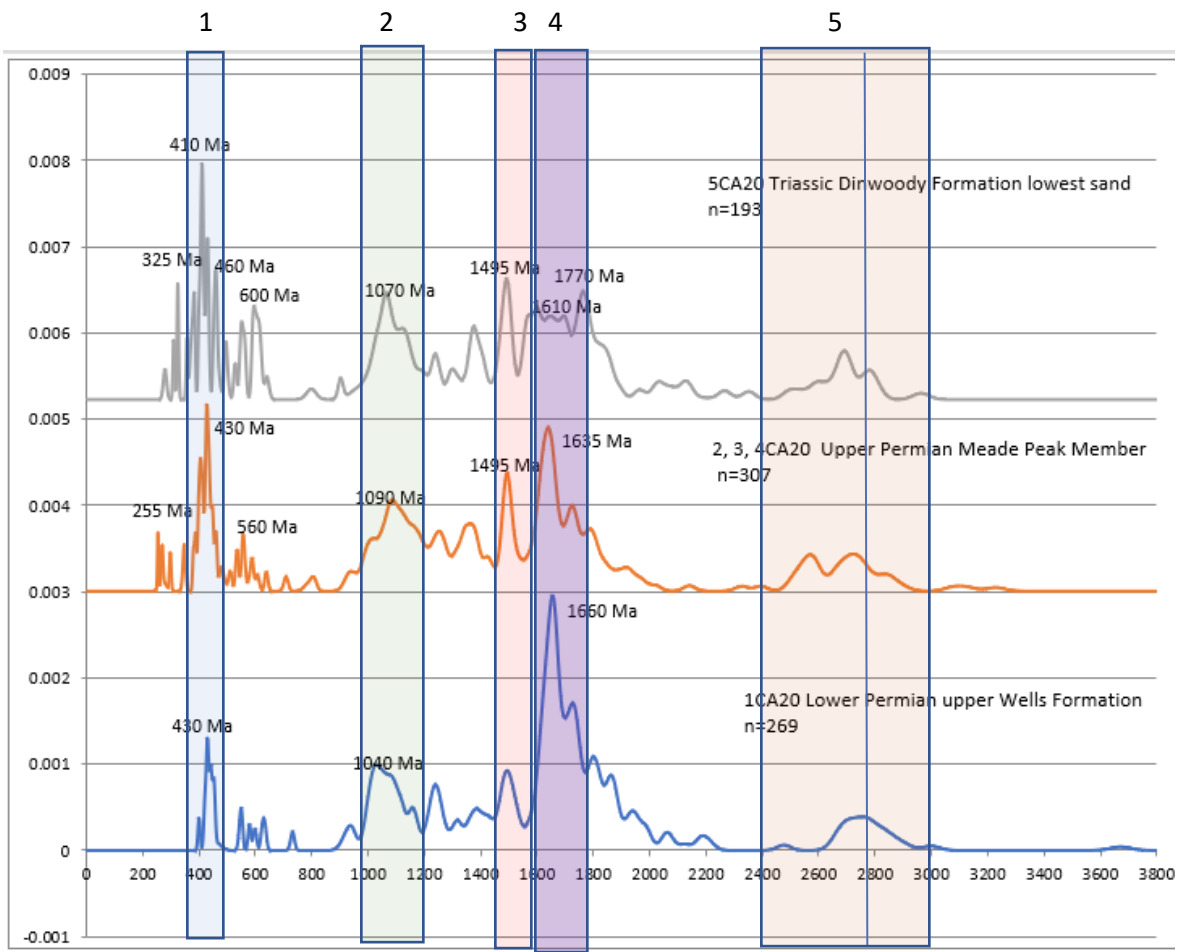


Figure 20: Compiled Probability Density Function for time periods represented in this work. Pennsylvanian Wells Limestone contained 269 sampled zircon grains. Permian 2CA20, 3CA20, and 4CA20 were compiled into one Permian sample, and contained 307 grains jointly. Triassic 5CA20 contains 193 sampled zircons. Age grouping are adopted from Link et al. (2005). (1) Mid Paleozoic grains with ages ranging from 350-450 Ma. (2) Mesoproterozoic grains from 1,000-1,200 Ma recycled Grenville aged grains. (3) Mesoproterozoic grains 1,380-1,470 Ma possibly sourced from east in Baltic basement or failed Mesoproterozoic rift along eastern edge of Laurentia (Colpron and Nelson, 2009; Evans and Mitchell, 2011; Beranek et al., 2016). (4) Mesoproterozoic grains from Yavapai Mazatzal province of Colorado. (5) Archean 2,400-3,000 Ma.

Climatic circulations shifted from Pennsylvanian to Permian time with persistent drier conditions conducive to continued eolian transportation. Extensive Gondwanan glaciation is thought to have occurred causing a cooler equatorial climate than what is observed today, and drier coastal conditions (Carroll et al., 1998; Soreghan et al., 2007; Soreghan and Soreghan, 2013; Soreghan et al., 2014). Coastal boundaries and environments shifted as coastal zones

moved further to the west moving sediment facies westward, and predominant eolian processes shifted from northeast to north from Pennsylvanian to Permian time (Piper and Link, 2002; Soreghan et al., 2002; Hiatt and Budd, 2003; Leary et al., 2020).

Unconformably overlying the Pennsylvanian, DZ populations in the combined Permian sample show similar age distribution, but variations of provenance predominance from the Pennsylvanian. Mid-Paleozoic grains are three times more prevalent in the Permian as the Pennsylvanian while Neoarchean grains are almost twice as prevalent. The increase in percentage of mid-Paleozoic grains supports inferences that Permian winds were predominately coming from the north-northeast. Grain textures also may support eolian process as the relative distribution decrease through the Permian Deposition of recycled Grenville grains and potentially Baltican grains transported via fluvial systems across the Pangean continent and recycled during drier Permian climatic conditions through eolian processes (Fedo et al., 2003; Soreghan et al., 2002; Leary et al., 2020). Grains were transported across the continent in hypothesized fluvial drainages (Rainbird et al., 1992).

Further interpretation of DZ populations from individual Permian samples may illustrate that during Permian time winds may have shifted. The Lower Ore Zone contains more Mid-Paleozoic 330-450 Ma and Mesoproterozoic 1,450-1,600 Ma grains than later Permian samples and contains fewer 900-1,200 Ma and Neoarchean grains 2,400-2,800 Ma. This relationship could indicate that through the deposition of the Lower Ore Zone winds were predominately northerly-derived with seasonal variations from the northeast. The reverse relationship in Center Waste Shale and Upper Ore zone exhibit increased prevalence of Neoproterozoic 900-1,200 Ma Appalachian Grenville grains and Neoarchean 2,400-2,800 Ma Wyoming craton. This

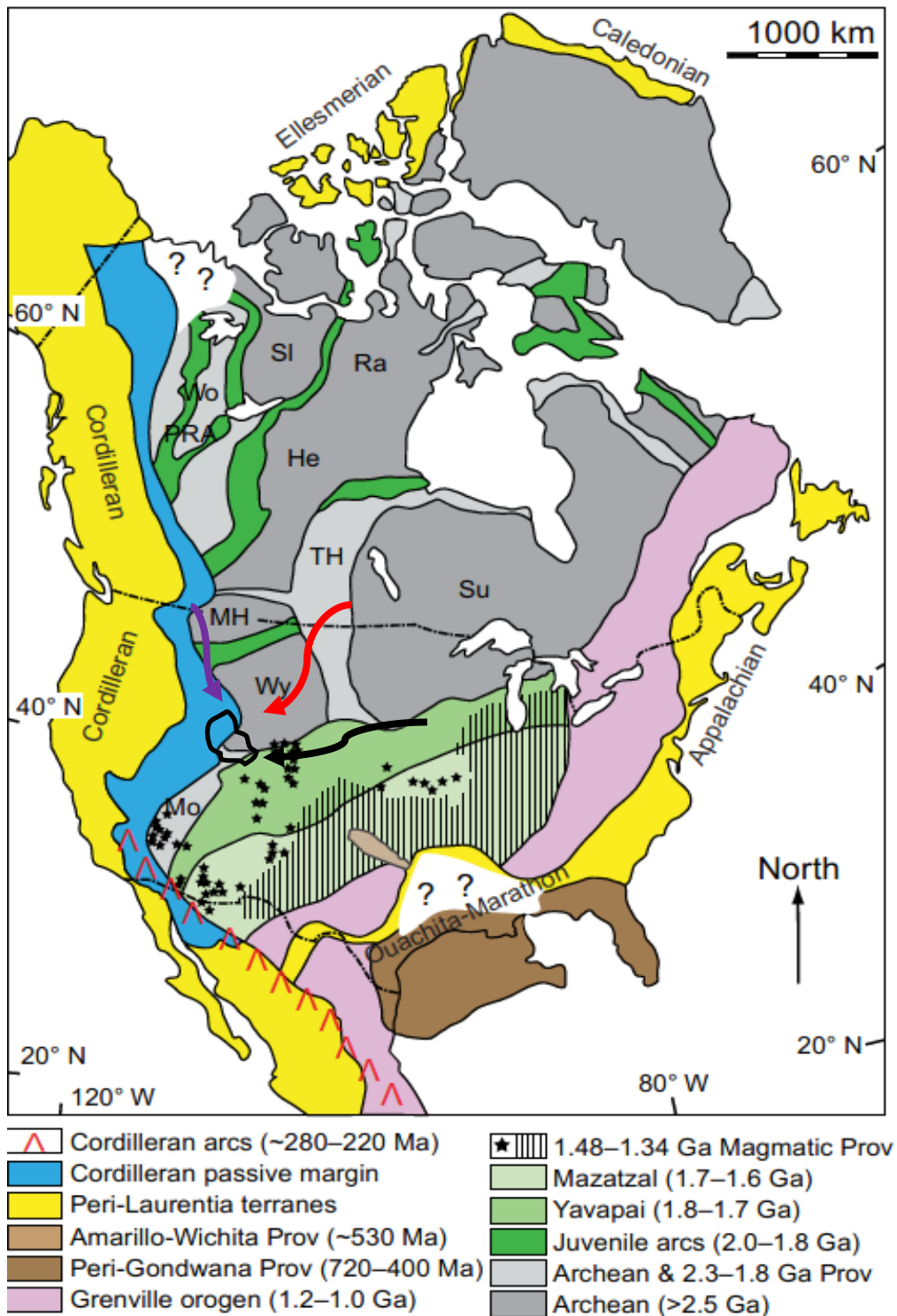


Figure 21: Provenance map adopted from Leary et al., (2020) Relative ages of provenance terrains present throughout modern day North America configuration. Phosphoria Basin is approximately located by black circle. Pennsylvanian 1 CA20 provenance indicated by black arrows, Permian combined indicated by red arrows, 5 CA20 indicated by purple arrows. See discussion about wind shift through Permian time.

suggests that during the Center Waste Shale and Upper Ore Zone winds were predominately from the northeast direction.

Unconformably overlying Phosphoria Formation, the shallow marine, Triassic Dinwoody DZ population shows an increase of younger mid-Paleozoic grains. Of all samples collected, the Triassic Dinwoody Formation has the most abundant grains in the mid-Paleozoic with ages from 330-450 Ma. Likewise, Mesoproterozoic 1,450-1,600 Ma grains presence is increased in 5CA20. All other main population groupings discussed show a reduced prevalence. This shift is interpreted to be caused by provenance from to terrains to the north and west of the basin (May et al., 2013).

As a special mention, DZ samples collected for this study showed similar colors, except Triassic grains were clear rather than colored. Grain sizes were largely smaller in the Dinwoody, which was apparent when picking location for laser ablation spots. Numerous aspects of zircon grain history may explain this observation and the Triassic grains may have undergone diagenetic bleaching or annealing of radiation damage (Garver and Kamp, 2002; Ault et al., 2018).

Conclusions

1. Samples collected for this study (Figures 16-21) exhibit DZ populations that are key indicators as to where grains deposited into the basin were sourced. From Pennsylvanian through Triassic time, predominance of source terranes shifts from predominantly east-northeasterly to west-northwesterly-derived, respectfully. This is indicated by the diminishing concentration of Yavapai-Mazatzal grains sourced from the southeast. An increase of

Appalachian Grenville grains through Permian Phosphoria samples illustrates more sediment routing from the north as Grenville grains are thought to have been deposited through continental drainages from the east of Laurentia. The Triassic Dinwoody Formation contains Mesozoic volcanic zircon grains possibly routed from the northwest. The initial shift in provenance is consistent with observations made by Soreghan et al. (2014) and Leary et al. (2020). Sediment dispersal was provided by longshore drift and fluvial input into the Pennsylvanian and Triassic basins

2. Compared with those in the underlying Pennsylvanian Wells Formation, DZ grains within the Phosphoria Formation indicate a reduced concentration sourced from southern Yavapai – Mazatzal sources, and more Archean craton and Grenville grains sourced from the north. Younger 330-450 Ma grains also show an increase in Permian samples as compared to the Pennsylvanian, with a possible source from the north. Eolian processes are the main process for sediment transport. However, distributions for DZ age population between Lower Ore Zone 2CA20 and later 3CA20 and 4CA20 Permian sediments demonstrate slightly different population percentages, but as a whole the Permian has 3x as many mid Paleozoic grains as the Pennsylvanian indicating a strong north easterly provenance.

3. Detrital zircon age populations are consistent with the eolian processes) being the primary source for siliciclastic input into the Permian Phosphoria Formation (Carroll and Stephens, 1998; Carroll et al., 1998; Soreghan et al., 2014; Leary et al., 2020). In this study, recovered grains demonstrate fine-grained, sub-rounded texture, consistent with an eolian transportation model. Zircon grains from Permian Lower Ore 2CA20 show a slightly smaller DZ grain size. Further evidence of eolian processes is the relative scarcity of DZs in Permian

samples 2CA20, 3CA20, and 4CA20. Pennsylvanian, and Triassic samples 1CA20 and 5CA20 contain the most recoverable DZ grains consistent with marine or fluvial zircon transport.

4. Targeted starved basin strata are not typical targets for detrital zircon research due to general lack of siliciclastic input and fine-grained nature. However, each sample from fine grained marine siltstone to mudstone produced recoverable zircons. This opens the opportunity further expand provenance studies by examining fine grained sediments.

5. Detrital zircon separation of fine-grained sediments can be accomplished and simplified by ultrasonically separating clay grains from denser particles. Preparing the sample as to attain the utmost surface area exposed to the ultrasonic vibrations aids in full separation of clay particles. This method is a valid procedure that avoids crushing the sample but does increase separation time.

6. A conclusion resulting from this project consists of the potential implication to detrital zircon grain morphology. Stark differences in primarily size and color of Triassic zircons to other Pennsylvanian and Permian zircons of this study are intriguing and may justify further investigation.

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Appendix A

The following data tables are associated with the data collection and analysis of samples containing detrital zircons. Laboratory settings for laser ablation and ICPMS analysis used to derive age results for each detrital zircon analyzed.

Laser ablation system Operational Settings	
Make, Model, and Type	Photon Machines Analyte G2 Excimer laser
Ablation cell and volume	HelEx ablation cell
Laser wavelength	193 nm
Pulse width	8 ns
Energy density	7 J/cm²
Repetition rate	7 Hz
Ablation duration	10 s
Ablation pit depth/ ablation rate	12 microns & 0.8 microns/sec
Spot Diameter nominal/ actual	20 microns
Sampling mode / Pattern	Spot
Carrier Gas	Helium
Cell Carrier gas flow	0.11 L/min He in inner cup, 0.29 L/min He in cell

Table 1: shows the setting used on the Laser ablation G2 Excimer laser. These settings are set at Laserchron laboratory by staff.

ICP-MS instrument Operation Settings	
Make, Model, and type	Thermo Element 2 HR ICPMS
Sample introduction	Ablation aerosol
RF power	1200 W
Make-up gas flow	0.8 L/min Ar
Detection system	Dual mode Secondary Electron Multiplier
Masses Measured	202Hg, 204(He+Pb), 206Pb, 207Pb, 208Pb, 232Th, 235U, 238U

Table 2: show setting used on the Element 2HR ICPMS. Settings are set by the Laser Chron laboratory.

Standard	$^{206}\text{Pb}^*/^{238}\text{U}$ Age (Ma, $\pm 2\sigma$)	$^{206}\text{Pb}^*/^{207}\text{Pb}^*$ Age (Ma, $\pm 2\sigma$)	
FC	1099.5 $\pm$ 05 Ma	1099 $\pm$ 0.6 Ma	Large crystals
SL	563.2 $\pm$ 4.8	568 $\pm$ 16Ma	Single crystal
R33	420.53 $\pm$ 0.16Ma	422.37 $\pm$ 036Ma	Small crystals

Table 3: shows the best ages for standards that were embedded in each sample mount. Standards were analyzed throughout the process by at least every 5th grain. Statistical evaluation is done on the standards to verify confidence in unknown grains.

% population per sample									
		Age		Penn	Permian				Triassic
	Provenance	From	to	1CA20	2CA20	3CA20	4CA20	Combined	5CA20
Sample size				269	201	70	31	318	202
Dev-Miss	Antler Orogenic Belt	330	450	3%	9%	9%	6%	9%	10%
Ordovician	Beaver head Pluton	460	480	<1	-	-	6%	1%	1%
Neoproterozoic	Bannock Volcanic member	680	720	-	1%	-	-	1%	-
Neoproterozoic	Ghost	580	800	2%	1%	3%	-	2%	4%
	Grenville	900	1200	16%	15%	26%	26%	19%	16%
	Syn Belt Supergroup	1380	1470	4%	3%	3%	6%	4%	3%
Mesoproterozoic	Non-North American	1450	1600	8%	12%	4%	6%	10%	12%
	Baltic, Failed rift								
Proterozoic	Yavapai Mazatzal	1600	1800	35%	23%	20%	23%	23%	18%
Paleoproterozoic	Peace River Arch	1800	2000	12%	4%	6%	13%	6%	5%
		2000	2400	-	1%	3%	-	2%	4%
Neoarchean	Wyoming Craton	2400	2800	6%	8%	13%	16%	10%	8%
Mesoarchean	Superior Craton	2800	3000	3%	2%	3%	-	2%	1%
Archean	3.0 + Ga	3000	3700	<1	1%	-	-	<1	-

Table 4: shows age distribution for each sample based on grouping presented by Link et al., (2005). Groupings selected show major populations of grains.

Appendix B

Table 5: Sampled data repository on each detrital zircon analyzed in for each sample collected.

1CA20								Isotope ratios								Apparent ages (Ma)							
Analysis	U	206Pb	U/Th	206Pb*	±	207Pb*	±	206Pb*	±	error	206Pb*	±	207Pb*	±	206Pb*	±	207Pb*	±	206Pb*	±	Best age	±	Conc
	(ppm)	204Pb		207Pb*	(%)	235U	(%)	238U	(%)	corr.	238U	(Ma)	235U	(Ma)	207Pb*	(Ma)	(Ma)	(Ma)	(Ma)	(Ma)	(Ma)	(%)	
Spot 1	261.144	670670.888	2.261	9.658	0.705	4.374		1.433	0.303	1.248	0.871	1705.477	18.703	1707.492	11.845	1709.946	12.962	1709.946	12.962	1709.946	12.962	99.739	
Spot 3	137.851	98322.790	2.036	10.911	1.038	3.352		1.882	0.263	1.570	0.834	1502.866	21.051	1493.253	14.721	1479.615	19.672	1479.615	19.672	1479.615	19.672	101.571	
Spot 4	218.284	30707.813	1.864	10.784	0.798	3.277		1.257	0.255	0.967	0.769	1462.001	12.653	1475.704	9.783	1495.449	15.202	1495.449	15.202	1495.449	15.202	97.763	
Spot 5	198.421	301150.060	3.647	8.888	0.763	5.234		1.281	0.334	1.028	0.803	1859.205	16.608	1858.138	10.918	1856.926	13.790	1856.926	13.790	1856.926	13.790	100.123	
Spot 6	66.167	36188.496	2.097	13.195	1.044	1.964		1.664	0.187	1.295	0.778	1105.677	13.153	1103.169	11.198	1098.239	20.941	1098.239	20.941	1098.239	20.941	100.677	
Spot 7	111.018	295791.375	1.357	9.990	0.921	3.819		1.698	0.274	1.427	0.840	1562.127	19.789	1596.797	13.664	1642.843	17.093	1642.843	17.093	1642.843	17.093	95.087	
Spot 10	143.107	36429.885	1.970	8.809	0.951	5.309		1.396	0.337	1.020	0.730	1869.927	16.550	1870.259	11.930	1870.611	17.202	1870.611	17.202	1870.611	17.202	99.963	
Spot 11	156.070	20373.746	3.570	12.322	1.085	2.378		1.547	0.212	1.088	0.704	1239.282	12.271	1235.986	11.056	1230.261	21.569	1230.261	21.569	1230.261	21.569	100.733	
Spot 12	80.717	28112.572	4.131	5.245	0.793	12.096		1.445	0.456	1.208	0.836	2422.339	24.388	2611.902	13.554	2762.329	13.029	2762.329	13.029	2762.329	13.029	87.692	
Spot 13	98.404	34481.022	2.047	11.047	1.177	2.874		2.583	0.229	2.297	0.890	1327.968	27.571	1375.150	19.458	1449.177	22.466	1449.177	22.466	1449.177	22.466	91.636	
Spot 14	206.088	94729.405	2.586	10.872	0.881	3.157		1.368	0.246	1.047	0.765	1419.931	13.337	1446.778	10.549	1486.434	16.685	1486.434	16.685	1486.434	16.685	95.526	
Spot 15	117.930	14400.698	1.957	10.829	0.887	3.374		1.470	0.265	1.168	0.795	1513.358	15.754	1498.280	11.510	1476.998	16.915	1476.998	16.915	1476.998	16.915	102.462	
Spot 16	309.344	99594.564	4.537	9.104	0.925	4.878		1.558	0.319	1.254	0.805	1783.459	19.536	1798.516	13.130	1816.005	16.793	1816.005	16.793	1816.005	16.793	98.208	
Spot 17	35.890	39419.349	1.852	5.339	0.766	14.215		1.307	0.545	1.060	0.810	2803.407	24.091	2764.162	12.404	2735.615	12.602	2735.615	12.602	2735.615	12.602	102.478	
Spot 18	50.141	14855.170	2.780	13.170	1.050	1.957		1.601	0.187	1.182	0.738	1105.261	12.005	1100.693	10.756	1091.692	21.620	1091.692	21.620	1091.692	21.620	101.243	
Spot 19	92.592	10732.219	0.532	14.100	0.913	1.541		1.614	0.159	1.317	0.816	948.865	11.624	946.746	9.938	941.825	19.107	941.825	19.107	941.825	19.107	100.747	
Spot 20	110.532	389193.172	2.183	9.882	0.930	4.017		1.590	0.284	1.290	0.811	1613.902	18.419	1637.701	12.930	1668.375	17.198	1668.375	17.198	1668.375	17.198	96.735	
Spot 21	201.201	311323.416	4.930	9.512	0.727	4.430		1.249	0.302	1.015	0.813	1700.976	15.174	1717.879	10.343	1738.528	13.332	1738.528	13.332	1738.528	13.332	97.840	
Spot 22	394.779	38258.280	2.030	18.237	0.746	0.519		1.504	0.068	1.300	0.864	425.949	5.359	424.644	5.220	417.544	16.898	425.949	5.359	425.949	5.359	102.013	
Spot 23	98.891	8272.777	1.089	9.762	0.789	4.066		1.303	0.289	1.037	0.796	1636.565	14.985	1647.494	10.620	1661.448	14.612	1661.448	14.612	1661.448	14.612	98.502	
Spot 25	78.381	11291.403	4.692	13.673	0.992	1.756		1.431	0.175	1.022	0.714	1041.535	9.881	1029.493	9.262	1003.974	20.336	1003.974	20.336	1003.974	20.336	103.741	
Spot 26	260.658	32073.884	2.505	8.825	0.650	5.247		1.300	0.334	1.126	0.866	1855.438	18.148	1860.328	11.085	1865.780	11.730	1865.780	11.730	1865.780	11.730	99.446	
Spot 27	139.314	17788.076	1.586	13.090	0.741	2.000		1.222	0.190	0.945	0.773	1120.717	9.719	1115.676	8.271	1105.851	15.486	1105.851	15.486	1105.851	15.486	101.344	
Spot 28	83.220	32394.110	2.552	4.968	0.658	12.581		2.277	0.449	2.180	0.957	2392.174	43.562	2648.837	21.422	2851.171	10.732	2851.171	10.732	2851.171	10.732	83.901	
Spot 29	329.931	134145.764	4.294	9.196	0.792	4.638		1.424	0.306	1.184	0.831	1723.299	17.900	1756.141	11.899	1795.430	14.426	1795.430	14.426	1795.430	14.426	95.983	
Spot 30	237.640	37325.745	0.540	10.026	0.722	3.791		1.466	0.274	1.274	0.869	1560.399	17.662	1590.927	11.778	1631.602	13.460	1631.602	13.460	1631.602	13.460	95.636	
Spot 31	97.237	22633.395	1.739	9.875	0.848	4.144		1.268	0.295	0.933	0.735	1668.934	13.713	1662.970	10.375	1655.432	15.926	1655.432	15.926	1655.432	15.926	100.816	
Spot 32	131.104	44707.813	1.721	7.957	0.978	6.305		1.493	0.361	1.128	0.756	1986.772	19.292	2019.113	13.087	2052.330	17.271	2052.330	17.271	2052.330	17.271	96.806	
Spot 33	141.359	117197.606	0.826	13.313	0.852	1.874		1.253	0.179	0.920	0.734	1063.113	9.013	1072.119	8.299	1090.465	17.042	1090.465	17.042	1090.465	17.042	97.492	
Spot 35	292.662	33546.888	2.352	10.024	0.782	3.954		1.347	0.286	1.097	0.814	1619.350	15.708	1624.832	10.917	1631.921	14.528	1631.921	14.528	1631.921	14.528	99.230	
Spot 36	98.433	34270.096	1.468	9.099	1.025	4.913		1.503	0.322	1.098	0.731	1799.050	17.237	1804.456	12.679	1810.691	18.643	1810.691	18.643	1810.691	18.643	99.357	
Spot 37	44.798	10466.739	0.959	7.584	0.804	7.458		1.558	0.410	1.287	0.826	2213.782	24.120	2167.933	13.947	2124.788	15.358	2124.788	15.358	2124.788	15.358	104.188	
Spot 38	65.053	36614.992	0.786	9.923	0.787	3.962		1.482	0.283	1.256	0.847	1607.126	17.859	1626.370	12.017	1651.338	14.598	1651.338	14.598	1651.338	14.598	97.323	
Spot 39	260.035	36881.432	0.650	9.625	0.669	4.065		1.401	0.282	1.230	0.878	1601.104	17.445	1647.347	11.416	1706.836	12.324	1706.836	12.324	1706.836	12.324	93.805	
Spot 41	118.410	52578.438	1.449	9.885	0.825	4.120		1.493	0.293	1.244	0.833	1656.866	18.181	1658.346	12.202	1660.205	15.286	1660.205	15.286	1660.205	15.286	99.799	
Spot 42	579.282	246510.704	4.496	9.354	0.946	4.645		1.533	0.312	1.207	0.787	1750.409	18.503	1757.340	12.812	1765.575	17.278	1765.575	17.278	1765.575	17.278	99.141	
Spot 43	126.057	37211.845	1.460	9.831	0.833	4.133		1.599	0.293	1.364	0.853	1654.973	19.908	1660.884	13.076	1668.346	15.446	1668.346	15.446	1668.346	15.446	99.198	
Spot 44	100.399	26699.888	1.866	9.916	1.038	4.008		1.583	0.287	1.195	0.755	1626.044	17.174	1635.754	12.862	1648.243	19.245	1648.243	19.245	1648.243	19.245	98.653	
Spot 45	111.725	23873.612	0.865	9.849	0.792	3.982		1.289	0.283	1.015	0.788	1607.798	14.448	1630.463	10.464	1659.814	14.712	1659.814	14.712	1659.814	14.712	96.866	
Spot 46	118.224	14399.367	1.039	16.604	1.075	0.840		1.555	0.102	1.091	0.702	625.400	6.501	618.921	7.205	595.276	23.986	625.400	6.501	625.400	6.501	105.061	
Spot 47	89.221	23783.060	0.969	9.657	0.769	4.289		1.451	0.299	1.229	0.847	1687.791	18.254	1691.282	11.945	1695.597	14.196	1695.597	14.196	1695.597	14.196	99.540	
Spot 48	269.812	102408.831	1.879	9.474	0.751	4.543		1.152	0.310	0.874	0.759	1738.991	13.325	1738.802	9.589	1738.560	13.760	1738.560	13.760	1738.560	13.760	100.025	
Spot 49	143.824	13154.100	1.040	17.614	0.792	0.548		1.390	0.071	1.136	0.817	439.671	4.827	443.415	4.994	462.917	17.761	439.671	4.827	439.671	4.827	94.978	

Spot 50	192.471	34934.586	2.018	13.637	0.937	1.825	1.570	0.180	1.255	0.799	1064.359	12.308	1054.316	10.296	1033.558	19.084	1083.558	19.084	102.980
Spot 51	90.582	119381.424	1.066	5.114	0.794	14.845	1.408	0.545	1.163	0.826	2803.498	26.437	2805.345	13.397	2806.661	12.987	2806.661	12.987	99.887
Spot 52	162.078	20519.268	1.310	15.845	1.077	0.769	1.599	0.088	1.155	0.723	546.023	6.049	579.223	7.057	711.657	23.503	546.023	6.049	76.726
Spot 53	91.495	8908.277	3.580	11.661	0.980	2.415	1.617	0.205	1.125	0.696	1204.587	12.366	1247.087	11.611	1321.227	22.495	1321.227	22.495	91.172
Spot 54	165.655	34758.082	3.855	9.283	0.742	4.668	1.372	0.311	1.152	0.840	1748.078	17.646	1761.585	11.471	1777.627	13.568	1777.627	13.568	98.338
Spot 55	52.301	90735.378	1.829	4.905	0.940	15.748	1.471	0.554	1.131	0.769	2839.825	25.984	2861.645	14.044	2877.034	15.271	2877.034	15.271	98.707
Spot 56	620.012	148810.635	2.340	12.916	0.721	1.996	1.203	0.185	0.963	0.800	1094.923	9.695	1114.245	8.137	1152.117	14.303	1152.117	14.303	95.036
Spot 58	117.284	30401.834	2.890	11.353	0.730	2.941	1.470	0.241	1.276	0.868	1390.321	15.956	1392.543	11.141	1395.929	14.009	1395.929	14.009	99.598
Spot 59	222.528	36799.083	5.934	9.660	0.763	4.169	1.366	0.290	1.132	0.828	1641.384	16.404	1667.875	11.191	1701.366	14.097	1701.366	14.097	96.474
Spot 60	37.060	13012.342	1.936	9.549	0.819	4.639	1.657	0.321	1.435	0.866	1795.035	22.476	1756.378	13.838	1710.673	15.238	1710.673	15.238	104.931
Spot 61	185.291	66815.094	1.851	10.176	0.881	3.858	1.973	0.282	1.766	0.895	1602.476	25.051	1604.982	15.914	1608.256	16.430	1608.256	16.430	99.641
Spot 62	725.277	71686.135	4.406	13.855	0.779	1.675	1.246	0.167	0.971	0.780	994.862	8.955	998.900	7.920	1007.754	15.819	1007.754	15.819	98.721
Spot 64	43.995	16155.613	1.156	9.852	0.992	4.259	1.616	0.304	1.262	0.781	1709.815	18.957	1685.498	13.287	1655.355	18.688	1655.355	18.688	103.290
Spot 65	117.993	34565.606	1.097	11.702	1.005	2.768	1.494	0.234	1.101	0.737	1352.950	13.435	1347.010	11.143	1337.570	19.519	1337.570	19.519	101.150
Spot 66	99.397	48634.805	1.317	10.534	0.962	3.510	1.509	0.266	1.163	0.770	1520.918	15.754	1529.457	11.927	1541.271	18.092	1541.271	18.092	98.679
Spot 67	80.294	19389.966	2.559	10.535	0.782	3.647	1.300	0.278	1.017	0.782	1580.046	14.248	1559.839	10.362	1532.570	15.257	1532.570	15.257	103.098
Spot 68	37.923	15399.145	2.129	7.406	0.730	7.822	1.186	0.416	0.934	0.788	2242.834	17.700	2210.693	10.675	2181.018	12.703	2181.018	12.703	102.834
Spot 69	123.794	48683.324	1.560	5.117	0.931	13.909	1.503	0.512	1.180	0.785	2663.629	25.750	2743.544	14.243	2802.883	15.238	2802.883	15.238	95.032
Spot 70	313.499	162033.124	3.289	13.490	0.820	1.871	1.460	0.181	1.208	0.827	1073.673	11.948	1070.902	9.660	1065.280	16.464	1065.280	16.464	100.788
Spot 71	53.170	39435.697	3.749	12.802	0.950	2.169	1.417	0.201	1.052	0.742	1178.307	11.324	1171.141	9.850	1157.900	18.849	1157.900	18.849	101.762
Spot 72	109.103	16570.594	3.423	10.870	0.738	3.201	1.553	0.253	1.346	0.867	1452.064	17.499	1457.372	12.014	1465.102	14.707	1465.102	14.707	99.110
Spot 73	180.141	38314.263	0.726	8.843	0.877	5.334	1.378	0.340	1.063	0.771	1888.764	17.403	1874.282	11.787	1858.249	15.852	1858.249	15.852	101.642
Spot 75	217.874	162278.986	2.419	9.408	0.902	4.691	1.350	0.318	1.004	0.744	1779.076	15.604	1765.714	11.297	1749.927	16.521	1749.927	16.521	101.666
Spot 76	151.633	68089.010	3.010	5.509	0.725	13.419	1.138	0.532	0.878	0.771	2750.040	19.646	2709.602	10.756	2679.574	11.989	2679.574	11.989	102.630
Spot 78	214.841	39587.307	0.991	18.390	1.257	0.537	1.728	0.071	1.186	0.686	445.037	5.099	436.129	6.128	389.345	28.229	445.037	5.099	114.304
Spot 79	92.423	1235.549	1.968	8.292	1.588	1.708	2.875	0.112	2.382	0.828	685.030	15.479	1011.407	18.414	1807.076	29.276	1807.076	29.276	37.908
Spot 80	59.473	16283.877	2.904	12.302	0.984	2.343	1.595	0.210	1.242	0.779	1226.691	13.875	1225.373	11.353	1223.036	19.666	1223.036	19.666	100.299
Spot 81	63.112	103091.364	3.252	10.744	0.955	3.475	1.491	0.269	1.145	0.768	1535.777	15.647	1521.587	11.758	1501.889	18.057	1501.889	18.057	102.256
Spot 82	361.826	45011.953	3.320	11.101	0.920	3.170	1.525	0.254	1.215	0.797	1459.575	15.869	1449.990	11.774	1435.949	17.583	1435.949	17.583	101.645
Spot 84	72.057	100843.324	3.582	7.887	0.728	6.785	1.094	0.385	0.817	0.746	2099.818	14.637	2083.749	9.685	2067.894	12.838	2067.894	12.838	101.544
Spot 85	336.264	62343.872	2.955	5.235	0.775	14.393	1.464	0.542	1.241	0.848	2792.461	28.134	2775.971	13.897	2763.996	12.728	2763.996	12.728	101.030
Spot 86	202.629	74677.129	2.682	10.060	0.634	4.072	1.104	0.295	0.903	0.818	1667.530	13.270	1648.675	8.996	1624.706	11.795	1624.706	11.795	102.636
Spot 87	181.604	3348913.980	2.048	9.026	0.704	5.145	1.296	0.334	1.089	0.840	1857.815	17.571	1843.534	11.022	1827.435	12.764	1827.435	12.764	101.662
Spot 88	293.274	178012.945	7.293	9.490	0.644	4.529	1.403	0.309	1.247	0.888	1737.549	18.987	1736.322	11.671	1734.829	11.810	1734.829	11.810	100.157
Spot 89	76.429	30000.144	2.042	9.430	0.875	4.804	1.365	0.327	1.046	0.767	1825.168	16.627	1785.679	11.469	1739.827	16.062	1739.827	16.062	104.905
Spot 90	128.084	32668.090	0.504	18.117	1.126	0.528	1.624	0.069	1.169	0.720	432.497	4.890	430.627	5.699	420.612	25.158	432.497	4.890	102.826
Spot 91	353.278	47184.191	5.370	13.640	0.743	1.787	1.315	0.176	1.084	0.824	1045.234	10.460	1040.784	8.564	1031.431	15.074	1031.431	15.074	101.338
Spot 92	88.740	25083.900	3.199	8.997	0.782	5.303	1.515	0.345	1.297	0.856	1909.724	21.435	1869.376	12.940	1824.794	14.193	1824.794	14.193	104.654
Spot 94	223.164	96994.909	31.289	10.405	0.834	3.662	1.604	0.274	1.370	0.854	1563.123	19.011	1563.108	12.792	1563.072	15.645	1563.072	15.645	100.008
Spot 95	167.590	187640.733	2.449	11.448	0.840	2.976	1.140	0.245	0.771	0.676	1413.620	9.790	1401.475	8.667	1383.029	16.135	1383.029	16.135	102.212
Spot 96	54.168	256235.591	1.708	12.228	1.082	2.538	1.622	0.223	1.209	0.745	1299.302	14.222	1283.142	11.815	1256.206	21.135	1256.206	21.135	103.431
Spot 97	192.159	222128.636	1.465	9.902	0.909	4.003	1.483	0.285	1.171	0.790	1617.723	16.751	1634.758	12.045	1656.728	16.846	1656.728	16.846	97.646
Spot 98	388.225	249638.790	3.998	9.804	0.934	4.236	1.389	0.299	1.029	0.740	1685.693	15.258	1681.039	11.413	1675.218	17.258	1675.218	17.258	100.625
Spot 99	474.038	52020.436	4.095	9.469	0.997	4.527	1.703	0.309	1.381	0.811	1736.136	21.017	1735.936	14.167	1735.680	18.289	1735.680	18.289	100.026
Spot 100	97.261	69643.307	2.209	10.180	0.875	4.014	1.393	0.294	1.084	0.778	1663.801	15.892	1636.971	11.326	1602.659	16.334	1602.659	16.334	103.815
Spot 101	142.553	44753.170	1.515	5.390	0.698	12.883	1.307	0.500	1.105	0.845	2612.543	23.731	2671.110	12.317	2715.741	11.518	2715.741	11.518	96.200
Spot 102	275.620	105881.666	2.987	14.431	1.001	1.517	1.644	0.158	1.305	0.793	943.086	11.446	937.086	10.063	923.023	20.585	923.023	20.585	102.174
Spot 103	97.001	39460.136	1.308	9.692	1.006	4.344	1.500	0.304	1.112	0.741	1708.701	16.687	1701.851	12.381	1693.410	18.565	1693.410	18.565	100.903
Spot 104	47.169	28898.664	0.904	11.085	0.893	3.258	1.341	0.261	1.001	0.746	1493.972	13.343	1470.971	10.419	1437.913	17.026	1437.913	17.026	103.899

Spot 106	110.358	31072.186	2.536	8.627	0.900	5.622	1.423	0.349	1.100	0.773	1992.083	18.367	1919.448	12.267	1905.810	16.210	1905.810	16.210	101.379
Spot 107	115.988	38564.894	1.692	9.280	0.564	4.882	1.095	0.326	0.938	0.857	1821.122	14.884	1799.202	9.228	1773.876	10.305	1773.876	10.305	102.663
Spot 108	72.677	19493.770	2.098	9.826	1.054	4.122	1.578	0.293	1.165	0.738	1655.957	17.011	1658.644	12.898	1662.032	19.715	1662.032	19.715	99.634
Spot 109	120.672	93936.566	3.849	8.498	0.644	4.880	1.123	0.298	0.920	0.819	1682.447	13.618	1798.858	9.461	1936.586	11.524	1936.586	11.524	86.877
Spot 110	382.095	33146.780	1.540	13.257	0.745	1.907	1.347	0.183	1.115	0.828	1081.598	11.103	1083.680	8.975	1087.875	15.154	1087.875	15.154	99.423
Spot 111	251.603	50819.617	1.216	9.659	0.725	4.399	1.298	0.306	1.076	0.829	1720.915	16.254	1712.067	10.741	1701.246	13.376	1701.246	13.376	101.156
Spot 112	79.256	12981.984	4.027	13.595	1.106	1.567	1.597	0.155	1.146	0.718	930.219	9.929	957.356	9.900	1020.219	22.533	1020.219	22.533	91.178
Spot 113	368.012	10772.292	2.898	17.358	0.809	0.569	1.173	0.073	0.848	0.724	451.337	3.699	457.072	4.315	485.990	17.858	451.337	3.699	92.870
Spot 114	163.150	37207.976	1.563	8.779	0.648	5.377	1.179	0.340	0.984	0.834	1885.766	16.082	1881.183	10.093	1876.112	11.712	1876.112	11.712	100.515
Spot 118	92.821	28396.271	4.338	13.315	0.843	1.941	1.292	0.187	0.971	0.752	1103.962	9.854	1095.432	8.660	1078.528	17.090	1078.528	17.090	102.358
Spot 119	624.047	16731.852	9.867	15.651	0.784	0.854	1.322	0.097	1.064	0.805	598.921	6.083	627.114	6.183	730.179	16.603	598.921	6.083	82.024
Spot 120	172.231	34926.210	4.028	9.507	0.677	4.490	1.515	0.308	1.355	0.894	1729.606	20.552	1729.180	12.582	1728.648	12.447	1728.648	12.447	100.055
Spot 122	387.970	35175.773	92.193	14.357	0.925	1.485	1.500	0.154	1.174	0.783	924.105	10.110	924.447	9.103	925.244	19.181	925.244	19.181	99.877
Spot 123	82.108	19166.197	3.715	9.971	0.966	4.135	1.467	0.298	1.102	0.751	1683.304	16.324	1661.271	11.992	1638.513	17.980	1638.513	17.980	103.048
Spot 124	31.787	9155.745	1.570	9.981	0.994	4.054	1.565	0.295	1.180	0.754	1667.119	17.338	1645.045	12.748	1616.941	19.138	1616.941	19.138	103.103
Spot 127	293.417	15476.774	1.011	17.032	0.679	0.719	1.391	0.089	1.085	0.779	551.174	5.730	549.828	5.907	544.255	19.050	551.174	5.730	101.271
Spot 130	208.361	34254.596	0.914	12.267	0.838	2.493	1.509	0.221	1.250	0.829	1284.542	14.560	1289.906	10.933	1245.229	16.537	1245.229	16.537	103.157
Spot 131	25.698	38439.360	2.020	12.467	1.078	2.427	1.525	0.218	1.078	0.707	1271.908	12.447	1250.689	10.966	1214.333	21.229	1214.333	21.229	104.741
Spot 132	788.987	521103.613	20.920	16.449	0.658	0.876	1.265	0.103	1.080	0.854	634.650	6.528	638.923	5.997	654.043	14.113	634.650	6.528	97.035
Spot 133	94.135	50033.792	1.456	4.797	0.884	17.076	1.369	0.589	1.045	0.764	2984.671	24.977	2939.128	13.133	2908.084	14.323	2908.084	14.323	102.634
Spot 134	209.767	210370.712	0.917	9.719	0.610	4.311	1.185	0.301	1.016	0.857	1697.281	15.157	1695.550	9.766	1693.394	11.248	1693.394	11.248	100.230
Spot 135	152.940	294871.069	2.151	8.468	0.786	5.952	1.343	0.362	1.089	0.811	1992.522	18.669	1968.826	11.678	1944.000	14.059	1944.000	14.059	102.496
Spot 136	107.624	44787.919	2.881	8.360	0.904	5.657	1.506	0.341	1.204	0.800	1889.454	19.726	1924.815	12.997	1963.100	16.135	1963.100	16.135	96.249
Spot 137	283.411	81835.742	3.160	13.524	0.707	1.753	1.271	0.171	1.056	0.831	1016.239	9.982	1028.412	8.219	1054.417	14.256	1054.417	14.256	96.379
Spot 138	79.714	65943.632	1.371	18.097	1.622	0.561	1.938	0.073	1.062	0.548	455.481	4.669	452.186	7.073	435.446	36.114	455.481	4.669	104.601
Spot 139	173.260	31258.003	1.268	11.908	0.964	2.607	1.524	0.224	1.176	0.772	1304.068	13.890	1302.570	11.182	1300.085	18.814	1300.085	18.814	100.306
Spot 140	66.688	25324.467	1.714	5.377	0.799	14.144	1.389	0.548	1.135	0.817	2815.973	25.905	2759.416	13.173	2718.292	13.191	2718.292	13.191	103.593
Spot 141	33.306	8561.874	1.209	13.095	1.087	1.956	1.610	0.188	1.144	0.710	1110.857	11.669	1100.396	10.816	1079.773	22.718	1079.773	22.718	102.879
Spot 142	194.702	34616.953	2.153	9.348	0.817	4.801	1.335	0.324	1.054	0.789	1807.326	16.614	1785.117	11.222	1759.238	14.990	1759.238	14.990	102.738
Spot 143	263.423	193756.925	2.438	8.466	0.929	5.737	1.605	0.349	1.309	0.816	1930.465	21.840	1936.942	13.880	1943.860	16.608	1943.860	16.608	99.311
Spot 145	114.432	158154.233	2.595	10.653	1.061	3.478	1.635	0.266	1.244	0.761	1522.658	16.866	1522.228	12.891	1521.612	19.998	1521.612	19.998	100.069
Spot 146	40.671	11827.592	1.033	10.609	0.868	3.506	1.381	0.271	1.069	0.774	1543.831	14.676	1528.622	10.908	1507.619	16.503	1507.619	16.503	102.402
Spot 147	139.521	22108.408	2.440	18.304	0.955	0.482	1.479	0.064	1.100	0.744	400.623	4.274	399.246	4.883	391.262	22.190	400.623	4.274	102.392
Spot 148	79.069	12768.606	2.314	11.459	0.765	2.953	1.509	0.246	1.299	0.861	1418.809	16.544	1395.661	11.443	1360.445	14.777	1360.445	14.777	104.290
Spot 149	344.255	156202.989	15.105	8.891	0.832	5.136	1.452	0.329	1.190	0.820	1831.770	18.983	1842.117	12.345	1853.811	15.039	1853.811	15.039	98.811
Spot 150	429.304	372004.817	3.545	10.005	0.767	4.085	1.299	0.294	1.049	0.807	1661.452	15.358	1651.242	10.597	1638.258	14.238	1638.258	14.238	101.416
Spot 151	82.231	11040.293	3.900	12.164	0.713	2.511	1.370	0.223	1.167	0.852	1298.221	13.720	1275.206	9.946	1236.627	14.063	1236.627	14.063	104.981
Spot 153	39.614	24728.825	3.171	5.411	0.962	13.909	1.720	0.543	1.426	0.829	2794.555	32.339	2743.552	16.298	2706.215	15.881	2706.215	15.881	103.264
Spot 154	86.022	160875.982	1.257	5.468	0.826	13.377	1.211	0.527	0.886	0.732	2728.090	19.713	2706.610	11.446	2690.597	13.648	2690.597	13.648	101.394
Spot 155	123.778	289719.663	2.089	9.931	0.775	3.644	1.380	0.261	1.141	0.827	1493.339	15.211	1559.260	10.992	1649.709	14.372	1649.709	14.372	90.521
Spot 156	50.140	38682.464	1.313	9.866	0.847	4.221	1.505	0.301	1.244	0.827	1695.751	18.554	1678.208	12.357	1656.331	15.687	1656.331	15.687	102.380
Spot 157	221.412	44752.457	3.382	10.854	0.674	3.175	1.211	0.249	1.005	0.830	1432.854	12.912	1451.010	9.351	1477.690	12.813	1477.690	12.813	96.966
Spot 158	105.534	35732.903	5.123	5.009	0.690	14.967	1.542	0.541	1.378	0.894	2786.362	31.185	2813.165	14.673	2832.417	11.256	2832.417	11.256	98.374
Spot 159	274.619	48245.307	3.348	8.191	0.528	5.986	1.164	0.354	1.037	0.891	1954.636	17.486	1973.774	10.126	1993.875	9.388	1993.875	9.388	98.032
Spot 160	255.968	2996.328	2.354	11.486	2.572	0.851	4.777	0.075	4.020	0.842	463.416	17.978	625.015	22.300	1263.943	50.398	463.416	17.978	36.664
Spot 161	91.908	60177.572	1.520	10.043	0.686	3.977	1.218	0.289	1.007	0.826	1634.469	14.535	1629.545	9.886	1623.176	12.767	1623.176	12.767	100.696
Spot 162	182.344	6622.965	1.958	12.840	0.912	1.640	1.439	0.156	1.107	0.769	934.783	9.632	985.593	9.075	1100.516	18.389	1100.516	18.389	84.940
Spot 163	134.711	234896.533	1.857	9.809	0.810	4.341	1.384	0.307	1.122	0.811	1726.727	16.994	1701.189	11.422	1669.854	14.988	1669.854	14.988	103.406
Spot 164	24.455	51242.623	1.115	12.555	1.868	2.198	2.206	0.200	1.173	0.532	1173.900	12.586	1180.325	15.398	1192.116	36.906	1192.116	36.906	98.472

Spot 165	80.477	39283.862	2.623	10.008	0.945	3.772	1.536	0.273	1.211	0.788	1557.221	16.754	1586.706	12.328	1626.095	17.568	1626.095	17.568	95.765
Spot 166	52.713	28144.531	1.901	10.031	0.898	4.112	1.659	0.299	1.392	0.839	1686.462	20.651	1656.672	13.554	1619.089	16.821	1619.089	16.821	104.161
Spot 167	112.325	187264.029	1.457	5.577	0.660	12.272	1.298	0.494	1.118	0.861	2587.432	23.890	2625.428	12.190	2654.842	10.942	2654.842	10.942	97.461
Spot 168	132.110	237078.115	3.315	9.171	0.739	4.898	1.192	0.324	0.935	0.784	1810.132	14.757	1801.837	10.052	1792.235	13.466	1792.235	13.466	100.999
Spot 170	128.550	64810.737	2.897	13.798	0.923	1.747	1.575	0.174	1.276	0.810	1036.611	12.215	1026.081	10.170	1003.672	18.745	1003.672	18.745	103.282
Spot 171	117.503	15819.064	3.982	13.664	0.898	1.764	1.593	0.176	1.269	0.797	1045.467	12.251	1032.306	10.321	1004.507	19.510	1004.507	19.510	104.078
Spot 172	286.468	108876.283	2.066	8.717	0.622	4.829	1.021	0.304	0.810	0.793	1711.194	12.177	1789.911	8.592	1882.915	11.203	1882.915	11.203	90.880
Spot 174	197.459	88870.700	12.419	14.199	0.704	1.554	1.235	0.160	1.015	0.822	954.955	9.007	952.025	7.631	945.277	14.434	945.277	14.434	101.024
Spot 175	55.272	15256.316	2.252	13.550	1.097	1.816	1.703	0.180	1.295	0.760	1066.956	12.735	1051.400	11.154	1019.210	22.396	1019.210	22.396	104.685
Spot 176	336.874	78952.640	4.267	9.404	0.841	4.487	1.320	0.305	1.017	0.771	1716.864	15.332	1728.586	10.961	1742.787	15.415	1742.787	15.415	98.513
Spot 177	99.001	15210.243	3.131	10.070	0.843	3.908	1.421	0.287	1.129	0.794	1625.387	16.217	1615.370	11.492	1602.324	16.113	1602.324	16.113	101.439
Spot 179	92.563	33083.274	1.266	9.777	0.772	4.075	1.126	0.289	0.820	0.728	1634.979	11.839	1649.376	9.183	1667.749	14.285	1667.749	14.285	98.035
Spot 180	43.063	37542.742	1.295	9.808	0.928	4.296	1.455	0.305	1.121	0.770	1716.822	16.892	1692.577	11.985	1662.659	17.174	1662.659	17.174	103.258
Spot 181	259.585	44989.298	3.211	13.008	0.608	2.032	1.153	0.192	0.978	0.848	1129.661	10.131	1126.306	7.849	1119.841	12.206	1119.841	12.206	100.877
Spot 182	174.839	46487.958	4.150	9.418	0.704	4.741	1.286	0.323	1.076	0.836	1805.039	16.995	1774.587	10.788	1738.932	12.933	1738.932	12.933	103.802
Spot 184	87.566	43562.946	1.788	10.738	0.783	3.438	1.503	0.267	1.283	0.853	1527.770	17.447	1513.014	11.826	1492.404	14.847	1492.404	14.847	102.370
Spot 185	93.875	35104.886	2.687	9.797	0.940	4.167	1.437	0.296	1.084	0.755	1671.625	15.966	1667.486	11.763	1662.264	17.441	1662.264	17.441	100.563
Spot 186	47.519	110893.078	1.399	7.331	0.869	7.278	1.419	0.386	1.122	0.791	2103.219	20.135	2146.077	12.670	2187.336	15.114	2187.336	15.114	96.154
Spot 188	235.778	39076.890	1.801	17.761	1.078	0.534	1.399	0.069	0.891	0.637	430.198	3.707	434.633	4.948	458.218	23.963	430.198	3.707	93.885
Spot 189	446.414	58113.993	2.001	9.428	0.695	4.403	1.188	0.301	0.963	0.811	1694.461	14.352	1712.996	9.832	1735.717	12.757	1735.717	12.757	97.623
Spot 190	114.022	38739.639	1.893	9.842	0.858	4.049	1.345	0.289	1.035	0.769	1636.808	14.954	1643.999	10.955	1653.190	15.940	1653.190	15.940	99.009
Spot 191	495.350	74947.575	2.950	12.704	0.727	2.159	1.125	0.199	0.858	0.763	1168.624	9.168	1167.879	7.807	1166.479	14.437	1166.479	14.437	100.184
Spot 193	63.878	9473.883	2.109	9.946	0.863	3.318	2.684	0.242	2.535	0.944	1397.564	31.849	1485.291	20.945	1612.892	16.440	1612.892	16.440	86.650
Spot 194	61.688	15842.373	2.988	10.704	0.836	3.466	1.429	0.271	1.152	0.806	1545.577	15.827	1519.431	11.263	1488.176	16.039	1488.176	16.039	104.207
Spot 195	480.578	8393.049	2.977	9.421	0.898	1.364	1.851	0.094	1.618	0.874	581.713	8.998	873.548	10.845	1709.890	16.555	1709.890	16.555	34.020
Spot 196	82.083	30379.293	2.025	8.712	0.733	5.576	1.370	0.353	1.156	0.843	1948.510	19.431	1912.397	11.797	1873.438	13.277	1873.438	13.277	104.007
Spot 197	157.891	75571.820	1.919	12.691	0.760	2.169	1.329	0.200	1.091	0.820	1173.780	11.704	1171.262	9.240	1166.593	15.076	1166.593	15.076	100.616
Spot 203	90.817	67392.150	2.615	9.453	0.824	4.477	1.366	0.307	1.089	0.798	1724.788	16.483	1726.752	11.336	1729.118	15.121	1729.118	15.121	99.750
Spot 204	137.690	39284.576	1.251	9.720	0.750	4.279	1.264	0.302	1.016	0.804	1699.406	15.179	1689.261	10.401	1676.674	13.883	1676.674	13.883	101.356
Spot 205	248.356	48298.149	3.695	13.093	1.153	1.936	1.686	0.184	1.228	0.728	1087.934	12.297	1093.543	11.291	1104.729	23.105	1104.729	23.105	98.480
Spot 206	189.841	202718.089	2.780	11.269	0.874	2.937	1.473	0.239	1.186	0.805	1383.231	14.761	1391.490	11.160	1404.156	16.749	1404.156	16.749	98.510
Spot 207	251.137	55866.039	2.859	8.372	0.659	4.970	1.223	0.301	1.030	0.842	1697.788	15.377	1814.318	10.340	1950.889	11.783	1950.889	11.783	87.025
Spot 208	133.177	208474.307	1.382	5.144	0.988	14.198	1.487	0.527	1.112	0.748	2730.197	24.747	2763.043	14.108	2787.109	16.176	2787.109	16.176	97.958
Spot 209	79.229	2654.226	3.415	12.028	2.842	1.720	3.400	0.159	1.833	0.539	953.495	16.243	1016.025	21.834	1153.339	56.851	1153.339	56.851	82.673
Spot 210	924.064	8372.345	6.480	9.717	0.887	3.278	1.489	0.233	1.196	0.803	1352.223	14.589	1475.795	11.586	1658.276	16.428	1658.276	16.428	81.544
Spot 211	117.920	1507551.446	1.329	6.204	0.676	10.790	1.252	0.483	1.054	0.842	2538.982	22.115	2505.203	11.636	2477.923	11.411	2477.923	11.411	102.464
Spot 213	207.898	33858.995	7.440	13.678	0.780	1.734	1.600	0.172	1.393	0.871	1021.355	13.158	1021.335	10.304	1021.272	15.929	1021.272	15.929	100.008
Spot 214	132.947	21399.086	1.394	12.129	0.847	2.482	1.478	0.218	1.210	0.819	1272.091	13.973	1266.745	10.699	1257.667	16.589	1257.667	16.589	101.147
Spot 215	293.068	187644.262	2.442	11.849	0.768	2.569	1.442	0.219	1.221	0.847	1276.562	14.136	1291.760	10.538	1317.094	14.880	1317.094	14.880	96.923
Spot 216	176.291	69081.846	1.593	12.338	0.886	2.217	1.575	0.197	1.301	0.826	1159.957	13.814	1186.403	11.018	1234.955	17.384	1234.955	17.384	93.927
Spot 217	121.953	44271.073	2.573	12.064	0.902	2.423	1.438	0.211	1.120	0.779	1233.984	12.580	1249.515	10.336	1276.360	17.565	1276.360	17.565	96.680
Spot 218	186.907	24214.166	2.551	9.495	0.860	4.529	1.725	0.310	1.496	0.867	1742.461	22.886	1736.399	14.351	1729.089	15.784	1729.089	15.784	100.773
Spot 220	37.016	213146.814	1.238	10.110	0.935	4.047	1.585	0.294	1.280	0.808	1660.959	18.741	1643.722	12.904	1621.730	17.389	1621.730	17.389	102.419
Spot 221	140.369	139117.080	1.262	9.986	0.823	4.098	1.257	0.294	0.950	0.756	1661.625	13.911	1653.877	10.258	1644.034	15.271	1644.034	15.271	101.070
Spot 223	298.490	61488.289	5.069	10.330	0.644	3.868	1.482	0.288	1.335	0.900	1630.087	19.223	1606.990	11.959	1576.829	12.066	1576.829	12.066	103.378
Spot 224	381.421	52884.603	3.089	9.504	0.914	4.551	1.366	0.311	1.016	0.743	1747.286	15.543	1740.318	11.372	1731.938	16.762	1731.938	16.762	100.886
Spot 225	185.029	18802.888	7.726	10.039	0.925	3.920	1.240	0.285	0.825	0.666	1614.700	11.791	1617.723	10.034	1621.641	17.223	1621.641	17.223	99.572
Spot 226	402.448	77427.080	2.648	9.623	0.763	4.338	1.197	0.300	0.922	0.770	1692.532	13.728	1700.527	9.877	1710.376	14.039	1710.376	14.039	98.957
Spot 227	502.759	20588.700	2.971	9.737	0.822	4.029	1.221	0.284	0.902	0.739	1609.295	12.848	1640.146	9.930	1679.904	15.187	1679.904	15.187	95.797

Spot 228	167.585	49804.366	1.834	10.003	0.945	4.023	1.616	0.290	1.310	0.811	1639.384	18.959	1638.855	13.141	1638.160	17.567	1638.180	17.567	100.075
Spot 229	28.337	12621.351	1.088	13.354	1.548	1.894	1.992	0.184	1.251	0.628	1089.978	12.542	1079.112	13.240	1057.253	31.222	1057.253	31.222	103.095
Spot 230	207.985	152357.580	2.735	9.137	0.789	4.936	1.456	0.324	1.224	0.841	1808.097	19.302	1808.477	12.298	1808.900	14.338	1808.900	14.338	99.956
Spot 231	182.793	37867.473	5.657	13.551	0.916	1.779	1.445	0.174	1.117	0.773	1032.922	10.660	1037.784	9.393	1048.059	18.506	1048.059	18.506	98.556
Spot 233	94.442	25084.033	1.731	8.247	0.843	6.082	1.490	0.362	1.229	0.824	1991.135	21.051	1987.692	12.998	1984.097	15.012	1984.097	15.012	100.355
Spot 234	185.202	38959.480	1.192	9.866	0.776	4.046	1.264	0.288	0.996	0.788	1629.147	14.340	1643.398	10.291	1661.660	14.404	1661.660	14.404	98.043
Spot 235	67.260	11794.637	3.214	13.370	0.956	1.819	1.446	0.177	1.080	0.747	1053.119	10.494	1052.345	9.471	1050.757	19.380	1050.757	19.380	100.225
Spot 236	219.485	295016.913	1.815	9.147	0.797	4.886	1.357	0.321	1.099	0.810	1794.345	17.212	1799.771	11.441	1806.048	14.486	1806.048	14.486	99.352
Spot 237	62.800	56674.584	0.447	11.447	0.748	3.019	1.519	0.249	1.321	0.870	1432.260	16.971	1412.416	11.584	1382.591	14.379	1382.591	14.379	103.592
Spot 238	182.192	50343.808	1.566	9.682	0.780	4.459	1.310	0.311	1.052	0.803	1746.042	16.095	1723.422	10.866	1696.043	14.384	1696.043	14.384	102.948
Spot 239	341.488	544205.733	6.953	7.261	0.852	7.750	1.377	0.404	1.082	0.785	2189.623	20.082	2202.425	12.386	2214.348	14.779	2214.348	14.779	98.883
Spot 240	117.593	11548.211	4.292	10.615	0.823	3.303	1.527	0.255	1.282	0.840	1465.438	16.801	1481.876	11.900	1505.471	15.671	1505.471	15.671	97.341
Spot 241	105.839	60750.439	2.208	8.582	0.814	5.400	1.373	0.334	1.105	0.805	1856.081	17.828	1884.889	11.765	1916.764	14.614	1916.764	14.614	96.834
Spot 242	160.113	2192662.211	125.989	13.744	0.742	1.689	1.211	0.167	0.957	0.791	994.820	8.825	1004.534	7.724	1025.773	15.001	1025.773	15.001	96.982
Spot 244	99.317	30047.768	1.438	9.718	0.782	4.345	1.255	0.305	0.977	0.779	1714.526	14.715	1702.008	10.361	1686.614	14.533	1686.614	14.533	101.655
Spot 245	38.165	7076.692	36.745	17.885	1.508	0.506	2.589	0.067	1.166	0.450	420.277	4.742	415.434	8.827	388.604	51.907	420.277	4.742	108.151
Spot 247	254.608	146220.981	2.349	9.495	0.722	4.405	1.370	0.300	1.165	0.850	1693.355	17.346	1713.293	11.340	1737.735	13.234	1737.735	13.234	97.446
Spot 248	85.648	47989.885	2.095	13.445	0.880	1.962	1.157	0.190	0.751	0.649	1119.857	7.719	1102.454	7.783	1068.285	17.690	1068.285	17.690	104.828
Spot 249	417.477	39376.591	1.822	14.759	1.083	1.132	1.582	0.120	1.150	0.727	732.270	7.961	768.489	8.530	875.249	22.502	732.270	7.961	83.664
Spot 250	249.522	73709.554	14.928	11.604	0.827	2.728	1.305	0.227	1.009	0.773	1319.403	12.044	1336.192	9.697	1363.176	15.934	1363.176	15.934	96.789
Spot 251	419.116	360721.969	46.840	2.959	1.008	36.789	1.519	0.779	1.136	0.748	3714.345	32.073	3687.877	15.013	3673.527	15.395	3673.527	15.395	101.111
Spot 252	311.575	55149.652	1.925	9.897	0.757	4.071	1.458	0.289	1.246	0.855	1637.242	18.012	1648.595	11.884	1663.082	14.013	1663.082	14.013	98.446
Spot 253	501.833	141119.868	8.017	10.066	0.859	4.071	1.622	0.293	1.376	0.848	1658.302	20.120	1648.499	13.226	1636.008	15.963	1636.008	15.963	101.363
Spot 255	71.636	130915.539	1.766	5.055	0.807	15.207	1.426	0.549	1.175	0.824	2820.933	26.853	2828.280	13.583	2838.505	13.158	2838.505	13.158	99.556
Spot 256	130.227	39684.596	2.392	9.998	0.875	3.955	1.422	0.283	1.121	0.788	1607.530	15.951	1624.937	11.528	1647.534	16.233	1647.534	16.233	97.572
Spot 257	194.276	37474.309	2.473	10.801	0.913	3.378	1.334	0.261	0.971	0.728	1497.313	12.970	1499.210	10.448	1501.877	17.286	1501.877	17.286	99.696
Spot 258	248.533	42673.640	1.982	8.789	0.828	5.396	1.643	0.340	1.419	0.864	1885.445	23.193	1884.186	14.074	1882.784	14.921	1882.784	14.921	100.141
Spot 259	316.320	533665.465	4.578	9.002	0.842	5.189	1.319	0.334	1.015	0.770	1856.734	16.378	1850.793	11.231	1844.107	15.244	1844.107	15.244	100.685
Spot 260	381.243	39228.321	1.536	16.991	0.816	0.770	1.301	0.094	1.010	0.777	579.198	5.597	579.556	5.746	580.980	17.819	579.198	5.597	99.698
Spot 262	106.542	36822.313	2.005	11.487	0.975	3.009	1.514	0.248	1.156	0.764	1428.077	14.810	1409.888	11.538	1382.486	18.774	1382.486	18.774	103.298
Spot 263	153.796	119458.861	3.756	10.767	0.820	3.497	1.273	0.269	0.974	0.765	1535.637	13.309	1526.622	10.055	1514.134	15.479	1514.134	15.479	101.420
Spot 264	371.463	34372.469	2.965	18.071	0.799	0.531	1.377	0.069	1.119	0.813	429.801	4.655	432.254	4.849	445.325	17.864	429.801	4.655	96.514
Spot 265	84.922	52194.683	3.496	5.234	0.758	13.515	1.633	0.505	1.446	0.886	2635.488	31.290	2716.353	15.441	2777.048	12.428	2777.048	12.428	94.902
Spot 266	152.493	2490306.752	1.637	8.607	0.839	5.652	1.461	0.347	1.196	0.819	1920.030	19.853	1924.141	12.602	1928.554	15.029	1928.554	15.029	99.558
Spot 267	39.473	20964.224	0.261	8.880	0.893	5.089	1.549	0.324	1.261	0.814	1809.653	19.903	1834.211	13.150	1862.180	16.248	1862.180	16.248	97.179
Spot 268	26.245	4929.232	3.012	10.388	0.923	3.429	1.485	0.262	1.158	0.780	1499.876	15.494	1511.073	11.676	1526.783	17.525	1526.783	17.525	98.238
Spot 269	110.395	7648.322	2.634	12.157	1.049	2.489	1.680	0.221	1.310	0.780	1287.075	15.287	1268.840	12.166	1238.048	20.598	1238.048	20.598	103.960
Spot 270	148.536	57419.951	1.545	8.282	0.816	6.171	1.541	0.366	1.307	0.848	2010.501	22.570	2000.339	13.466	1989.844	14.525	1989.844	14.525	101.038
Spot 271	99.258	34261.641	2.775	13.651	0.923	1.802	1.518	0.177	1.199	0.790	1049.677	11.619	1046.243	9.911	1039.060	18.791	1039.060	18.791	101.022
Spot 272	333.625	568129.826	20.581	4.555	0.706	18.575	1.304	0.605	1.096	0.841	3049.119	26.629	3020.010	12.563	3000.681	11.353	3000.681	11.353	101.614
Spot 273	116.070	34505.242	2.465	17.989	1.104	0.548	1.598	0.071	1.154	0.722	442.947	4.941	443.651	5.742	447.284	24.567	442.947	4.941	99.030
Spot 274	85.032	82891.478	0.899	5.263	0.735	14.650	1.239	0.553	0.997	0.805	2835.822	22.886	2792.803	11.779	2761.866	12.072	2761.866	12.072	102.678
Spot 275	212.944	93859.220	3.475	9.181	0.766	4.878	1.318	0.322	1.073	0.814	1797.895	16.880	1798.445	11.109	1799.066	13.944	1799.066	13.944	99.935
Spot 276	656.479	38086.994	0.817	13.637	0.826	1.637	1.287	0.161	0.987	0.767	961.933	8.820	984.501	8.112	1035.145	16.700	1035.145	16.700	92.927
Spot 277	73.342	77989.808	4.085	10.133	0.708	4.113	1.358	0.299	1.158	0.853	1688.699	17.209	1656.870	11.090	1616.736	13.185	1616.736	13.185	104.451
Spot 278	200.541	80188.716	4.386	9.198	1.011	4.831	1.651	0.320	1.305	0.791	1788.421	20.381	1790.314	13.886	1792.505	18.405	1792.505	18.405	99.772
Spot 279	161.708	37508.641	3.351	12.866	0.865	2.130	1.350	0.198	1.035	0.767	1163.481	11.014	1158.425	9.326	1148.997	17.213	1148.997	17.213	101.261
Spot 280	55.386	10800.266	4.610	9.383	0.949	4.609	1.474	0.315	1.049	0.712	1764.565	16.200	1750.824	12.295	1734.443	18.973	1734.443	18.973	101.737
Spot 283	374.815	602927.146	16.443	8.854	0.872	5.158	1.421	0.329	1.122	0.790	1832.002	17.897	1845.745	12.090	1861.255	15.753	1861.255	15.753	98.428

Spot 14	242.413	41692.847	23.189	10.120	0.710	3.591	1.378	0.263	1.180	0.857	1505.685	15.850	1547.537	10.943	1605.152	13.250	1605.152	13.250	93.803
Spot 15	81.029	41601.602	4.812	11.381	0.723	2.984	1.495	0.246	1.308	0.875	1417.867	16.649	1408.581	11.374	1381.933	13.922	1381.933	13.922	102.600
fc	233.146	37081.822	1.554	13.258	0.701	1.887	1.053	0.181	0.783	0.743	1075.006	7.748	1076.586	6.990	1079.787	14.137	1079.787	14.137	99.557
Spot 16	60.477	34750.189	1.251	16.277	2.200	0.608	2.368	0.072	0.875	0.369	447.391	3.780	482.126	9.088	650.885	47.249	447.391	3.780	68.736
Spot 17	118.948	164541.894	2.771	12.794	0.615	1.997	1.089	0.185	0.898	0.825	1093.264	9.035	1114.600	7.366	1156.430	12.201	1156.430	12.201	94.538
Spot 18	156.163	83983.387	8.924	5.342	0.946	11.289	1.644	0.436	1.345	0.818	2333.059	26.320	2547.315	15.338	2722.613	15.593	2722.613	15.593	85.692
Spot 19	90.200	50028.696	1.648	17.905	1.179	0.537	1.732	0.070	1.269	0.733	435.156	5.340	436.461	6.145	443.332	26.215	435.156	5.340	98.156
Spot 20	85.318	147781.121	2.220	17.792	0.939	0.542	1.632	0.070	1.335	0.818	434.983	5.614	439.803	5.824	465.097	20.800	434.983	5.614	93.525
Spot 21	91.708	24586.539	1.598	10.023	0.847	4.046	1.510	0.294	1.243	0.823	1663.939	18.222	1643.425	12.293	1617.269	15.970	1617.269	15.970	102.886
Spot 22	162.983	94374.600	3.599	8.563	0.725	5.330	1.021	0.330	0.718	0.704	1837.563	11.487	1873.614	8.728	1913.819	13.014	1913.819	13.014	96.016
Spot 23	112.802	206638.106	2.661	8.339	0.783	6.002	1.369	0.361	1.123	0.820	1989.230	19.213	1976.119	11.915	1962.410	13.978	1962.410	13.978	101.367
Spot 24	59.643	65252.864	3.138	13.806	0.935	1.738	1.417	0.174	1.064	0.751	1033.140	10.156	1022.788	9.133	1000.684	18.984	1000.684	18.984	103.243
Spot 25	234.980	20369.401	1.727	17.719	0.882	0.572	1.371	0.074	0.962	0.702	461.206	4.282	459.468	5.066	450.763	21.687	461.206	4.282	102.317
Spot 26	145.464	25855.002	2.605	10.702	0.751	3.348	1.430	0.259	1.217	0.851	1484.195	16.138	1492.305	11.183	1508.830	14.193	1503.830	14.193	98.694
Spot 27	52.194	17120.819	2.392	9.174	1.000	4.765	1.622	0.318	1.265	0.780	1780.079	19.674	1778.830	13.618	1777.350	18.541	1777.350	18.541	100.154
Spot 28	58.413	37822.177	2.164	9.861	0.705	3.939	1.238	0.282	1.017	0.821	1598.925	14.399	1621.740	10.027	1651.459	13.097	1651.459	13.097	96.819
Spot 29	128.506	44705.164	2.104	10.792	0.593	3.392	1.298	0.265	1.154	0.889	1515.623	15.580	1502.532	10.181	1484.103	11.287	1484.103	11.287	102.124
Spot 44	28.355	6029.672	2.796	11.342	0.953	2.835	1.371	0.238	0.979	0.714	1378.154	12.153	1364.852	10.290	1344.069	18.525	1344.069	18.525	102.536
Spot 45	73.627	19513.774	1.338	9.805	0.837	3.968	1.553	0.283	1.299	0.837	1605.383	18.467	1627.688	12.598	1656.624	15.765	1656.624	15.765	96.907
Spot 46	36.442	23516.896	3.017	5.162	0.808	14.702	1.504	0.549	1.269	0.844	2821.697	28.995	2796.123	14.301	2777.716	13.242	2777.716	13.242	101.588
Spot 47	46.969	67228.637	3.350	9.835	0.771	4.018	1.260	0.286	0.996	0.791	1620.332	14.273	1637.772	10.244	1660.220	14.282	1660.220	14.282	97.597
Spot 49	327.201	17469312.505	0.882	14.041	0.864	1.320	1.600	0.134	1.347	0.842	808.753	10.238	854.507	9.244	975.205	17.608	808.753	10.238	82.932
Spot 50	435.094	241372.676	3.028	15.758	0.816	1.022	1.481	0.116	1.236	0.834	709.174	8.299	715.050	7.601	733.558	17.281	709.174	8.299	96.676
Spot 51	106.867	37096.290	2.705	17.784	1.151	0.515	1.678	0.067	1.221	0.727	415.788	4.915	422.082	5.796	456.595	25.574	415.788	4.915	91.063
Spot 52	460.429	53335.021	2.359	5.807	1.099	11.059	1.962	0.464	1.626	0.828	2457.375	33.219	2528.105	18.276	2585.365	18.346	2585.365	18.346	95.049
Spot 54	98.705	83404.850	6.131	9.049	0.708	4.889	1.117	0.319	0.864	0.773	1787.206	13.483	1800.369	9.417	1815.633	12.860	1815.633	12.860	98.434
Spot 55	111.675	18007.216	2.572	18.160	0.890	0.491	1.471	0.065	1.113	0.756	407.711	4.397	405.755	4.922	394.614	21.589	407.711	4.397	103.319
Spot 58	15.921	23213.798	2.080	12.215	1.168	2.304	1.506	0.204	0.945	0.628	1199.131	10.340	1213.613	10.662	1239.446	22.962	1239.446	22.962	96.747
Spot 60	310.326	84654.752	2.375	9.535	0.618	4.487	1.075	0.309	0.880	0.818	1735.499	13.387	1728.618	8.927	1720.280	11.351	1720.280	11.351	100.885
Spot 61	11.544	6972.001	0.979	13.136	1.617	1.906	2.255	0.186	0.965	0.428	1097.140	9.739	1083.069	15.017	1054.889	41.065	1054.889	41.065	104.005
Spot 62	125.181	63275.382	2.963	10.452	1.032	3.282	1.622	0.248	1.251	0.771	1428.367	16.080	1476.904	12.627	1547.337	19.405	1547.337	19.405	92.311
Spot 63	171.037	34405.248	1.911	18.094	0.982	0.500	1.654	0.066	1.328	0.803	410.277	5.279	411.458	5.594	418.070	22.000	410.277	5.279	98.136
Spot 64	117.026	30357.729	3.304	9.378	0.660	4.487	1.279	0.305	1.095	0.857	1715.207	16.492	1728.624	10.616	1744.887	12.086	1744.887	12.086	98.299
Spot 76	60.341	33883.625	4.409	8.758	0.912	4.857	1.403	0.308	1.065	0.759	1731.970	16.174	1794.891	11.812	1868.790	16.473	1868.790	16.473	92.679
Spot 77	577.865	179970.124	1.673	13.304	0.811	1.887	1.391	0.181	1.130	0.812	1074.657	11.189	1076.410	9.234	1079.970	16.280	1079.970	16.280	99.508
Spot 79	251.919	118211.050	9.528	13.538	0.838	1.741	1.543	0.171	1.296	0.840	1015.015	12.168	1023.962	9.953	1043.151	16.928	1043.151	16.928	97.308
Spot 80	57.477	29988.773	0.776	9.995	0.740	3.906	1.224	0.283	0.972	0.794	1607.559	13.825	1614.870	9.895	1624.396	13.841	1624.396	13.841	98.963
Spot 81	68.844	54975.984	2.386	5.350	0.675	13.658	1.118	0.528	0.891	0.797	2733.129	19.855	2726.282	10.577	2721.202	11.120	2721.202	11.120	100.438
Spot 82	180.408	56420.178	3.488	10.721	0.876	3.334	1.625	0.259	1.369	0.842	1483.209	18.138	1489.134	12.697	1497.565	16.573	1497.565	16.573	99.041
Spot 83	134.462	233678.534	98.601	13.143	0.905	1.900	1.603	0.180	1.324	0.826	1068.704	13.085	1081.140	10.666	1106.274	18.082	1106.274	18.082	96.604
xx	3858.117	56485.066	1.012	18.492	0.584	0.413	1.355	0.055	1.222	0.902	347.013	4.128	350.716	4.017	375.291	13.159	347.013	4.128	92.465
Spot 86	137.464	47645.994	2.616	5.811	0.971	10.959	1.563	0.460	1.224	0.783	2438.658	24.863	2519.679	14.546	2585.594	16.218	2585.594	16.218	94.317
Spot 87	12.549	13715.089	0.965	12.970	1.436	1.988	2.109	0.188	1.545	0.732	1112.597	15.786	1111.368	14.251	1108.945	28.710	1108.945	28.710	100.329
Spot 88	127.563	31211.615	2.300	12.437	0.966	2.213	1.438	0.200	1.061	0.738	1172.684	11.373	1185.090	10.058	1207.783	19.123	1207.783	19.123	97.094
Spot 89	47.704	7709.593	1.933	13.183	0.959	1.546	2.135	0.151	1.585	0.742	904.422	13.374	949.025	13.164	1053.975	28.814	1053.975	28.814	85.811
Spot 90	274.245	86680.372	4.364	9.545	0.841	4.400	1.563	0.303	1.317	0.843	1706.811	19.755	1712.374	12.932	1719.168	15.458	1719.168	15.458	99.281
Spot 91	283.896	12042.311	1.125	15.776	1.156	0.677	2.903	0.078	2.591	0.892	486.989	12.152	524.669	11.895	692.180	27.908	486.989	12.152	70.356
Spot 92	215.455	113313.617	3.204	9.296	0.926	4.731	1.516	0.318	1.200	0.792	1777.857	18.647	1772.707	12.705	1766.630	16.911	1766.630	16.911	100.636
Spot 93	117.093	37668.993	0.961	11.736	0.784	2.634	1.459	0.224	1.230	0.843	1302.580	14.502	1310.064	10.741	1322.318	15.229	1322.318	15.229	98.507

Spot 111	60.895	12521.714	3.242	11.822	0.797	2.658	1.299	0.290	1.022	0.787	1332.196	12.305	1316.801	9.582	1291.810	15.583	1291.810	15.583	103.126
Spot 112	41.188	41070.514	0.680	10.003	0.869	3.890	1.483	0.282	1.202	0.810	1598.966	17.015	1611.684	11.983	1628.322	16.174	1628.322	16.174	98.197
Spot 113	70.792	37753.101	4.442	9.252	0.841	4.730	1.422	0.317	1.146	0.806	1773.016	17.759	1772.619	11.916	1772.137	15.364	1772.137	15.364	100.090
Spot 114	83.875	76834.588	2.207	10.740	0.757	3.440	1.229	0.267	0.968	0.788	1523.741	13.142	1513.681	9.672	1499.620	14.322	1499.620	14.322	101.608
Spot 116	138.380	38858.380	2.504	11.486	0.603	2.613	1.597	0.217	1.478	0.925	1265.717	16.987	1304.385	11.731	1368.541	11.651	1368.541	11.651	92.487
Spot 117	176.808	209146.992	0.977	10.427	0.672	3.567	1.191	0.268	0.983	0.826	1530.239	13.394	1542.302	9.444	1558.860	12.600	1558.860	12.600	98.164
Spot 119	10.073	39017.514	2.602	11.611	1.210	2.902	1.591	0.244	1.033	0.649	1404.965	13.046	1382.405	12.017	1347.722	23.359	1347.722	23.359	104.247
Spot 120	214.934	37614.585	2.392	10.728	0.782	3.373	1.413	0.261	1.177	0.833	1497.352	15.726	1498.059	11.070	1499.043	14.800	1499.043	14.800	99.887
Spot 121	56.967	35550.870	1.323	17.792	1.489	0.506	2.024	0.065	1.372	0.678	407.576	5.417	415.641	6.905	460.642	38.022	407.576	5.417	88.480
Spot 123	181.515	325795.878	3.291	11.605	0.820	2.238	1.490	0.187	1.244	0.835	1104.952	12.635	1198.113	10.457	1356.544	15.803	1356.544	15.803	81.453
Spot 124	76.944	35198.821	1.978	12.140	0.551	2.436	0.944	0.214	0.763	0.808	1249.174	8.665	1253.383	6.799	1260.618	10.883	1260.618	10.883	99.092
Spot 125	344.360	47221.260	1.635	6.782	0.743	7.610	1.422	0.372	1.212	0.853	2038.848	21.187	2186.098	12.761	2327.250	12.735	2327.250	12.735	87.608
Spot 126	152.057	60685.336	2.869	17.514	0.966	0.583	1.425	0.074	1.047	0.735	459.392	4.641	466.539	5.330	501.848	21.285	459.392	4.641	91.540
Spot 127	176.657	123510.299	5.272	11.136	0.601	2.670	1.719	0.214	1.611	0.937	1252.184	18.329	1320.287	12.700	1432.590	11.473	1432.590	11.473	87.407
Spot 129	79.281	219441.145	2.449	12.104	1.019	2.322	1.544	0.203	1.160	0.752	1188.808	12.598	1218.996	10.959	1272.817	19.854	1272.817	19.854	93.400
Spot 130	41.368	6189.728	1.352	12.284	0.839	2.290	1.368	0.208	1.077	0.788	1220.082	11.972	1209.075	9.665	1188.451	16.639	1189.451	16.639	102.575
Spot 131	61.523	250194.543	2.317	8.923	0.706	5.279	1.308	0.339	1.101	0.842	1882.818	17.974	1885.394	11.164	1846.018	12.769	1846.018	12.769	101.993
Spot 133	35.263	15798.905	1.260	13.246	0.841	1.891	1.508	0.183	1.229	0.815	1080.716	12.228	1077.804	10.012	1071.941	17.521	1071.941	17.521	100.819
Spot 134	62.518	317049.958	1.354	4.952	0.690	14.635	1.671	0.522	1.522	0.911	2707.046	33.644	2791.779	15.882	2853.575	11.230	2853.575	11.230	94.865
Spot 135	155.154	29789.779	4.588	10.048	0.870	3.902	1.380	0.284	1.071	0.776	1609.456	15.250	1614.056	11.153	1620.047	16.199	1620.047	16.199	99.346
Spot 136	50.663	20379.508	4.304	9.931	0.844	4.010	1.523	0.289	1.256	0.825	1634.466	18.128	1636.222	12.377	1638.462	15.999	1638.462	15.999	99.756
Spot 137	33.997	36787.344	3.665	13.541	1.141	1.760	1.660	0.173	1.205	0.726	1026.183	11.428	1030.854	10.746	1040.758	23.059	1040.758	23.059	98.600
Spot 138	43.171	194843.615	1.668	12.980	0.751	2.071	1.350	0.194	1.122	0.831	1142.042	11.739	1139.323	9.243	1134.168	14.926	1134.168	14.926	100.694
Spot 139	31.576	1836.118	1.048	17.002	1.429	0.638	2.077	0.090	1.136	0.547	557.556	6.067	500.878	8.211	249.583	39.997	557.556	6.067	223.395
Spot 141	76.475	14845.609	0.948	16.352	0.774	0.872	1.313	0.104	1.058	0.806	639.660	6.445	636.738	6.210	626.360	16.766	639.660	6.445	102.123
Spot 142	261.907	62172.257	2.388	10.550	0.619	3.509	1.202	0.267	1.030	0.857	1525.707	13.999	1529.183	9.498	1533.978	11.650	1533.978	11.650	99.461
Spot 143	60.696	18637.027	1.824	18.028	1.102	0.525	1.526	0.069	1.053	0.690	430.886	4.388	428.672	5.336	416.771	24.678	430.886	4.388	103.387
Spot 144	150.218	18053.965	1.926	17.995	1.026	0.520	1.571	0.068	1.177	0.749	426.027	4.850	425.082	5.457	419.938	23.247	426.027	4.850	101.450
Spot 145	157.350	297376.445	4.919	12.103	0.688	2.316	1.369	0.202	1.184	0.865	1184.560	12.807	1217.108	9.709	1275.269	13.410	1275.269	13.410	92.887
Spot 146	146.308	33543.756	2.586	9.480	0.843	4.545	1.276	0.311	0.956	0.749	1746.645	14.630	1739.300	10.624	1730.463	15.516	1730.463	15.516	100.935
Spot 147	97.166	52102.896	0.828	9.957	0.723	4.069	1.216	0.292	0.978	0.804	1652.918	14.254	1648.182	9.915	1642.130	13.434	1642.130	13.434	100.657
Spot 148	263.001	53325.911	2.257	12.240	0.976	2.461	1.468	0.217	1.096	0.746	1268.188	12.618	1260.617	10.602	1247.711	19.114	1247.711	19.114	101.641
Spot 149	10.536	13256.046	0.645	9.147	1.156	4.783	1.559	0.318	1.044	0.670	1778.698	16.235	1781.991	13.091	1785.832	21.088	1785.832	21.088	99.601
Spot 150	34.551	45118.649	0.963	9.896	0.789	4.086	1.181	0.292	0.878	0.744	1650.797	12.793	1651.584	9.638	1652.568	14.642	1652.568	14.642	99.893
Spot 151	339.361	86984.695	1.387	9.744	0.741	3.917	1.347	0.275	1.124	0.835	1566.189	15.635	1617.253	10.896	1684.354	13.691	1684.354	13.691	92.985
Spot 155	26.292	19073.967	1.712	13.864	1.291	1.610	1.741	0.162	1.164	0.669	969.571	10.480	974.281	10.908	984.919	26.336	984.919	26.336	98.442
Spot 157	137.528	34739.788	0.408	10.173	0.793	3.603	1.352	0.264	1.095	0.810	1512.118	14.759	1550.093	10.746	1602.233	14.796	1602.233	14.796	94.376
Spot 158	42.506	11161.208	2.945	9.492	0.648	4.617	1.659	0.319	1.521	0.917	1782.553	23.688	1752.316	13.851	1716.421	12.196	1716.421	12.196	103.853
Spot 161	91.357	36343.969	0.887	18.336	0.981	0.511	1.510	0.068	1.147	0.760	422.363	4.689	418.794	5.182	399.162	22.004	422.363	4.689	105.812
Spot 162	322.453	67996.135	2.336	10.884	0.871	3.173	1.564	0.249	1.299	0.830	1430.994	16.667	1450.723	12.077	1479.731	16.524	1479.731	16.524	96.706
Spot 172	33.381	50469.087	2.227	10.941	0.871	3.272	1.365	0.258	1.051	0.770	1478.691	13.888	1474.436	10.615	1468.299	16.535	1468.299	16.535	100.708
Spot 173	85.714	34495.861	3.316	11.374	0.693	2.695	1.337	0.221	1.143	0.855	1287.767	13.337	1327.116	9.900	1391.190	13.310	1391.190	13.310	92.566
Spot 174	103.801	32676.182	3.186	11.444	0.631	2.871	1.098	0.237	0.895	0.815	1371.514	11.052	1374.350	8.267	1378.743	12.226	1378.743	12.226	99.476
Spot 175	228.118	34755.295	4.258	10.603	0.543	3.375	1.044	0.258	0.888	0.851	1479.382	11.742	1498.522	8.179	1525.679	10.339	1525.679	10.339	96.966
Spot 177	107.131	312871.770	2.074	5.896	0.562	10.448	1.229	0.443	1.093	0.889	2362.035	21.608	2475.278	11.385	2569.589	9.391	2569.589	9.391	91.923
Spot 167	68.292	6997.104	1.740	16.703	1.089	0.520	1.486	0.065	0.981	0.660	404.036	3.844	425.440	5.165	543.144	24.418	404.036	3.844	74.388
Spot 181	32.305	32027.972	1.700	10.023	0.748	4.172	1.389	0.302	1.168	0.841	1700.297	17.455	1668.446	11.377	1628.583	13.976	1628.583	13.976	104.404
Spot 182	84.105	53254.876	1.464	11.885	0.664	2.535	1.067	0.217	0.834	0.782	1266.435	9.594	1282.101	7.767	1308.432	12.898	1308.432	12.898	96.790
Spot 183	316.371	75379.115	2.066	11.621	0.963	2.486	1.553	0.208	1.218	0.784	1217.876	13.518	1267.914	11.246	1353.797	18.585	1353.797	18.585	89.960

Spot 184	511.450	67739.662	11.650	17.949	1.031	0.483	1.726	0.063	1.384	0.802	390.888	5.248	400.125	5.706	453.818	22.887	390.888	5.248	86.133
Spot 185	547.631	1177345.515	7.390	9.956	0.633	3.558	1.479	0.254	1.337	0.904	1461.461	17.484	1540.168	11.726	1649.933	11.738	1649.933	11.738	88.577
Spot 189	268.955	134973.092	27.355	12.714	0.857	1.944	1.473	0.178	1.197	0.813	1055.378	11.658	1096.264	9.874	1178.388	16.955	1178.388	16.955	89.561
Spot 190	33.765	45427.739	1.353	9.849	1.068	4.176	1.448	0.297	0.977	0.675	1674.103	14.412	1669.320	11.863	1663.296	19.772	1663.296	19.772	100.650
Spot 191	58.596	53237.128	1.384	5.428	0.998	12.842	1.681	0.502	1.353	0.805	2621.141	29.147	2668.098	15.839	2708.872	16.465	2703.872	16.465	96.940
Spot 192	44.878	22144.599	1.649	4.173	0.845	20.306	1.490	0.610	1.227	0.823	3071.902	29.989	3106.069	14.423	3128.220	13.450	3128.220	13.450	98.200
Spot 198	138.653	27295.779	6.392	5.901	0.748	11.062	1.336	0.471	1.108	0.829	2488.008	22.863	2528.338	12.444	2560.853	12.508	2560.853	12.508	97.155
Spot 194	32.197	132127.993	2.826	10.812	1.002	3.356	1.627	0.261	1.282	0.788	1496.980	17.122	1494.148	12.727	1490.114	18.970	1490.114	18.970	100.461
Spot 195	155.477	267566.087	3.299	11.247	0.957	2.986	1.576	0.242	1.253	0.795	1396.172	15.725	1404.038	11.989	1415.981	18.292	1415.981	18.292	98.601
Spot 197	137.300	28729.193	3.673	10.770	0.713	3.264	1.268	0.254	1.048	0.826	1460.485	13.694	1472.454	9.857	1489.732	13.526	1489.732	13.526	98.037
Spot 198	251.400	32838.500	2.800	9.529	0.942	4.108	1.607	0.283	1.302	0.810	1605.541	18.501	1695.900	13.123	1720.371	17.313	1720.371	17.313	93.325
Spot 199	51.251	7368.214	1.617	9.704	0.859	4.096	1.402	0.291	1.092	0.779	1648.273	15.883	1653.563	11.441	1660.275	16.273	1660.275	16.273	99.277
Spot 200	168.993	38080.327	1.997	10.543	0.855	3.635	1.481	0.277	1.210	0.817	1574.886	16.906	1557.120	11.797	1533.087	16.090	1533.087	16.090	102.727
Spot 204	303.198	72408.465	1.961	9.407	0.685	4.615	1.190	0.313	0.972	0.817	1754.643	14.986	1751.933	9.928	1748.684	12.550	1748.684	12.550	100.341
Spot 205	123.783	95605.582	2.377	12.284	0.550	2.277	1.203	0.202	1.070	0.889	1183.522	11.569	1205.113	8.489	1244.034	10.780	1244.034	10.780	95.136
Spot 206	326.598	112889.041	3.186	4.819	0.750	12.903	1.298	0.447	1.059	0.816	2384.092	21.097	2672.559	12.229	2898.696	12.171	2898.696	12.171	82.247
Spot 207	108.320	78009.295	1.189	9.936	0.741	3.911	1.310	0.280	1.080	0.825	1590.229	15.222	1615.861	10.591	1649.402	13.736	1649.402	13.736	96.412
Spot 208	54.005	16324.796	1.210	17.601	1.379	0.504	1.938	0.065	1.349	0.696	404.342	5.287	414.322	6.592	470.313	30.796	404.342	5.287	85.973
Spot 209	281.924	31272.675	1.407	18.024	0.957	0.524	1.396	0.068	0.996	0.714	426.700	4.114	427.592	4.871	432.384	21.792	426.700	4.114	98.686
Spot 211	60.610	35055.539	1.488	5.978	0.896	11.011	1.520	0.474	1.227	0.808	2502.448	25.451	2524.101	14.146	2541.544	15.023	2541.544	15.023	98.462
Spot 212	99.044	53399.980	2.451	4.314	0.775	19.657	1.329	0.610	1.079	0.812	3071.721	26.376	3074.625	12.843	3076.512	12.388	3076.512	12.388	99.844
Spot 213	206.038	210200.636	2.085	12.525	0.967	2.241	1.576	0.202	1.245	0.790	1186.235	13.486	1198.834	11.065	1207.638	19.040	1207.638	19.040	98.228
Spot 214	153.090	27370.198	1.726	11.187	0.709	2.983	1.227	0.241	1.002	0.816	1394.068	12.556	1408.334	9.332	1417.420	13.555	1417.420	13.555	98.352
Spot 215	110.187	51085.102	1.390	17.476	1.040	0.571	1.444	0.072	1.002	0.694	449.023	4.345	458.670	5.330	507.304	22.888	449.023	4.345	88.512
Spot 216	148.085	3820.166	3.543	15.641	2.021	0.362	4.949	0.043	4.508	0.910	273.529	12.059	313.986	13.366	626.300	44.271	273.529	12.059	43.674
Spot 217	100.785	10341.291	1.972	16.921	1.154	0.792	1.730	0.099	1.249	0.722	607.213	7.237	592.446	7.766	536.294	26.192	607.213	7.237	113.224
Spot 218	66.192	73363.219	1.551	5.115	0.759	14.565	1.546	0.536	1.346	0.871	2767.980	30.296	2787.254	14.688	2801.220	12.425	2801.220	12.425	98.813
Spot 219	112.323	24911.730	2.792	12.839	0.822	2.046	1.527	0.190	1.274	0.834	1123.181	13.128	1130.994	10.414	1146.003	16.718	1146.003	16.718	98.009
Spot 220	357.859	17656.261	1.299	17.788	0.811	0.529	1.340	0.069	1.002	0.748	428.250	4.151	431.233	4.709	447.176	19.797	428.250	4.151	95.768
Spot 4 (Copy)	62.584	31012.064	1.698	10.772	0.620	3.329	1.101	0.259	0.907	0.823	1485.411	12.032	1487.890	8.601	1491.408	11.831	1491.408	11.831	99.598
Spot 6 (Copy)	103.386	282277.075	4.734	8.915	0.965	5.312	1.449	0.341	1.081	0.746	1890.230	17.711	1870.857	12.383	1849.392	17.448	1849.392	17.448	102.208
Spot 8 (Copy)	396.427	15854.655	3.616	16.896	0.993	0.521	1.454	0.064	1.051	0.723	401.886	4.094	425.996	5.059	558.630	21.921	401.886	4.094	71.941
Spot 9 (Copy)	110.543	17679.681	3.468	14.252	0.819	1.524	1.512	0.158	1.240	0.820	946.457	10.916	940.127	9.273	925.328	17.810	925.328	17.810	102.283
Spot 10 (Copy)	309.953	38808.167	1.987	17.630	0.856	0.536	1.390	0.068	1.092	0.786	426.756	4.509	435.689	4.924	488.205	18.984	426.756	4.509	88.318
Spot 11 (Copy)	60.686	19053.401	1.138	10.084	0.814	4.023	1.400	0.294	1.126	0.805	1661.848	16.499	1638.784	11.384	1609.301	15.493	1609.301	15.493	103.265
Spot 12 (Copy)	124.078	36140.952	3.731	5.402	0.841	12.237	1.465	0.477	1.200	0.819	2512.544	24.966	2622.765	13.755	2708.965	13.878	2708.965	13.878	92.749
Spot 13 (Copy)	86.367	56195.823	16.943	9.873	0.632	3.989	1.079	0.284	0.875	0.810	1612.358	12.479	1632.020	8.764	1657.440	11.713	1657.440	11.713	97.280
Spot 14 (Copy)	160.711	7255.769	1.507	18.741	0.785	0.337	1.654	0.047	1.088	0.658	298.078	3.168	295.263	4.238	273.037	28.550	298.078	3.168	109.171
Spot 17 (Copy)	29.925	20009.264	3.593	10.054	0.820	3.864	1.341	0.282	1.049	0.782	1599.592	14.856	1606.216	10.818	1614.897	15.568	1614.897	15.568	99.052
Spot 18 (Copy)	184.133	78734.016	2.585	9.096	0.832	4.683	1.497	0.307	1.245	0.831	1726.682	18.858	1764.192	12.530	1808.883	15.122	1808.883	15.122	95.456
Spot 19 (Copy)	15.782	9083.345	1.358	10.141	0.886	3.869	1.509	0.287	1.137	0.754	1626.087	16.342	1607.261	12.176	1582.660	18.551	1582.660	18.551	102.744
Spot 20 (Copy)	71.477	36554.491	4.136	12.072	0.802	2.405	1.270	0.210	0.985	0.775	1228.943	11.018	1243.966	9.108	1270.061	15.636	1270.061	15.636	96.762
Spot 21 (Copy)	113.893	151709.178	2.916	8.085	0.868	6.083	1.339	0.354	1.020	0.761	1955.664	17.201	1987.814	11.678	2021.402	15.381	2021.402	15.381	96.748
Spot 22 (Copy)	90.103	6265.875	2.270	17.188	0.994	0.671	1.638	0.087	1.219	0.744	535.112	6.257	521.483	6.680	462.249	24.266	535.112	6.257	115.763
Spot 23 (Copy)	69.167	38359.160	2.126	10.220	1.019	3.912	1.538	0.289	1.151	0.748	1635.388	16.625	1616.195	12.439	1591.268	19.060	1591.268	19.060	102.773
Spot 24 (Copy)	130.949	56683.711	2.798	14.297	0.815	1.436	1.326	0.148	1.046	0.789	891.111	8.707	908.897	7.938	935.265	16.703	935.265	16.703	95.279
Spot 25 (Copy)	29.303	10725.054	1.980	5.538	0.952	10.419	1.664	0.418	1.362	0.819	2251.094	25.885	2472.775	15.419	2660.340	15.843	2660.340	15.843	84.617
Spot 26 (Copy)	264.662	17084.440	5.388	9.422	0.904	3.591	1.629	0.245	1.355	0.832	1414.259	17.205	1547.470	12.940	1734.445	16.596	1734.445	16.596	81.540
Spot 27 (Copy)	393.984	141095.957	12.130	5.004	0.838	13.370	1.424	0.482	1.152	0.809	2535.529	24.143	2706.131	13.455	2836.098	13.659	2836.098	13.659	89.402

Spot 28 (Cp)	40.339	15486.629	1.369	5.894	0.640	9.805	1.505	0.417	1.361	0.904	2248.608	25.829	2416.647	13.864	2561.366	10.741	2561.366	10.741	87.789
Spot 29 (Cp)	112.600	32706.375	1.757	11.393	1.037	2.943	1.564	0.242	1.168	0.746	1398.204	14.678	1398.143	11.857	1385.384	19.991	1385.384	19.991	100.925
Spot 81 (Cp)	91.898	8048.574	2.965	12.789	0.864	1.819	1.391	0.171	1.090	0.783	1018.101	10.264	1052.390	9.117	1124.226	17.245	1124.226	17.245	90.560
Spot 82 (Cp)	118.624	26250.296	1.509	9.930	0.531	3.615	1.258	0.259	1.135	0.903	1485.588	15.060	1552.784	10.002	1645.432	10.044	1645.432	10.044	90.286
Spot 83 (Cp)	41.930	6776.793	0.707	17.166	1.302	0.704	1.630	0.090	0.947	0.581	556.342	5.046	541.021	6.836	476.951	29.333	556.342	5.046	116.646
Spot 87 (Cp)	85.576	10290.572	1.379	10.188	1.261	3.649	1.688	0.271	1.120	0.664	1545.382	15.392	1560.324	13.453	1580.588	23.621	1580.588	23.621	97.773
Spot 88 (Cp)	26.259	12604.086	2.612	5.219	1.023	13.286	1.573	0.501	1.189	0.756	2617.406	25.573	2700.185	14.856	2762.727	16.914	2762.727	16.914	94.740
Spot 89 (Cp)	63.267	128340.729	1.816	9.884	0.986	4.219	1.262	0.300	0.787	0.624	1691.464	11.715	1677.779	10.360	1660.692	18.262	1660.692	18.262	101.853
Spot 91 (Cp)	56.036	22381.057	2.048	11.694	1.352	2.515	1.655	0.213	0.950	0.574	1244.387	10.754	1276.272	12.024	1330.360	26.222	1330.360	26.222	93.538
Spot 111 (Cp)	76.492	28480.295	1.567	5.583	0.704	12.491	1.235	0.503	1.015	0.822	2624.958	21.878	2642.046	11.610	2655.146	11.674	2655.146	11.674	98.863
Spot 112 (Cp)	65.591	222213.130	1.593	5.447	0.712	13.520	1.354	0.530	1.152	0.851	2740.196	25.707	2716.694	12.800	2699.248	11.751	2699.248	11.751	101.517
Spot 113 (Cp)	127.759	13389.566	3.909	10.850	1.181	2.541	2.599	0.200	2.316	0.891	1177.844	24.928	1288.968	18.942	1466.191	22.426	1466.191	22.426	80.334
Spot 114 (Cp)	153.687	64262.690	3.123	10.757	0.588	3.367	1.199	0.261	1.044	0.871	1494.859	13.929	1496.859	9.384	1499.674	11.135	1499.674	11.135	99.679
Spot 116 (Cp)	199.107	48617.969	6.702	9.464	0.787	4.180	1.430	0.285	1.194	0.835	1618.453	17.087	1670.073	11.721	1735.561	14.451	1735.561	14.451	93.252
Spot 117 (Cp)	58.740	25250.151	3.819	9.943	0.799	3.842	1.342	0.276	1.078	0.803	1572.543	15.045	1601.680	10.814	1640.204	14.840	1640.204	14.840	95.875
Spot 119 (Cp)	276.437	16524.687	3.503	12.359	0.763	1.942	1.670	0.174	1.485	0.889	1035.936	14.216	1095.652	11.195	1216.307	15.035	1216.307	15.035	85.171
Spot 120 (Cp)	153.922	141223.771	5.760	13.015	0.717	2.001	1.167	0.187	0.921	0.789	1107.597	9.371	1115.998	7.904	1132.377	14.284	1132.377	14.284	97.812
Spot 121 (Cp)	103.500	77951.845	2.165	10.749	0.771	3.230	1.262	0.250	0.999	0.791	1438.691	12.875	1464.488	9.785	1502.081	14.587	1502.081	14.587	95.780
Spot 123 (Cp)	144.835	19134.128	1.217	10.058	0.632	3.548	1.011	0.258	0.790	0.781	1480.846	10.449	1537.927	8.011	1617.299	11.759	1617.299	11.759	91.563
Spot 124 (Cp)	244.610	23657.461	4.312	18.152	0.850	0.520	1.724	0.069	1.478	0.857	427.752	6.116	425.240	5.989	411.623	19.854	427.752	6.116	103.918
Spot 125 (Cp)	136.253	12967.370	2.751	12.864	0.958	2.096	1.556	0.196	1.226	0.788	1155.546	12.969	1147.536	10.699	1132.411	19.067	1132.411	19.067	102.043
Spot 126 (Cp)	43.115	10377.751	1.553	11.782	0.956	2.581	1.723	0.222	1.377	0.799	1291.464	16.113	1295.200	12.609	1301.382	20.124	1301.382	20.124	99.238
Spot 127 (Cp)	121.565	33899.880	2.252	12.760	0.788	2.020	1.210	0.186	0.916	0.757	1099.254	9.255	1122.119	8.219	1166.640	15.694	1166.640	15.694	94.224
Spot 128 (Cp)	146.380	219587.177	47.162	13.426	0.829	1.791	1.288	0.173	0.986	0.765	1026.788	9.360	1042.009	8.394	1074.092	16.633	1074.092	16.633	95.596
Spot 130 (Cp)	83.659	34281.264	2.184	6.528	0.665	9.184	1.254	0.431	1.063	0.848	2311.864	20.655	2356.566	11.486	2395.463	11.324	2395.463	11.324	96.510
Spot 131 (Cp)	76.292	31400.252	1.313	9.559	0.850	4.355	1.279	0.300	0.953	0.745	1691.475	14.184	1708.849	10.561	1719.082	15.666	1719.082	15.666	98.394
Spot 132 (Cp)	87.475	218586.288	1.060	10.056	0.648	3.354	1.218	0.242	1.032	0.847	1398.064	12.969	1493.614	9.529	1631.971	12.035	1631.971	12.035	85.667
Spot 133 (Cp)	160.899	39617.354	2.118	10.826	0.745	3.338	1.422	0.260	1.120	0.851	1491.777	16.120	1490.024	11.113	1487.513	14.146	1487.513	14.146	100.287
Spot 134 (Cp)	27.104	3322.759	1.009	13.298	1.108	1.700	1.792	0.172	1.269	0.764	1023.569	12.957	1008.549	11.460	976.069	23.584	976.069	23.584	104.866
Spot 135 (Cp)	32.377	104209.985	1.884	8.703	1.103	5.154	1.723	0.322	1.324	0.769	1801.157	20.813	1845.133	14.657	1895.070	19.832	1895.070	19.832	95.044
Spot 137 (Cp)	18.812	22166.550	1.606	3.925	0.740	22.962	1.316	0.647	1.088	0.827	3218.044	27.566	3225.344	12.803	3229.875	11.671	3229.875	11.671	99.634
Spot 138 (Cp)	186.925	6402.002	1.715	19.047	1.012	0.299	2.136	0.043	1.169	0.547	269.096	3.082	265.250	4.987	231.402	41.258	269.096	3.082	116.289
Spot 139 (Cp)	195.579	35386.344	2.488	11.694	0.681	2.562	1.206	0.216	0.992	0.823	1258.968	11.351	1289.951	8.809	1341.889	13.242	1341.889	13.242	93.821
Spot 141 (Cp)	151.800	32826.242	3.742	11.502	0.698	2.742	1.009	0.227	0.728	0.722	1319.696	8.691	1339.811	7.510	1372.075	13.447	1372.075	13.447	96.188
Spot 142 (Cp)	219.317	54016.812	0.983	10.828	0.788	3.047	1.134	0.237	0.815	0.719	1372.058	10.071	1419.458	8.667	1491.287	14.921	1491.287	14.921	92.005
Spot 143 (Cp)	70.927	102385.205	2.071	9.005	0.675	5.065	1.193	0.327	0.984	0.825	1825.618	15.642	1830.224	10.116	1835.452	12.222	1835.452	12.222	99.464
Spot 144 (Cp)	192.834	112147.425	1.238	9.827	0.763	3.870	1.387	0.273	1.158	0.835	1556.017	16.007	1607.508	11.191	1675.627	14.107	1675.627	14.107	92.862
Spot 145 (Cp)	34.297	30676.058	2.512	9.898	0.922	4.030	1.438	0.287	1.100	0.765	1627.932	15.830	1640.351	11.697	1656.290	17.141	1656.290	17.141	98.288
Spot 146 (Cp)	121.470	24106.061	3.425	13.270	0.731	1.899	1.515	0.182	1.327	0.876	1078.173	13.173	1080.643	10.077	1085.646	14.663	1085.646	14.663	99.312
Spot 147 (Cp)	101.570	22689.894	6.321	13.408	0.888	1.755	1.501	0.170	1.198	0.798	1012.562	11.227	1028.839	9.710	1063.632	18.195	1063.632	18.195	95.199
Spot 149 (Cp)	78.571	66463.608	2.904	9.610	0.607	4.319	1.168	0.298	0.998	0.854	1681.335	14.774	1697.075	9.634	1716.554	11.162	1716.554	11.162	97.948
Spot 150 (Cp)	35.180	55081.548	2.002	4.955	0.713	15.156	1.285	0.539	1.069	0.832	2778.316	24.124	2825.118	12.240	2858.675	11.607	2858.675	11.607	97.189
Spot 151 (Cp)	170.275	47808.740	0.968	13.313	0.666	1.869	1.150	0.179	0.936	0.814	1061.671	9.161	1070.237	7.606	1087.732	13.379	1087.732	13.379	97.604
Spot 214 (Cp)	50.903	103115.817	2.721	10.886	0.746	3.246	1.299	0.254	1.063	0.818	1456.769	13.858	1468.133	10.082	1484.589	14.143	1484.589	14.143	98.126
3CA20							Isotope ratios						Apparent ages (Ma)						
Analysis	U	206Pb	U/Th	206Pb* ±	207Pb* ±		206Pb* ±	error	206Pb* ±		207Pb* ±		206Pb* ±		Best age ±	Conc			
	(ppm)	204Pb		207Pb* (%)	235U (%)		238U (%)	corr.	238U (Ma)		235U (Ma)		207Pb* (Ma)		(Ma)	(Ma)	(Ma)	(Ma)	(%)

Spot 1	399.529	600899.212	11.960	10.352	0.711	3.276	1.278	0.243	1.061	0.831	1404.003	13.390	1475.331	9.939	1579.475	13.305	1579.475	13.305	88.890
Spot 2	119.717	33945.730	40.175	11.487	1.830	2.410	2.366	0.200	1.499	0.633	1172.984	16.073	1245.630	16.984	1373.510	35.230	1373.510	35.230	85.400
Spot 3	188.080	132946.400	2.157	11.414	0.773	2.703	1.662	0.222	1.471	0.885	1290.282	17.202	1329.237	12.319	1392.551	14.840	1392.551	14.840	92.656
Spot 4	366.280	753598.505	2.615	12.484	0.835	2.256	1.476	0.202	1.218	0.825	1186.657	13.198	1198.693	10.387	1220.436	16.405	1220.436	16.405	97.232
Spot 5	396.166	139813.017	2.167	12.719	0.893	2.092	1.395	0.192	1.071	0.768	1129.596	11.102	1146.339	9.583	1178.171	17.662	1178.171	17.662	95.877
Spot 6	338.720	116814.076	2.922	9.681	0.772	4.099	1.280	0.286	1.022	0.798	1619.140	14.627	1654.155	10.452	1698.900	14.222	1698.900	14.222	95.305
Spot 7	27.881	96822.539	1.209	5.946	0.777	11.062	1.245	0.474	0.973	0.782	2500.937	20.170	2530.058	11.596	2553.481	13.004	2553.481	13.004	97.942
Spot 8	93.211	96110.410	1.910	13.249	0.982	1.897	1.483	0.181	1.111	0.749	1072.482	10.980	1080.131	9.862	1095.575	19.666	1095.575	19.666	97.892
Spot 11	296.255	732077.471	19.484	5.040	0.845	13.004	1.588	0.471	1.344	0.847	2487.770	27.742	2679.912	14.971	2828.242	13.787	2828.242	13.787	87.962
Spot 12	391.508	543844.189	20.722	13.209	0.599	2.036	1.004	0.193	0.805	0.802	1138.724	8.403	1127.522	6.833	1105.990	11.991	1105.990	11.991	102.960
Spot 13	258.247	139780.435	2.857	10.116	0.610	3.828	1.022	0.278	0.820	0.802	1583.542	11.512	1598.748	8.229	1618.833	11.360	1618.833	11.360	97.820
Spot 14	456.500	256336.396	10.535	5.322	0.570	12.872	1.731	0.492	1.635	0.944	2579.913	34.753	2670.342	16.313	2739.541	9.382	2739.541	9.382	94.173
Spot 16	31.161	16592.689	1.251	8.702	0.985	5.165	1.467	0.325	1.087	0.741	1814.947	17.192	1846.819	12.480	1882.900	17.747	1882.900	17.747	96.391
Spot 17	61.125	23537.589	1.171	13.442	0.697	1.750	1.345	0.170	1.150	0.855	1014.286	10.792	1027.229	8.694	1054.917	14.087	1054.917	14.087	96.148
Spot 19	189.132	94806.560	1.502	9.181	0.662	4.762	1.116	0.315	0.898	0.805	1763.726	13.861	1778.200	9.367	1795.216	12.062	1795.216	12.062	98.246
Spot 23	9.836	22215.025	7.873	12.408	1.867	1.970	2.380	0.177	1.474	0.620	1050.996	14.297	1105.154	16.027	1213.380	36.736	1213.380	36.736	86.617
Spot 25	176.098	561516.759	3.487	5.220	0.895	14.002	1.409	0.526	1.088	0.772	2723.233	24.164	2749.835	13.351	2769.413	14.679	2769.413	14.679	98.332
Spot 26	437.783	318252.789	4.021	12.358	0.463	2.145	0.987	0.191	0.872	0.883	1125.251	9.000	1163.396	6.837	1235.147	9.091	1235.147	9.091	91.103
Spot 27	145.758	73295.255	1.807	13.204	0.958	2.023	1.577	0.193	1.252	0.794	1135.143	13.034	1123.135	10.716	1100.003	19.196	1100.003	19.196	103.195
Spot 28	137.406	54099.975	1.412	10.017	0.595	3.740	1.144	0.270	0.975	0.852	1541.654	13.367	1579.970	9.162	1631.491	11.110	1631.491	11.110	94.494
Spot 29	167.984	560157.409	2.908	13.062	0.870	1.880	1.666	0.177	1.421	0.853	1048.950	13.755	1073.939	11.044	1125.007	17.347	1125.007	17.347	93.239
Spot 32	656.634	121373.628	1.050	10.146	0.565	3.441	1.061	0.252	0.899	0.847	1446.475	11.646	1513.707	8.351	1609.048	10.523	1609.048	10.523	89.896
Spot 33	161.827	33617752.594	2.381	9.306	1.064	4.709	1.627	0.315	1.231	0.756	1767.367	19.026	1768.806	13.629	1770.488	19.437	1770.488	19.437	99.824
Spot 35	633.400	54041.354	0.835	17.902	0.619	0.492	1.079	0.064	0.884	0.819	398.311	3.413	406.265	3.612	451.713	13.755	398.311	3.413	88.178
Spot 36	208.744	40887.922	1.774	11.554	0.870	2.312	1.553	0.193	1.286	0.828	1138.073	13.416	1215.938	11.006	1356.898	16.776	1356.898	16.776	83.873
Spot 39	127.153	149764.447	3.609	9.938	0.812	3.505	2.485	0.251	2.348	0.945	1443.981	30.380	1528.262	19.630	1646.955	15.055	1646.955	15.055	87.676
Spot 40	78.864	92705.277	1.525	9.680	0.780	4.388	1.374	0.306	1.131	0.823	1722.401	17.094	1709.994	11.364	1694.814	14.390	1694.814	14.390	101.628
Spot 44	30.236	66064.253	1.089	9.918	1.241	4.081	1.667	0.288	1.113	0.667	1633.840	16.062	1640.410	13.566	1648.824	23.022	1648.824	23.022	99.091
Spot 45	752.867	39623.505	6.683	12.830	0.445	0.773	2.073	0.072	2.024	0.977	446.853	8.740	581.378	9.175	1149.124	8.830	446.853	8.740	38.886
Spot 46	21.632	17233.537	1.158	13.318	1.417	1.848	2.139	0.180	1.504	0.703	1064.245	14.753	1062.867	14.093	1060.059	30.606	1060.059	30.606	100.395
Spot 47	279.396	132548.877	2.761	11.175	0.668	3.072	1.256	0.248	1.064	0.847	1427.199	13.616	1425.612	9.621	1423.224	12.765	1423.224	12.765	100.279
Spot 49	442.460	110862.393	1.411	14.203	0.815	1.595	1.484	0.164	1.239	0.835	977.278	11.237	968.355	9.261	948.162	16.694	948.162	16.694	103.071
Spot 50	36.702	68977.897	0.853	5.478	0.689	12.511	1.500	0.494	1.333	0.888	2589.821	28.423	2643.578	14.108	2684.977	11.395	2684.977	11.395	96.456
Spot 51	144.140	202256.641	3.769	5.576	0.992	10.523	1.921	0.423	1.645	0.856	2275.872	31.546	2481.976	17.814	2655.278	16.444	2655.278	16.444	85.711
Spot 52	49.749	38857.975	1.512	5.486	0.961	13.171	1.332	0.522	0.922	0.692	2707.751	20.396	2691.985	12.575	2680.157	15.902	2680.157	15.902	101.030
Spot 53	28.846	12168.984	0.773	13.114	1.744	1.848	2.148	0.178	1.245	0.580	1053.451	12.102	1062.729	14.155	1081.810	35.115	1081.810	35.115	97.379
Spot 54	109.649	153253.002	3.927	7.544	0.810	7.171	1.220	0.390	0.913	0.748	2123.769	16.517	2132.913	10.873	2141.722	14.151	2141.722	14.151	99.162
Spot 55	242.040	114561.274	3.491	13.187	0.895	1.968	1.406	0.187	1.084	0.771	1107.315	11.031	1104.729	9.465	1099.659	17.921	1099.659	17.921	100.696
Spot 56	362.277	316681.388	3.685	12.880	0.906	2.103	1.548	0.195	1.255	0.811	1150.552	13.228	1149.934	10.654	1148.770	17.981	1148.770	17.981	100.155
Spot 59	287.897	293361.524	3.711	5.761	0.859	9.615	1.598	0.399	1.347	0.843	2165.767	24.782	2398.618	14.697	2602.683	14.316	2602.683	14.316	83.213
Spot 60	441.535	194931.099	3.706	13.869	0.799	1.705	1.248	0.171	0.959	0.768	1015.871	9.009	1010.320	7.985	998.283	16.219	998.283	16.219	101.762
Spot 62	11.731	5865.258	0.880	14.438	2.025	1.206	3.307	0.130	2.132	0.645	788.790	15.830	803.551	18.361	844.683	52.595	788.790	15.830	93.383
Spot 63	422.067	824858.740	2.389	18.122	0.954	0.535	1.439	0.070	1.077	0.749	435.488	4.537	435.036	5.092	432.627	21.264	435.488	4.537	100.661
Spot 64	642.105	241955.250	0.910	18.012	0.849	0.477	1.282	0.062	0.960	0.749	387.851	3.615	396.262	4.206	445.608	18.877	387.851	3.615	87.089
Spot 76	415.965	133078.655	1.345	12.673	0.828	2.135	1.396	0.195	1.124	0.805	1149.312	11.834	1160.338	9.657	1181.002	16.379	1181.002	16.379	97.317
Spot 77	76.467	35621.384	2.002	12.149	0.630	2.482	1.557	0.218	1.416	0.909	1272.766	16.352	1266.809	11.273	1256.712	12.684	1256.712	12.684	101.277
Spot 78	202.140	74501.323	1.529	13.055	0.664	1.906	1.174	0.180	0.967	0.823	1065.459	9.496	1083.170	7.820	1118.987	13.292	1118.987	13.292	95.216

Spot 80	291.517	2539566.195	14.367	5.293	0.668	13.474	1.129	0.514	0.910	0.806	2674.013	19.913	2713.452	10.668	2742.934	10.980	2742.934	10.980	97.487
Spot 81	312.146	44284.763	3.675	12.814	0.897	1.875	1.601	0.174	1.324	0.827	1033.381	12.644	1072.216	10.599	1152.045	17.847	1152.045	17.847	89.700
Spot 82	61.488	52050.474	0.825	9.106	0.689	4.847	1.334	0.319	1.142	0.856	1784.408	17.800	1799.180	11.231	1803.383	12.547	1803.383	12.547	98.948
Spot 83	294.015	3337885.560	3.516	13.968	0.779	1.487	1.219	0.150	0.937	0.769	899.580	7.870	925.239	7.400	986.903	15.834	986.903	15.834	91.152
Spot 84	557.453	215802.643	1.454	9.556	0.738	4.505	1.523	0.310	1.333	0.875	1743.047	20.352	1731.870	12.657	1718.377	13.559	1718.377	13.559	101.436
Spot 85	273.188	60803.769	8.019	16.341	0.574	0.810	0.988	0.096	0.804	0.814	589.310	4.528	602.217	4.489	651.091	12.329	589.310	4.528	90.511
Spot 90	595.850	225034.498	2.740	13.771	0.697	1.743	1.237	0.173	1.022	0.826	1029.227	9.723	1024.615	7.982	1014.760	14.116	1014.760	14.116	101.426
Spot 92	32.869	37809.269	3.177	9.335	1.130	4.418	1.425	0.298	0.866	0.608	1682.092	12.818	1715.718	11.797	1756.991	20.696	1756.991	20.696	95.737
Spot 93	62.054	65791.847	1.051	9.961	1.155	3.814	1.852	0.274	1.448	0.782	1562.089	20.080	1595.599	14.897	1640.131	21.438	1640.131	21.438	95.242
Spot 94	92.159	70980.229	0.383	9.653	0.881	4.215	1.685	0.294	1.436	0.852	1659.581	21.010	1676.903	13.831	1698.631	16.253	1698.631	16.253	97.701
Spot 95	243.500	534700.291	0.968	10.361	1.066	3.416	1.456	0.255	0.992	0.681	1464.250	12.997	1508.054	11.440	1570.118	19.970	1570.118	19.970	93.257
xx	168.115	36154.667	2.166	18.156	1.164	0.503	1.707	0.066	1.227	0.718	413.581	4.914	413.664	5.801	414.103	26.545	413.581	4.914	99.874
Spot 96	171.146	168379.163	1.922	18.273	1.045	0.539	1.820	0.071	1.490	0.819	442.185	6.367	437.471	6.468	412.713	23.360	442.185	6.367	107.141
Spot 97	253.357	162571.576	3.109	11.709	0.885	2.741	1.429	0.231	1.121	0.785	1341.633	13.582	1339.564	10.630	1336.240	17.122	1336.240	17.122	100.404
Spot 98	1716.872	19475.128	4.990	10.643	0.974	1.287	2.029	0.099	1.779	0.877	610.940	10.371	840.127	11.593	1506.572	18.405	1506.572	18.405	40.552
Spot 99	223.036	172748.508	4.054	8.470	1.016	5.354	1.432	0.327	1.010	0.705	1822.544	16.081	1877.591	12.255	1939.039	18.172	1939.039	18.172	93.992
Spot 100	69.709	35678.920	0.985	11.765	0.807	2.553	1.419	0.217	1.165	0.821	1267.312	13.409	1287.192	10.352	1320.500	15.682	1320.500	15.682	95.972
Spot 101	321.051	186534.766	0.935	16.572	0.860	0.758	1.649	0.090	1.407	0.853	558.194	7.524	572.569	7.218	630.078	18.548	558.194	7.524	88.591
Spot 102	349.354	1683006.922	10.726	6.118	0.678	9.601	1.202	0.423	0.992	0.825	2272.789	18.997	2397.282	11.050	2504.799	11.409	2504.799	11.409	90.737
Spot 103	200.077	22057.253	3.637	17.728	1.163	0.545	1.712	0.070	1.256	0.734	437.866	5.318	441.394	6.129	459.807	25.796	437.866	5.318	95.228
Spot 104	181.070	201971.764	1.084	9.736	0.959	4.057	1.530	0.285	1.192	0.779	1614.453	17.027	1645.681	12.464	1685.779	17.698	1685.779	17.698	95.769
Spot 105	44.673	172593.830	0.658	16.644	1.303	0.788	1.980	0.095	1.490	0.753	582.348	8.298	590.273	8.861	620.840	28.113	582.348	8.298	93.800
Spot 106	143.990	143612.287	3.431	8.524	0.756	5.231	1.260	0.321	1.008	0.800	1795.589	15.800	1857.620	10.744	1927.764	13.551	1927.764	13.551	93.144
Spot 109	101.180	59388.296	1.519	16.975	1.010	0.706	1.460	0.087	1.052	0.721	535.703	5.408	542.490	6.135	571.126	22.013	535.703	5.408	93.798
Spot 110	152.340	45682.945	2.127	17.016	0.871	0.670	1.558	0.083	1.288	0.824	511.433	6.310	520.986	6.351	563.071	19.256	511.433	6.310	90.829

4CA20 Spot 21	105.831	324720.041	5.037	6.052	1.034	9.133	1.453	0.400	1.020	0.702	2167.625	18.784	2351.453	13.295	2514.959	17.376	2514.959	17.376	86.189		
4CA20 Spot 21	558.487	449263.803	1.134	8.254	0.875	6.136	1.409	0.366	1.104	0.784	2011.285	19.074	1995.413	12.298	1979.000	15.580	1979.000	15.580	101.631		
4CA20 Spot 21	346.750	346963.824	3.696	8.972	0.827	4.432	1.475	0.287	1.221	0.828	1628.524	17.577	1718.283	12.220	1829.448	14.990	1829.448	14.990	89.017		
4CA20 Spot 24	88.559	58865.294	2.592	11.569	0.769	2.705	1.402	0.227	1.172	0.836	1317.593	13.963	1329.709	10.390	1349.259	14.842	1349.259	14.842	97.653		
4CA20 Spot 24	290.488	219500.293	6.670	5.254	1.096	11.568	1.468	0.439	0.976	0.665	2347.669	19.203	2570.110	13.720	2750.533	18.019	2750.533	18.019	85.353		
4CA20 Spot 25	159.282	152387.315	2.830	10.653	0.808	3.307	1.394	0.255	1.136	0.815	1462.996	14.867	1482.644	10.869	1510.853	15.260	1510.853	15.260	96.832		
4CA20 Spot 26	82.155	26074.162	1.473	17.686	1.359	0.597	2.071	0.077	1.537	0.742	478.257	7.086	475.160	7.859	460.215	30.791	478.257	7.086	103.920		
4CA20 Spot 27	45.055	166052.559	1.669	9.894	0.989	3.227	1.847	0.231	1.560	0.844	1339.265	18.861	1463.556	14.317	1648.840	18.341	1648.840	18.341	81.225		
4CA20 Spot 28	69.958	296497.236	1.705	10.153	0.910	3.957	1.513	0.291	1.209	0.799	1644.162	17.546	1625.398	12.267	1601.175	16.982	1601.175	16.982	102.665		
4CA20 Spot 28	123.663	163229.056	2.668	13.004	1.204	1.904	1.622	0.179	1.087	0.670	1062.197	10.647	1082.327	10.799	1123.063	24.008	1123.063	24.008	94.580		
4CA20 Spot 30	108.873	80593.444	1.160	10.022	0.966	3.155	1.707	0.229	1.408	0.824	1329.009	16.904	1446.261	13.164	1623.094	17.974	1623.094	17.974	81.881		
4CA20 Spot 31	257.901	1030468.340	3.263	9.217	0.909	4.771	1.569	0.318	1.279	0.815	1778.829	19.887	1779.729	13.175	1780.768	16.580	1780.768	16.580	99.891		
4CA20 Spot 32	373.045	127103.709	4.745	19.434	1.158	0.287	1.650	0.040	1.176	0.712	254.900	2.939	255.856	3.733	264.602	26.597	254.900	2.939	96.334		
4CA20 Spot 33	69.035	247528.207	1.173	5.775	0.913	12.059	1.336	0.503	0.976	0.730	2628.245	21.056	2609.003	12.527	2594.091	15.222	2594.091	15.222	101.317		
4CA20 Spot 34	842.780	30035.882	3.091	14.799	1.091	0.515	2.106	0.055	1.802	0.855	348.142	6.106	421.954	7.272	848.328	22.686	348.142	6.106	41.039		
5CA20							Isotope ratios							Apparent ages (Ma)							
Analysis	U	206Pb	U/Th	206Pb*	±	207Pb*	±	206Pb*	±	error	206Pb*	±	207Pb*	±	206Pb*	±	Best age	±	Conc		
	(ppm)	204Pb		207Pb*	(%)	235U	(%)	238U	(%)	corr.	238U	(Ma)	235U	(Ma)	207Pb*	(Ma)	(Ma)	(Ma)	(%)		
Spot 1	10.660	1642.228	5.482	9.615	1.490	3.598	2.864	0.272	1.546	0.540	1552.929	21.342	1549.000	22.755	1543.626	45.309	1543.626	45.309	6.439		
Spot 2	121.019	42005.221	1.766	8.917	0.606	4.743	1.124	0.307	0.946	0.842	1725.930	14.323	1774.957	9.422	1833.102	10.988	1833.102	10.988	125.778		
Spot 3	131.652	1130.435	1.722	6.941	4.275	5.566	5.508	0.304	2.333	0.424	1712.630	35.091	1910.922	47.448	2133.556	87.364	2133.556	87.364	5.839		
Spot 4	97.917	991306.620	2.127	5.377	0.737	13.429	1.294	0.523	1.063	0.822	2710.294	23.517	2710.329	12.225	2710.343	12.165	2710.343	12.165	1519.527		
Spot 6	52.292	90646.109	0.781	5.425	0.715	12.308	1.388	0.484	1.189	0.857	2543.745	24.999	2628.216	13.032	2693.919	11.808	2693.919	11.808	400.228		
Spot 7	324.528	62290.548	2.308	9.612	0.892	4.330	1.438	0.302	1.129	0.785	1700.741	16.873	1699.026	11.866	1696.894	16.431	1696.894	16.431	174.482		
xx	308.759	2050.955	1.688	17.030	5.644	0.011	6.792	0.002	1.938	0.285	9.750	0.189	10.885	0.735	269.712	149.393	9.750	0.189	1.255.825		
Spot 9	664.006	23701.395	6.902	18.493	0.950	0.471	1.325	0.064	0.898	0.677	399.445	3.477	391.757	4.307	346.637	22.036	399.445	3.477	63.068		
Spot 12	541.801	3699.004	1.227	12.555	2.212	0.540	2.525	0.052	1.205	0.477	324.517	3.814	438.140	8.987	1089.681	44.468	324.517	3.814	76.214		
Spot 13	378.247	48267.781	11.678	17.236	0.921	0.602	1.810	0.076	1.556	0.860	469.971	7.053	478.363	6.903	518.779	20.295	469.971	7.053	100.836		
Spot 16	192.146	10769.801	2.141	16.166	0.824	0.814	1.589	0.097	1.115	0.701	598.873	6.375	604.693	7.241	626.545	24.423	598.873	6.375	68.046		
xx	527.689	3721.971	1.592	20.432	1.666	0.046	2.816	0.007	1.006	0.357	47.441	0.476	45.556	1.255	NA	NA	47.441	0.476	448.289		
Spot 19	101.420	29604.418	1.957	13.552	0.846	1.769	1.251	0.174	0.922	0.737	1036.204	8.822	1034.143	8.116	1029.768	17.128	1029.768	17.128	111.723		
Spot 20	266.825	102618.866	28.756	13.956	0.942	1.306	2.477	0.132	2.291	0.925	799.060	17.214	848.336	14.244	979.538	19.182	799.060	17.214	50.327		
Spot 21	113.256	16925.049	4.079	10.751	0.886	3.300	1.454	0.259	1.130	0.777	1483.006	14.965	1481.035	11.329	1478.195	17.356	1478.195	17.356	23.462		
Spot 22	122.656	19704.480	8.901	10.260	0.781	3.528	1.823	0.263	1.645	0.903	1507.683	22.116	1533.530	14.421	1569.346	14.703	1569.346	14.703	9.954		
Spot 23	121.737	30011.077	1.408	10.317	0.681	3.489	1.148	0.261	0.924	0.805	1496.960	12.345	1524.793	9.061	1563.619	12.771	1563.619	12.771	94.586		
Spot 24	366.875	30898.759	3.617	18.207	0.907	0.495	1.526	0.066	1.227	0.804	409.796	4.872	408.296	5.130	399.804	20.330	409.796	4.872	239.198		
Spot 26	99.568	13830.517	1.732	16.468	1.246	0.797	1.724	0.096	1.171	0.679	593.099	6.634	594.869	7.760	601.605	27.383	593.099	6.634	114.724		
Spot 27	300.144	70094.713	2.370	12.205	0.792	2.227	1.781	0.197	1.595	0.896	1157.714	16.899	1189.567	12.477	1247.945	15.489	1247.945	15.489	270.643		
Spot 28	161.838	37404.734	1.148	5.176	0.566	12.595	0.988	0.472	0.810	0.820	2490.989	16.736	2649.871	9.295	2773.511	9.279	2773.511	9.279	111.937		
Spot 29	126.990	703912.375	2.808	9.652	0.947	4.265	1.380	0.297	1.003	0.727	1678.318	14.816	1686.608	11.347	1696.917	17.461	1696.917	17.461	1633.760		
Spot 30	70.877	8987.035	1.915	13.217	1.148	1.831	1.863	0.178	1.454	0.780	1058.749	14.196	1056.506	12.236	1051.893	23.492	1051.893	23.492	37.402		
Spot 31	288.322	21734.079	1.462	11.438	0.672	2.514	1.219	0.209	1.014	0.832	1224.927	11.311	1276.192	8.853	1363.586	13.021	1363.586	13.021	93.663		
Spot 32	151.964	89438.948	3.821	9.913	0.838	4.008	1.537	0.287	1.289	0.838	1628.735	18.548	1635.899	12.491	1645.103	15.540	1645.103	15.540	150.233		
Spot 33	227.722	36355.888	1.851	17.050	1.091	0.719	1.729	0.089	1.339	0.775	549.947	7.058	549.968	7.340	550.058	23.865	549.947	7.058	406.672		
xx	207.469	6627.795	0.664	3.608	32.516	0.085	33.007	0.002	5.673	0.172	14.387	0.815	83.096	26.341	3345.075	524.955	14.387	0.815	10382.552		

Spot 35	580.359	251864.015	7.450	13.851	0.772	1.664		1.679	0.167	1.491	0.888	992.986	13.719	994.922	10.647	999.173	15.669	999.173	15.669	379.956
xx	167.192	1840.048	2.817	20.290	3.255	0.037		3.899	0.006	1.565	0.401	41.674	0.650	36.898	1.413	NA	NA	41.674	0.650	239.955
Spot 37	25.766	4410.749	1.225	9.712	1.198	3.866		2.012	0.280	1.598	0.794	1588.870	22.505	1606.587	16.236	1629.875	22.735	1629.875	22.735	17.876
Spot 38	86.751	14722.605	3.029	10.021	0.684	3.597		1.225	0.263	1.011	0.826	1503.660	13.561	1548.916	9.731	1611.199	12.876	1611.199	12.876	25.080
xx	435.475	10996.120	1.398	20.225	1.228	0.105		1.686	0.016	0.904	0.536	100.697	0.903	101.229	1.624	113.755	38.596	100.697	0.903	591.527
Spot 40	113.058	72505.433	2.210	7.594	0.729	6.940		1.142	0.381	0.879	0.770	2082.052	15.642	2108.729	10.138	2124.982	12.774	2124.982	12.774	153.623
xx	190.922	1019.762	1.111	20.690	3.189	0.029		4.936	0.006	1.485	0.301	39.825	0.590	28.847	1.404	NA	NA	39.825	0.590	251.102
Spot 44	679.921	7809.472	6.804	12.702	0.694	1.621		1.265	0.152	1.057	0.836	913.296	9.004	978.565	7.944	1128.070	13.807	1128.070	13.807	10.949
Spot 45	385.223	12570.919	2.050	18.045	0.893	0.429		1.418	0.057	1.089	0.768	357.718	3.791	362.305	4.320	391.752	20.358	357.718	3.791	126.652
Spot 46	112.125	35728.692	3.206	9.205	0.758	4.738		1.391	0.316	1.165	0.837	1771.652	18.041	1773.980	11.666	1776.706	13.891	1776.706	13.891	46.710
Spot 47	743.022	36766.688	2.016	13.215	0.777	1.842		1.550	0.177	1.336	0.862	1049.477	12.944	1060.496	10.201	1083.241	15.730	1083.241	15.730	206.570
Spot 48	97.432	26455.053	2.954	10.807	0.820	3.229		1.344	0.254	1.062	0.790	1457.333	13.851	1464.243	10.419	1474.262	15.626	1474.262	15.626	46.596
Spot 49	394.177	51320.498	6.690	9.170	0.856	4.564		1.545	0.303	1.286	0.832	1706.131	19.273	1742.713	12.867	1786.876	15.606	1786.876	15.606	55.080
Spot 50	207.641	27542.632	3.373	10.124	0.652	4.027		1.388	0.296	1.224	0.882	1671.129	18.021	1639.676	11.288	1599.560	12.196	1599.560	12.196	34.748
Spot 52	44.758	10887.163	1.668	12.893	0.954	1.794		1.685	0.170	1.382	0.820	1012.168	12.943	1043.448	10.990	1109.529	19.297	1109.529	19.297	54.041
Spot 53	261.849	31802.416	1.774	10.745	0.656	3.381		1.228	0.264	1.038	0.845	1508.765	13.963	1500.040	9.627	1487.717	12.445	1487.717	12.445	86.311
Spot 54	71.735	104745.440	1.909	5.448	0.887	10.480		1.936	0.413	1.721	0.889	2226.931	32.398	2478.158	17.944	2691.091	14.655	2691.091	14.655	288.945
Spot 55	184.371	6820.115	2.125	17.938	0.969	0.481		2.338	0.065	0.790	0.338	404.436	3.096	398.479	7.706	364.049	49.612	404.436	3.096	56.328
xx	1858.090	16402.909	5.228	20.527	0.691	0.098		1.041	0.015	0.754	0.725	94.703	0.709	94.916	0.943	100.255	16.979	94.703	0.709	266.465
xx	236.711	11999.533	1.090	9.996	4.440	0.105		4.609	0.008	1.235	0.268	49.237	0.606	101.308	4.444	1610.042	82.787	49.237	0.606	2200.977
xx	223.332	1415.782	1.739	19.437	3.222	0.024		4.400	0.004	1.549	0.352	27.340	0.423	24.152	1.050	NA	NA	27.340	0.423	365.763
Spot 59	63.742	19919.256	1.155	6.971	0.835	7.689		1.498	0.389	1.243	0.830	2118.720	22.438	2195.375	13.460	2267.739	14.421	2267.739	14.421	66.260
Spot 60	653.242	39798.424	7.151	13.389	0.727	1.491		1.400	0.145	1.193	0.852	872.263	9.735	926.824	8.510	1058.996	14.742	1058.996	14.742	56.252
Spot 61	208.435	10109.490	1.308	16.929	0.982	0.727		1.466	0.091	1.007	0.687	562.349	5.424	555.080	6.269	525.400	23.353	562.349	5.424	105.620
Spot 62	344.410	35622.884	1.079	11.240	0.611	2.661		1.205	0.217	1.037	0.860	1265.773	11.912	1317.737	8.897	1408.274	11.788	1408.274	11.788	222.259
Spot 63	102.191	31565.443	2.358	10.824	0.721	3.134		1.420	0.246	1.223	0.861	1418.583	15.576	1441.075	10.934	1474.409	13.695	1474.409	13.695	77.533
Spot 64	383.146	33510.613	3.095	9.211	0.663	4.066		1.201	0.271	1.001	0.834	1548.149	13.776	1647.608	9.786	1776.892	12.099	1776.892	12.099	54.726
Spot 65	38.697	33763.356	2.893	12.904	1.142	1.955		1.510	0.183	0.966	0.653	1083.860	9.895	1100.009	10.143	1132.078	22.775	1132.078	22.775	86.967
Spot 66	71.226	20142.985	20.458	5.148	0.797	13.738		1.522	0.512	1.296	0.852	2666.086	28.302	2731.822	14.403	2780.776	13.062	2780.776	13.062	3.751
Spot 67	320.665	57484.181	3.146	9.097	0.552	4.414		1.082	0.291	0.931	0.860	1644.594	13.508	1714.911	8.961	1801.865	10.056	1801.865	10.056	110.926
Spot 68	356.670	160246.770	6.142	9.948	0.758	3.995		1.513	0.288	1.310	0.865	1629.453	18.856	1638.190	12.290	1637.989	14.078	1637.989	14.078	173.344
xx	299.509	178534.981	2.498	19.709	1.557	0.105		2.112	0.015	1.427	0.676	95.877	1.358	101.261	2.035	229.903	35.947	95.877	1.358	8123.122
Spot 70	421.436	14239.700	2.494	12.727	0.664	1.733		1.397	0.162	1.228	0.879	966.127	11.022	1020.848	8.996	1140.100	13.238	1140.100	13.238	49.928
Spot 72	107.044	30633.001	1.457	15.965	1.086	0.860		1.634	0.100	1.220	0.747	616.363	7.171	630.362	7.672	680.884	23.223	616.363	7.171	263.890
Spot 73	255.675	12646.000	15.041	12.350	0.866	1.928		1.299	0.175	0.968	0.745	1040.758	9.305	1090.762	8.686	1191.983	17.097	1191.983	17.097	9.608
Spot 74	31.311	2051.928	2.875	16.157	1.710	0.683		6.914	0.091	1.588	0.229	558.598	8.468	528.782	28.504	402.052	150.879	558.598	8.468	17.902
Spot 75	140.317	65629.739	2.978	13.601	1.115	1.796		1.654	0.178	1.222	0.739	1055.248	11.891	1044.177	10.790	1021.065	22.594	1021.065	22.594	296.369
Spot 79	211.943	65692.591	3.312	9.543	0.708	4.483		1.250	0.311	1.030	0.824	1746.197	15.756	1727.835	10.379	1705.649	13.040	1705.649	13.040	114.992
Spot 81	165.788	31018.797	1.788	8.747	1.153	4.603		1.908	0.293	1.520	0.797	1658.738	22.226	1749.730	15.914	1860.210	20.826	1860.210	20.826	90.524
Spot 83	68.361	9293.086	2.667	13.394	0.961	1.763		2.034	0.175	1.482	0.728	1039.670	14.226	1031.777	13.180	1015.065	28.265	1015.065	28.265	25.473
Spot 84	829.925	16053.800	10.155	13.153	1.072	1.480		1.751	0.143	1.385	0.791	861.648	11.170	922.173	10.612	1069.902	21.537	1069.902	21.537	18.011
Spot 85	651.109	175748.522	10.191	5.730	0.902	11.207		2.030	0.466	1.818	0.896	2468.185	37.287	2540.525	18.922	2598.789	15.031	2598.789	15.031	109.179
Spot 87	85.875	118581.077	2.201	12.920	0.855	1.966		1.385	0.187	1.090	0.787	1105.099	11.072	1110.664	9.355	1121.556	17.043	1121.556	17.043	574.205
Spot 89	286.737	32592.325	0.751	9.697	0.653	3.703		1.305	0.262	1.125	0.862	1502.165	15.071	1572.045	10.433	1667.143	12.237	1667.143	12.237	267.498
Spot 90	77.664	16295.265	2.216	11.258	0.711	2.560		2.153	0.212	2.028	0.942	1238.135	22.848	1289.159	15.718	1375.174	13.871	1375.174	13.871	54.548
Spot 91	534.380	2876.593	3.713	11.351	1.626	0.920		2.208	0.080	1.487	0.674	498.219	7.131	662.155	10.739	1269.379	31.828	498.219	7.131	25.661
Spot 92	138.282	7900.362	1.040	17.050	1.003	0.667		1.917	0.085	0.862	0.449	528.008	4.369	518.867	7.789	478.797	37.853	528.008	4.369	109.643
Spot 93	93.205	33070.235	2.477	10.794	0.860	3.203		1.527	0.253	1.260	0.825	1451.427	16.380	1457.948	11.817	1467.446	16.371	1467.446	16.371	92.513
Spot 94	199.391	26953.851	2.113	17.623	1.012	0.567		1.512	0.073	1.100	0.728	456.082	4.845	455.927	5.554	455.124	23.011	456.082	4.845	238.988

Spot 95	100.720	304002.534	1.616	13.331	0.892	1.619	1.655	0.157	1.395	0.842	940.120	12.200	977.596	10.391	1062.789	17.926	1062.789	17.926	2168.363
Spot 97	68.367	185352.846	2.161	5.425	0.967	12.807	1.554	0.505	1.217	0.783	2635.558	26.334	2665.557	14.641	2688.382	15.976	2688.382	15.976	385.525
Spot 98	414.016	39444.877	1.656	17.957	0.812	0.503	1.238	0.066	0.934	0.754	413.156	3.737	413.899	4.209	418.019	18.162	413.156	3.737	315.591
Spot 100	543.537	79606.122	2.013	10.328	0.626	3.492	1.282	0.263	1.118	0.872	1503.123	14.994	1525.507	10.118	1556.679	11.755	1556.679	11.755	277.954
Spot 103	219.441	130823.410	1.282	10.143	0.605	3.750	1.169	0.276	1.001	0.856	1571.843	13.958	1582.093	9.375	1595.767	11.300	1595.767	11.300	529.373
xx	241.915	5363.923	5.809	19.633	1.322	0.181	3.299	0.027	0.992	0.301	173.536	1.698	168.987	5.136	105.725	74.358	173.536	1.698	57.625
Spot 105	101.188	17628.724	1.480	9.696	0.714	3.621	1.580	0.257	1.404	0.889	1473.794	18.497	1554.193	12.568	1665.238	13.391	1665.238	13.391	50.286
Spot 106	244.689	16325.243	1.672	17.673	1.163	0.529	1.399	0.069	0.775	0.554	429.961	3.221	430.992	4.913	436.487	25.956	429.961	3.221	186.073
Spot 107	163.738	8846.492	1.494	18.789	1.473	0.270	2.445	0.038	1.477	0.604	240.935	3.493	243.055	5.285	263.553	44.748	240.935	3.493	211.687
Spot 108	153.295	204015.695	2.203	9.870	0.834	3.922	1.450	0.281	1.186	0.818	1597.792	16.777	1618.270	11.730	1644.993	15.480	1644.993	15.480	626.756
Spot 109	178.945	58532.274	3.808	9.227	0.765	4.702	1.132	0.316	0.834	0.737	1768.283	12.902	1767.605	9.480	1766.788	13.983	1766.788	13.983	87.348
Spot 110	114.706	49354.175	2.540	9.183	0.624	4.637	1.401	0.310	1.254	0.895	1739.991	19.124	1755.883	11.702	1774.834	11.399	1774.834	11.399	107.751
xx	150.067	2496.465	1.547	8.819	11.255	0.012	11.574	0.001	2.699	0.233	5.163	0.139	12.010	1.382	1760.761	206.427	5.163	0.139	2161.419
xx	80.128	2271.368	2.188	17.380	3.176	0.077	3.423	0.011	1.234	0.360	69.930	0.858	75.056	2.476	241.521	73.595	69.930	0.858	143.000
xx	123.232	10710.419	1.991	19.880	3.153	0.052	3.529	0.008	1.578	0.447	49.265	0.774	51.257	1.764	145.448	74.052	49.265	0.774	1008.218
Spot 114	114.537	37833.439	2.406	10.670	0.853	3.320	1.313	0.258	0.998	0.760	1478.536	13.182	1485.751	10.247	1496.050	16.152	1496.050	16.152	78.976
Spot 115	142.436	256390.750	2.356	11.288	0.748	2.886	1.289	0.236	1.050	0.814	1367.500	12.934	1378.344	9.720	1395.162	14.345	1395.162	14.345	860.882
Spot 116	214.657	12754.878	1.028	17.401	0.969	0.402	1.419	0.052	0.829	0.584	325.204	2.628	343.120	4.130	466.339	25.508	325.204	2.628	281.287
Spot 117	89.464	173081.148	2.909	5.199	0.967	13.884	1.518	0.523	1.170	0.771	2713.204	25.921	2741.795	14.378	2762.907	15.868	2762.907	15.868	220.599
xx	383.572	4457.757	1.274	18.728	1.337	0.109	2.589	0.016	1.128	0.436	101.267	1.134	105.471	2.594	201.514	54.130	101.267	1.134	267.987
Spot 119	81.645	14136.256	0.917	8.236	0.710	6.111	1.311	0.368	1.102	0.841	2017.876	19.090	1991.842	11.437	1964.916	12.660	1964.916	12.660	56.427
Spot 120	40.696	115046.355	1.391	11.408	0.764	2.505	1.114	0.207	0.811	0.728	1214.934	8.985	1273.595	8.087	1374.005	14.690	1374.005	14.690	699.835
Spot 121	65.059	68558.301	1.657	13.208	1.059	1.857	1.549	0.178	1.130	0.730	1057.337	11.021	1065.977	10.223	1083.707	21.234	1083.707	21.234	445.422
Spot 122	887.602	13122.616	13.745	12.839	1.015	1.762	1.548	0.166	1.167	0.754	991.763	10.729	1031.654	10.030	1117.239	20.290	1117.239	20.290	12.163
Spot 123	321.795	38628.046	1.702	14.833	0.909	0.967	1.695	0.105	1.430	0.844	641.044	8.723	686.920	8.459	840.246	18.922	641.044	8.723	382.936
Spot 124	265.043	51924.638	10.201	9.318	0.647	4.430	1.101	0.300	0.890	0.808	1690.380	13.230	1717.886	9.117	1751.559	11.854	1751.559	11.854	28.509
Spot 125	154.083	105725.368	54.699	8.835	0.474	5.032	0.930	0.323	0.800	0.860	1801.989	12.573	1824.752	7.874	1850.817	8.565	1850.817	8.565	12.774
Spot 126	251.772	525108.730	3.970	9.372	0.781	4.508	1.408	0.306	1.172	0.832	1722.068	17.710	1732.433	11.705	1744.956	14.311	1744.956	14.311	781.081
Spot 128	40.854	8190.889	1.480	8.770	1.153	4.888	1.990	0.314	1.503	0.755	1762.646	23.175	1800.141	16.772	1843.836	23.597	1843.836	23.597	26.543
Spot 130	37.539	4412.119	2.413	12.570	1.241	1.840	2.858	0.174	1.478	0.517	1035.503	14.141	1059.882	18.806	1110.413	48.854	1110.413	48.854	15.034
Spot 131	162.092	71825.698	1.456	5.661	0.823	11.925	1.407	0.489	1.141	0.811	2564.348	24.149	2598.525	13.184	2625.265	13.687	2625.265	13.687	182.980
Spot 134	72.801	11345.303	3.250	10.924	0.917	3.040	1.765	0.243	1.431	0.811	1401.665	18.029	1417.611	13.486	1441.631	19.687	1441.631	19.687	20.327
Spot 135	254.714	34347.356	1.963	5.416	0.620	12.733	1.330	0.499	1.177	0.885	2607.993	25.239	2660.111	12.523	2699.970	10.243	2699.970	10.243	51.661
Spot 136	92.299	179113.753	0.836	7.562	0.767	6.749	1.186	0.369	0.905	0.763	2022.417	15.714	2079.077	10.492	2135.667	13.414	2135.667	13.414	1064.463
Spot 137	368.682	807877.324	10.745	10.244	1.009	3.621	2.394	0.268	2.171	0.907	1529.188	29.552	1554.081	19.049	1588.066	18.860	1588.066	18.860	545.051
Spot 138	145.429	83460.079	1.726	10.735	0.543	3.347	0.876	0.260	0.687	0.784	1488.746	9.130	1492.180	6.846	1497.047	10.273	1497.047	10.273	302.889
Spot 139	41.421	15910.693	2.702	12.602	1.106	2.045	1.793	0.188	1.409	0.786	1111.200	14.385	1130.682	12.227	1168.304	21.948	1168.304	21.948	43.166
Spot 141	34.785	3491.841	1.558	15.633	1.449	0.815	2.535	0.098	1.144	0.451	604.750	6.603	605.020	11.554	606.010	48.914	604.750	6.603	29.692
Spot 143	77.604	56381.552	1.950	8.832	0.669	4.880	1.311	0.312	1.127	0.860	1750.571	17.281	1798.826	11.047	1855.214	12.089	1855.214	12.089	172.288
Spot 144	268.954	24954.160	12.808	9.025	0.540	4.619	0.872	0.303	0.685	0.785	1704.162	10.252	1752.688	7.281	1811.039	9.820	1811.039	9.820	8.453
Spot 145	69.291	20428.136	2.418	11.290	1.058	2.883	1.542	0.236	1.120	0.726	1368.363	13.803	1377.432	11.623	1391.499	20.338	1391.499	20.338	47.896
Spot 146	272.197	49529.177	4.105	9.160	0.743	4.739	1.243	0.314	0.996	0.801	1759.287	15.336	1774.227	10.421	1791.835	13.535	1791.835	13.535	72.688
Spot 147	262.448	157053.890	3.785	7.967	1.001	6.137	1.574	0.354	1.215	0.772	1951.923	20.460	1995.503	13.746	2040.926	17.702	2040.926	17.702	234.299
Spot 148	84.554	17470.747	1.371	11.791	0.878	2.573	1.580	0.221	1.293	0.818	1285.914	15.070	1293.007	11.553	1304.786	17.639	1304.786	17.639	83.604
Spot 149	223.573	3403986.920	1.339	9.361	0.676	4.500	1.204	0.304	0.995	0.827	1709.285	14.946	1730.971	9.999	1757.268	12.374	1757.268	12.374	14383.415
Spot 151	67.115	6487.881	1.871	10.140	0.954	3.666	1.709	0.274	1.417	0.829	1561.809	19.655	1563.973	13.634	1566.880	17.898	1566.880	17.898	18.716
Spot 152	60.505	25416.725	2.334	11.597	0.962	2.627	1.439	0.221	1.064	0.740	1288.570	12.429	1308.327	10.582	1340.847	18.709	1340.847	18.709	74.618
Spot 153	233.093	127291.788	3.347	9.334	0.779	4.619	1.530	0.311	1.318	0.861	1746.322	20.156	1752.667	12.775	1760.225	14.236	1760.225	14.236	221.742
Spot 154	189.198	10478.631	7.504	17.750	1.203	0.505	1.898	0.066	1.339	0.705	413.483	5.361	414.981	6.466	423.298	30.050	413.483	5.361	28.777

Spot 155	145.455	24314.716	2.799	10.701	0.735	3.381	1.313	0.262	1.083	0.824	1502.290	14.506	1499.898	10.292	1496.502	14.070	1496.502	14.070	48.307
Spot 157	183.245	81283.823	2.025	12.309	0.639	2.125	1.023	0.189	0.799	0.781	1116.268	8.188	1157.089	7.065	1234.386	12.557	1234.386	12.557	388.004
Spot 158	843.057	51056.010	170.206	14.605	0.547	1.423	0.996	0.150	0.832	0.835	903.645	7.014	898.596	5.941	886.193	11.320	903.645	7.014	11.066
Spot 159	202.766	1735.754	1.521	20.282	1.752	0.087	2.413	0.015	1.238	0.513	98.094	1.205	84.331	1.953	NA	NA	98.094	1.205	102.368
Spot 160	324.412	42869.198	4.077	17.266	1.260	0.479	2.598	0.060	2.272	0.874	375.855	8.296	397.533	8.548	525.617	27.638	375.855	8.296	353.384
Spot 161	40.584	66975.954	0.612	5.570	0.702	12.462	1.414	0.501	1.227	0.868	2618.430	26.411	2639.891	13.292	2656.370	11.646	2656.370	11.646	437.599
Spot 162	281.093	80049.535	2.153	9.758	0.446	4.065	0.992	0.287	0.886	0.893	1624.350	12.726	1647.401	8.086	1676.915	8.245	1676.915	8.245	179.298
Spot 163	262.217	31228.881	2.764	18.582	1.161	0.309	1.885	0.042	1.472	0.781	264.157	3.809	273.734	4.522	356.424	26.580	264.157	3.809	383.758
Spot 164	235.159	2469224.781	10.130	17.965	1.189	0.460	1.850	0.060	1.417	0.766	372.699	5.130	384.260	5.918	454.488	26.395	372.699	5.130	8078.248
Spot 165	307.589	25881.254	1.772	9.441	0.527	4.359	1.008	0.298	0.859	0.852	1680.639	12.712	1704.608	8.325	1734.182	9.663	1734.182	9.663	64.805
Spot 166	37.490	148185.330	1.136	13.268	1.443	1.708	1.907	0.164	1.247	0.654	976.739	11.304	1011.379	12.215	1087.190	28.926	1087.190	28.926	1515.834
Spot 167	438.674	37153.051	3.287	13.579	0.769	1.767	1.391	0.174	1.159	0.833	1034.784	11.083	1033.583	9.022	1031.025	15.564	1031.025	15.564	80.724
Spot 168	578.115	20659.428	1.792	11.362	0.652	2.348	4.079	0.194	4.026	0.987	1143.146	42.176	1226.895	29.053	1377.248	12.560	1377.248	12.560	60.097
Spot 169	53.194	17473.508	1.167	8.615	0.722	5.424	1.354	0.339	1.138	0.836	1883.805	18.505	1888.620	11.613	1899.900	13.356	1893.900	13.356	52.685
Spot 170	221.685	314811.533	2.061	6.675	0.689	8.788	1.103	0.423	0.861	0.781	2275.627	16.517	2316.209	10.058	2352.165	11.778	2352.165	11.778	590.024
Spot 171	270.309	25688.607	0.923	5.805	0.791	9.292	1.537	0.390	1.318	0.857	2124.190	23.845	2367.223	14.090	2583.665	13.208	2583.665	13.208	50.835
Spot 172	104.808	1841078.080	1.795	10.640	0.994	3.301	1.260	0.253	0.774	0.614	1456.293	10.084	1481.313	9.818	1517.317	18.756	1517.317	18.756	6837.068
Spot 173	49.065	7897.848	1.304	16.184	1.464	0.825	1.950	0.099	1.282	0.657	609.591	7.456	610.958	8.950	616.011	31.714	609.591	7.456	87.965
Spot 175	51.072	10861.262	1.238	9.687	0.805	4.393	1.286	0.311	0.949	0.738	1744.931	14.508	1711.024	10.633	1669.747	16.034	1669.747	16.034	40.120
Spot 176	64.771	31255.817	1.308	11.189	0.708	2.804	1.383	0.228	1.187	0.858	1321.602	14.179	1356.711	10.349	1412.457	13.575	1412.457	13.575	146.743
Spot 177	118.586	4580.537	1.288	17.569	1.215	0.542	1.807	0.073	0.964	0.533	452.878	4.215	439.709	6.450	371.322	34.429	452.878	4.215	67.574
Spot 178	133.380	17861.405	3.486	17.314	1.299	0.547	1.915	0.069	1.395	0.728	432.294	5.831	443.278	6.877	500.710	28.884	432.294	5.831	99.373
Spot 179	308.532	23423.633	1.205	16.740	1.025	0.405	1.344	0.049	0.845	0.629	310.957	2.566	345.075	3.932	581.675	22.678	310.957	2.566	446.556
Spot 180	326.529	113547.992	1.561	6.133	0.617	10.202	1.161	0.452	0.983	0.847	2403.625	19.718	2453.262	10.733	2494.650	10.400	2494.650	10.400	288.708
Spot 181	173.288	19840.892	1.246	10.319	0.663	3.566	1.107	0.267	0.887	0.801	1527.939	12.061	1541.983	8.780	1561.273	12.435	1561.273	12.435	75.071
Spot 182	557.943	186217.267	10.474	10.341	0.695	3.633	1.457	0.271	1.280	0.879	1547.590	17.616	1556.801	11.602	1569.304	13.029	1569.304	13.029	135.892
Spot 183	456.915	1012.759	1.417	15.706	3.235	0.031	5.740	0.005	1.611	0.281	29.365	0.472	31.083	1.757	165.968	128.802	29.365	0.472	340.547
Spot 184	298.355	37456.940	1.943	18.114	1.322	0.185	1.486	0.024	0.677	0.456	155.284	1.039	172.598	2.358	416.970	29.540	155.284	1.039	922.832
Spot 185	150.326	43287.673	2.569	9.305	0.550	4.755	1.114	0.320	0.968	0.869	1790.721	15.141	1777.071	9.349	1761.057	10.080	1761.057	10.080	86.382
Spot 186	524.338	166125.448	2.449	10.747	0.673	3.406	1.269	0.264	1.076	0.848	1511.930	14.508	1505.690	9.963	1496.903	12.723	1496.903	12.723	450.689
Spot 187	118.115	72265.311	2.227	5.990	0.734	10.628	1.339	0.460	1.120	0.837	2438.812	22.751	2491.183	12.430	2534.151	12.311	2534.151	12.311	140.570
Spot 188	473.193	96867.049	2.190	11.938	0.717	2.535	1.220	0.219	0.987	0.809	1274.983	11.418	1282.003	8.884	1299.770	13.953	1293.770	13.953	363.637
Spot 189	215.054	102533.228	2.933	9.051	0.723	4.703	1.385	0.307	1.181	0.853	1726.584	17.891	1767.717	11.597	1816.649	13.127	1816.649	13.127	218.852
Spot 192	470.820	1613.761	1.916	20.031	2.275	0.025	11.699	0.005	1.204	0.103	29.019	0.349	25.518	2.948	NA	NA	29.019	0.349	344.599
Spot 193	141.649	20947.940	1.241	15.707	1.868	0.531	2.252	0.061	1.254	0.557	380.407	4.633	432.265	7.927	718.918	39.705	380.407	4.633	358.699
Spot 194	184.286	3936.557	4.141	14.198	1.386	0.685	1.834	0.074	0.930	0.507	460.422	4.132	530.066	7.572	842.386	32.891	460.422	4.132	21.819
Spot 195	74.064	37772.757	3.812	9.991	1.058	3.953	1.648	0.286	1.263	0.766	1621.165	18.103	1624.629	13.354	1629.101	19.674	1629.101	19.674	51.016
Spot 196	795.781	1636.441	2.363	11.459	3.040	0.697	3.961	0.064	1.416	0.421	399.569	5.485	537.025	14.016	1173.663	60.325	399.569	5.485	25.027
Spot 197	199.225	30903.230	3.537	9.585	0.717	4.319	1.280	0.300	1.059	0.827	1690.729	15.755	1697.070	10.558	1704.892	13.240	1704.892	13.240	37.798
Spot 199	62.295	84209.251	2.211	5.438	0.874	12.728	1.275	0.500	0.929	0.728	2612.757	19.954	2659.749	12.006	2695.667	14.431	2695.667	14.431	139.914
Spot 207	97.018	42597.107	2.418	4.607	0.825	17.066	1.402	0.568	1.134	0.808	2900.503	26.478	2938.570	13.450	2964.730	13.309	2964.730	13.309	62.499
Spot 208	545.601	5305.171	1.529	20.166	1.843	0.077	2.498	0.012	1.137	0.455	75.688	0.855	74.931	1.804	50.847	NA	75.688	0.855	354.892
Spot 209	99.060	32741.656	5.268	10.157	0.958	3.292	1.514	0.242	1.170	0.773	1398.766	14.718	1479.109	11.790	1596.318	17.923	1596.318	17.923	51.655
Spot 210	278.095	14677.561	1.102	20.572	1.772	0.078	2.085	0.012	1.097	0.526	75.439	0.822	75.896	1.525	90.319	42.015	75.439	0.822	1422.338
Spot 212	152.522	1484.001	2.222	19.723	1.636	0.150	2.288	0.027	1.434	0.627	168.959	2.392	141.584	3.024	NA	NA	168.959	2.392	59.186
Spot 213	198.501	30657.915	2.444	10.731	0.704	3.291	1.159	0.256	0.920	0.794	1470.612	12.099	1478.988	9.025	1491.007	13.338	1491.007	13.338	63.222
Spot 214	132.692	27689.393	1.743	10.012	1.800	3.756	2.859	0.273	2.220	0.777	1555.891	30.692	1588.358	22.926	1620.123	38.511	1620.123	38.511	71.726
Spot 218	27.728	17135.562	1.314	11.371	0.940	2.614	1.375	0.217	0.992	0.722	1266.147	11.408	1304.579	10.101	1368.332	18.329	1368.332	18.329	70.956
Spot 219	241.369	30492.436	1.979	10.636	0.547	3.163	1.145	0.245	1.000	0.873	1410.054	12.659	1448.059	8.835	1504.287	10.565	1504.287	10.565	107.597

Spot 227	60.405	38112.875	1.278	13.065	0.775	1.935	1.329	0.184	1.080	0.813	1086.967	10.802	1098.115	8.897	1105.398	15.493	1105.398	15.493	210.885
Spot 228	23.729	4299.840	1.556	13.114	1.141	1.683	2.655	0.167	0.757	0.285	994.809	6.977	1002.150	16.909	1018.226	51.536	1018.226	51.536	18.125
Spot 230	232.239	13225.089	16.779	16.268	0.962	0.839	1.632	0.100	1.282	0.785	617.259	7.543	618.541	7.560	623.216	21.816	617.259	7.543	16.201
Spot 231	11.472	6140.205	1.866	13.020	1.865	1.718	2.293	0.167	1.277	0.557	995.174	11.777	1015.323	14.716	1059.056	38.336	1059.056	38.336	29.602
Spot 232	233.407	33109.756	3.277	9.226	0.723	4.634	1.177	0.311	0.928	0.789	1743.613	14.183	1755.403	9.827	1769.452	13.202	1769.452	13.202	40.902
Spot 234	356.655	17665.260	2.188	15.878	0.900	0.685	1.541	0.080	1.249	0.811	494.550	5.948	529.518	6.358	683.241	19.231	494.550	5.948	126.935
r33	584.881	31520.205	1.367	17.925	0.991	0.518	1.596	0.068	1.251	0.783	422.999	5.121	423.937	5.533	429.018	22.116	422.999	5.121	468.741
Spot 236	68.601	32086.940	0.757	9.801	0.675	3.989	1.052	0.284	0.805	0.765	1612.264	11.484	1631.950	8.544	1657.399	12.553	1657.399	12.553	222.329
Spot 238	331.228	24490.522	2.636	16.784	0.678	0.727	1.096	0.089	0.860	0.785	550.390	4.539	554.888	4.684	573.363	14.757	550.390	4.539	122.488
Spot 240	37.585	45345.079	3.237	12.427	0.942	2.075	1.468	0.187	1.125	0.767	1106.049	11.439	1140.605	10.058	1206.957	18.553	1206.957	18.553	134.451
Spot 242	45.433	6714.279	1.540	9.909	0.799	3.735	1.521	0.273	1.292	0.849	1556.111	17.861	1578.993	12.182	1609.683	14.955	1609.683	14.955	18.962
Spot 243	268.201	110942.116	3.049	9.000	0.691	4.968	1.452	0.323	1.277	0.879	1804.305	20.097	1813.830	12.273	1824.773	12.535	1824.773	12.535	188.502
r33	646.073	60016.658	1.579	18.150	0.997	0.524	1.557	0.069	1.195	0.768	429.425	4.965	427.548	5.432	417.421	22.285	429.425	4.965	1008.259
Spot 246	421.749	2789602.210	3.675	9.599	0.697	4.507	1.068	0.312	0.809	0.757	1751.468	12.405	1732.217	8.873	1709.025	12.826	1709.025	12.826	3943.006
Spot 250	133.472	21988.198	3.032	9.366	0.685	4.554	1.261	0.310	1.044	0.828	1738.698	15.907	1740.843	10.500	1743.403	12.966	1743.403	12.966	31.370
xx	65.030	3922.869	10.977	16.784	1.204	0.696	2.656	0.090	1.270	0.478	554.839	6.750	536.161	11.065	457.449	51.775	554.839	6.750	18.023
Spot 258	98.254	69053.054	1.768	12.259	0.782	2.347	1.300	0.208	1.038	0.799	1219.504	11.532	1226.688	9.253	1239.352	15.349	1239.352	15.349	292.114
sl	187.920	24043.193	5.155	16.680	1.141	0.772	1.748	0.094	1.318	0.754	578.812	7.295	581.070	7.736	589.905	24.925	578.812	7.295	70.985
Spot 267	204.067	128496.730	3.931	9.624	0.605	4.541	1.310	0.316	1.162	0.887	1769.459	17.985	1738.604	10.905	1701.670	11.143	1701.670	11.143	227.497
Spot 268	350.388	32164.828	4.579	13.341	0.645	1.761	1.223	0.171	1.034	0.845	1015.063	9.707	1031.185	7.923	1065.562	13.158	1065.562	13.158	79.614
Spot 269	47.766	2846.658	1.819	12.962	1.204	1.707	1.561	0.171	0.990	0.634	1015.826	9.306	1011.265	9.997	1001.381	24.509	1001.381	24.509	10.984
Spot 271	725.236	3169.396	1.734	13.712	0.946	0.420	2.536	0.044	2.351	0.927	279.019	6.420	355.703	7.610	892.289	19.603	279.019	6.420	55.972
Spot 277	318.091	32491.402	3.430	10.688	0.738	3.354	1.199	0.260	0.946	0.788	1490.448	12.583	1498.825	9.382	1498.603	13.954	1498.603	13.954	52.055
Spot 280	82.074	176292.254	0.996	5.095	0.859	14.572	1.555	0.536	1.296	0.833	2768.363	29.161	2787.699	14.773	2801.709	14.055	2801.709	14.055	635.063
Spot 282	195.071	39176.076	2.688	17.521	0.809	0.513	1.161	0.065	0.832	0.717	407.932	3.289	420.395	3.996	489.347	17.878	407.932	3.289	315.268
Spot 284	672.492	7289.637	2.271	20.035	0.986	0.103	1.559	0.016	0.870	0.558	99.558	0.859	99.726	1.481	103.742	30.613	99.558	0.859	232.191
Spot 286	419.763	34599.975	1.107	18.017	0.853	0.504	1.303	0.066	0.973	0.747	412.640	3.888	414.078	4.430	422.075	19.344	412.640	3.888	561.071
Spot 287	52.376	1191.800	1.120	16.538	1.760	0.408	2.662	0.061	0.958	0.360	384.023	3.573	347.784	7.840	112.296	58.603	384.023	3.573	26.040
Spot 289	682.184	50711.985	4.939	12.761	0.728	2.069	1.066	0.192	0.779	0.730	1130.242	8.071	1138.691	7.301	1154.808	14.481	1154.808	14.481	85.629
Spot 292	266.503	14582.946	2.184	17.497	1.024	0.577	1.543	0.074	1.037	0.672	462.186	4.625	462.649	5.735	464.968	25.322	462.186	4.625	127.808
Spot 294	294.308	45562.445	2.883	13.294	0.863	1.900	1.294	0.183	0.962	0.744	1085.614	9.616	1081.085	8.608	1071.988	17.355	1071.988	17.355	156.010
Spot 295	207.148	129158.405	1.881	8.046	0.810	6.176	1.363	0.360	1.097	0.804	1980.482	18.697	2001.073	11.913	2022.386	14.347	2022.386	14.347	363.196
Spot 296	65.962	2177.067	1.276	15.826	1.274	0.750	1.690	0.096	1.035	0.613	591.000	5.848	588.434	7.358	479.135	29.526	591.000	5.848	22.956
Spot 297	255.531	31088.851	4.394	9.404	0.849	4.463	1.431	0.305	1.149	0.803	1714.735	17.296	1724.207	11.867	1735.709	15.633	1735.709	15.633	45.157
Spot 298	362.398	2051.677	0.962	17.091	3.004	0.032	3.737	0.004	1.298	0.347	28.755	0.372	31.735	1.168	263.434	80.469	28.755	0.372	528.651
Spot 299	44.160	35501.063	1.043	7.783	0.892	6.579	1.693	0.371	1.439	0.850	2035.581	25.120	2056.527	14.926	2077.571	15.710	2077.571	15.710	180.404
Spot 300	320.324	30269.674	1.633	17.733	0.848	0.510	1.384	0.066	1.089	0.787	412.070	4.348	418.750	4.750	455.732	18.963	412.070	4.348	352.738
Spot 301	133.064	126191.853	8.255	12.170	0.952	2.393	1.560	0.211	1.235	0.792	1232.311	13.857	1240.502	11.170	1254.773	18.628	1254.773	18.628	144.413
Spot 302	187.727	371232.536	2.022	9.669	0.888	4.370	1.176	0.305	0.771	0.656	1717.568	11.620	1706.618	9.715	1698.187	16.369	1693.187	16.369	908.688
Spot 303	407.077	55568.745	1.690	13.483	0.831	1.897	1.333	0.185	1.041	0.781	1096.538	10.498	1080.094	8.862	1047.083	16.796	1047.083	16.796	290.364
Spot 304	140.276	33588.665	2.167	5.473	0.885	13.198	1.445	0.523	1.141	0.790	2710.004	25.246	2698.909	13.637	2681.845	14.655	2681.845	14.655	57.214
Spot 305	21.466	10844.376	2.538	5.097	0.855	14.883	1.419	0.551	1.126	0.794	2828.385	25.789	2807.816	13.498	2798.062	14.114	2793.062	14.114	12.270
Spot 306	127.663	35735.277	2.410	13.273	0.941	1.904	1.411	0.183	1.048	0.743	1085.672	10.472	1082.398	9.393	1075.812	18.956	1075.812	18.956	150.279
Spot 307	44.900	6859.987	1.668	13.751	1.168	1.570	1.692	0.161	1.081	0.639	959.676	9.639	958.577	10.499	956.036	26.633	956.036	26.633	37.016
Spot 308	329.922	13281.402	1.573	17.900	1.029	0.525	1.476	0.069	1.053	0.714	431.478	4.396	428.526	5.159	412.661	23.108	431.478	4.396	165.484
Spot 309	43.454	6258.013	2.121	12.355	1.263	2.112	2.003	0.194	1.480	0.739	1141.029	15.472	1152.737	13.805	1174.838	26.713	1174.838	26.713	21.590
Spot 310	114.267	142528.285	1.562	11.821	0.976	2.398	1.724	0.205	1.421	0.824	1200.669	15.570	1242.074	12.354	1314.601	18.924	1314.601	18.924	943.088
Spot 311	65.602	15174.626	2.128	9.927	0.858	3.938	1.544	0.284	1.246	0.807	1612.001	17.772	1621.485	12.501	1633.799	16.929	1633.799	16.929	35.488
Spot 312	126.547	33085.289	1.443	17.358	1.184	0.537	1.576	0.068	1.039	0.659	422.370	4.248	436.759	5.593	513.343	26.048	422.370	4.248	576.765

Spot 313	370.600	31376.900	6.014	18.027	0.898	0.528	1.516	0.069	1.214	0.800	430.604	5.055	430.206	5.318	428.057	20.272	430.604	5.055	102.000
Spot 315	32.149	3878.270	1.457	9.858	0.844	3.544	1.746	0.261	1.524	0.873	1492.480	20.304	1537.108	13.828	1599.039	15.903	1599.039	15.903	15.273
xx	63.133	1991.766	11.422	16.387	1.361	0.667	2.047	0.090	1.493	0.729	553.375	7.918	519.133	8.319	371.126	31.508	553.375	7.918	18.071