Supplemental Material Table 1: Details for Table 1 of the paper.

Ichnotaxon	Biological Counterpart (Trackmaker)
Ameghinichnus	advanced synapsid, possibly trithelodontid (*1*)
Rhynchosauroides hyperbates	lepidosauromorph or primitive archosauromorph (*2*,*3*)
Rhynchosauroides spp.	lepidosauromorphs (*2*,*3*)
Chirotherium lulli	crurotarsan, possibly aetosaurid (*4*)
Procolophonichnium	procolophonid parareptile (*5*)
Gwyneddichnium	tanystropheid (*6*)
Apatopus	phytosaur (*3*)
Brachychirotherium parvum	rauisuchian crurotarsan (*7*)
new taxon B	crurotarsan, possibly crocodylomorph (*8*)
Batrachopus deweyii	crocodylomorph (*9*)
"*Batrachopus*" *gracilis*	crocodylomorph (*9*)
unnamed dinosaurian genus 1	unknown dinosaur, perhaps herrerasaurid
Otozoum	prosauropod dinosaurs (*10*,*11*)
"*Grallator*"	small theropod dinosaur (*12*)
"*Anchisauripus*"	small to medium sized theropod dinosaur (*12*)
Eubrontes giganteus	large theropod dinosaur (*12*)
Atreipus spp.	ornithischian dinosaur (*13*)
Anomoepus scambus	ornithischian dinosaur (*14*)

Supplementary Materials: Table 2: Ages and localities for Figure 2 of paper and Figures 1 and 2 of supplementary materials. na, indicates that although many tracks are known from the locality and are in various institutions, we have not attempted to quantify their numbers for this study;
Maximum size is based on a survey of the largest of the specimens ([15]).

Ichnotaxa

age Ma	Formation	Abbrev -iation	Basin	Locality	Age	Ichnotaxa	#Non-Dino-saur Tracks	#Dino-saur Tracks	%Dino-saur Tracks	Max. Thero-pod Track Size	#Non Dino-saur Taxa	#Dino-saur Taxa	%Dino-saur Taxa	Comments
199	Portland	1	Hartford	Stony Brook, Kelsey Furguson Quarry, Simsbury, CT	Hettangian-Sinemurian	*Batrachopus deweyii, Grallator parallelus, Anchisauripus tuberosus, Eubrontes giganteus, Otozoum moodii, Anomoepus scambus*	na	na	na	34	1	5	83	(*16*)
199	McCoy Brook	2	Fundy	Five Islands Provincial Park, Blue Sac shore	Hettangian-Sinemurian	*Batrachopus deweyii, Batrachopus gracilis, Grallator parallelus, Anchisauripus tuberosus, Eubrontes giganteus, Anomoepus scambus, Otozoum moodii*	na	na	na	35	2	5	71	(*14,27*)
200	Portland	3	Hartford	Chicopee, MA	Hettangian-Sinemurian	*Batrachopus deweyii, Grallator parallelus, Anchisauripus tuberosus, Anomoepus scambus*	na	na	na	20	1	3	75	(revised from ref. *17*)
200	Turners Falls	4	Deerfield	Stoughton Quarry, Montague, MA	Hettangian	*Batrachopus deweyii, Batrachopus gracilis, Grallator parallelus, Anchisauripus tuberosus, Eubrontes giganteus*	na	na	na	35	2	3	60	(revised from ref. *17*,)
200	Turners Falls	5	Deerfield	Barton Cove, Lily Pond, Gill, MA	Hettangian	*Batrachopus deweyii, Batrachopus gracilis, Grallator parallelus, Anchisauripus tuberosus, Eubrontes giganteus, Anomoepus scambus*	na	na	na	35	2	4	67	(revised from ref. *17*)
201	Portland	6	Hartford	Portland brownstone Quarry, Portland, CT	Hettangian	*Batrachopus deweyii, Grallator parallelus, Anchisauripus tuberosus, Anomoepus scambus, Otozoum moodii*	na	na	na	25	1	4	80	(revised from ref. *17*)
201	Boonton	7	Newark	Boonton Dam, Boonton, NJ	Hettangian	*Batrachopus deweyii, Grallator parallelus, Anchisauripus tuberosus, Eubrontes giganteus, Anomoepus scambus*	1	9	82	35	1	4	80	youngest Newark basin assemblage (*16*)

201	Towaco	8	Newark	Riker Hill Quarry, Roseland, NJ	Hettangian	*Ameghinichnus* n. sp., *Batrachopus deweyii*, *Grallator parallelus*, *Anchisauripus tuberosus*, *Eubrontes giganteus*, *Anomoepus scambus*	100	1400	93	35	2	4	67	the most densely sampled locality in Newark basin (*17)*
201	Towaco	9	Newark	Stephen Drive, Montville, NJ	Hettangian	*Rhynchosauroides* sp., *Grallator parallelus*, *Anchisauripus tuberosus*	1	9	82	20	1	2	67	LA Rhynchosauroides (*16*)
201	East Berlin and lower Turners Falls	10	Hartford		Hettangian	*Batrachopus deweyii*, *Grallator parallelus*, *Anchisauripus tuberosus*, *Eubrontes giganteus*, *Anomoepus scambus*	na	na	na	36	1	4	80	(revised from ref.*17*)
201	Towaco	11	Newark	Vreeland Quarry, Montville, NJ	Hettangian	*Batrachopus deweyii*, *Grallator parallelus*, *Anchisauripus tuberosus*, *Eubrontes giganteus*, *Anomoepus scambus*	1	404	100	35	1	4	80	(*16*)
201	Towaco	12	Newark	Toms Point, Lincoln Park, NJ	Hettangian	*Batrachopus deweyii*, *Grallator parallelus*, *Anchisauripus tuberosus*, *Eubrontes giganteus*, *Anomoepus scambus*	1	99	98	35	1	4	80	(*16*)
201	Feltville	13	Newark	Shrump Quarry, Roseland, NJ	Hettangian	*Batrachopus deweyii*, *Grallator parallelus*, *Anchisauripus tuberosus*, *Anomoepus scambus*	1	9	82	25	1	3	75	(*16*)
201	Turkey Run	14	Culpeper	Oak Hill Estate, Aldie, VA	Hettangian	*Grallator parallelus*, *Anchisauripus tuberosus*, *Eubrontes giganteus*, cf. *Anomoepus scambus*	na	na	na	35	0	4	100	(*27*)
201	Feltville	15	Newark	Exeter Golf Course, Exeter, PA	Hettangian	*Grallator* cf. *G. parallelus*, *Anchisauripus tuberosus*, *Eubrontes giganteus*	0	4	100	33	0	3	100	(*16*)
201	McCoy Brook	16	Fundy	Wasson Bluff	Hettangian	*Batrachopus deweyii*, *Grallator parallelus*, *Anchisauripus tuberosus*, *Eubrontes giganteus*, *Anomoepus scambus*, *Otozoum moodii*	na	na	na	35	1	5	83	(*27*)
201	Shuttle Meadow	17	Hartford		Hettangian	*Batrachopus deweyii*, *Grallator parallelus*, *Anchisauripus tuberosus*, *Eubrontes giganteus*	na	na	na	34	1	3	75	(revised from ref. *17*)

201	Midland	18	Culpeper	Licking Run Reservoir, Midland, VA	Hettangian	*Grallator parallelus, Anchisauripus tuberosus, Eubrontes giganteus, Batrachopus deweyii*	na	na	na	34	1	4	80	(*16*)
201	Feltville	19	Newark	Vosseller Rd., Martinsville, NJ	Hettangian	*Anchisauripus tuberosus, Eubrontes giganteus*	0	6	100	35	0	2	100	oldest interflow assemblage (*16*)
201	Passaic	20	Newark	Exeter Village, Exeter, PA	Hettangian	*Rhynchosauroides* sp., *Grallator parallelus*	1	3	60	11	1	1	50	(*16*)
201	Passaic	21	Newark	R. H. Hamilton Quarry, and Montclair State Univ., Clifton and Paterson, NJ	Hettangian	*Rhynchosauroides* n. sp., *Batrachopus deweyii, Grallator parallelus, Anchisauripus tuberosus, Eubrontes giganteus*	200	1000	83	35	2	3	60	FA, *Eubrontes giganteus*; superb specimens of all taxa (*16*)
202	Passaic	22	Newark	Exeter Village, Exeter, PA	Rhaetian	*Batrachopus deweyii, Rhynchosauroides* sp., *Grallator parallelus, Anchisauripus tuberosus*	50	2	4	20	2	2	50	(*16*)
202	Passaic	23	Newark	Exeter Village, Exeter, PA	Rhaetian	*Rhynchosauroides* sp., *Grallator parallelus*	120	60	33	23	1	1	50	(*16*)
202	Passaic	24	Newark	Friendship Home, Exeter, PA	Rhaetian	*Rhynchosauroides sp., Batrachopus gracilis, Apatopus* sp., *?Brachychirotherium*, New taxon B, *Grallator parallelus, Anchisauripus tuberosus*	20	10	33	20	5	2	29	LA, definite *Apatopus* sp. modified from ref. (*18*)
202	Passaic	25	Newark	Friendship Home, Exeter, PA	Rhaetian	*Brachychirotherium* sp., *Grallator parallelus*	1	1	50	13	1	1	50	LA, definite *Brachychirotherium* (*16*)
202	Passaic	26	Newark	Friendship Home, Exeter, PA	Rhaetian	*Rhynchosauroides, Batrachopus gracilis, Brachychirotherium*, New taxon B, *Grallator parallelus, Anchisauripus tuberosus*	150	200	57	22	4	2	33	very good and abundant *Brachychirotherium*. Modified from ref. (*18*)

202	Passaic	27	Newark	Wingspread, Exeter, PA	Rhaetian	*Rhynchosauroides* sp., *Gwyneddichnium* sp., *Batrachopus gracilis, Brachychirotherium*, New Taxon B, *Grallator parallelus, Anchisauripus tuberosus*	~50	100	67	20	5	2	29	LA, *Gwyneddichnium*, very good *Anchisauripus tuberosus*. Modified from ref. (*18*)
202	Passaic	28	Newark	Type Pine Ridge, Exeter, PA	Rhaetian	*Grallator parallelus*	0	4	100	12	0	1	100	(*16*)
202	Passaic	29	Newark	Pathfinder Meadows, Exeter	Rhaetian	*Grallator parallelus*	0	2	100	11	0	1	100	(*16*)
202	Passaic	30	Newark	Pathfinder Meadows, Exeter Township	Rhaetian	NewTaxon B, *?Brachychirotherium* sp., *Rhynchosauroides* sp., *Grallator parallelus*	5	30	86	17	3	1	25	major reptile bone site (*26,16*)
202	Passaic	31	Newark	West Orange, NJ	Rhaetian	*Apatopus* sp.	1	0	0	na	1	0	0	(*19*)
204	Passaic	32	Newark	Heister's Creek, Exeter Township, PA	Rhaetian	*Rhynchosauroides* sp., New Taxon B, *?Gwyneddichnium* sp., *Grallator parallelus*	4	75	95	9	3	1	25	Modified from ref. (*8*)
204	Passaic	33	Newark	Tulpehocken Rd., Exeter Township	Rhaetian	*Grallator parallelus*	0	2	100	16	0	1	100	(*16*)
204	Passaic	34	Newark	Shelbourn Square, Exeter Township, PA	Rhaetian	*Rhynchosauroides* sp., New Taxon B, *Batrachopus gracilis, Brachychirotherium* sp., *Grallator parallelus*	10	20	67	9	4	1	20	Modified from ref. (*8*)
205	Passaic	35	Newark	Valley Ridge, Exeter Township, PA	Rhaetian	*Grallator parallelus*	0	12	100	9	0	1	100	(*16*)
205	Passaic	36	Newark	Fairview Chapel, Exeter Township, PA	Rhaetian	*Rhynchosauroides* sp.	20	0	0	na	1	0	0	(*16*)
206	Passaic	37	Newark	Passaic, NJ	Rhaetian	*Procolophonichnium* sp., *?Gwyneddichnium* sp.	3	0	0	na	2	0	0	(*19*)

206	Passaic	38	Newark	Furnace Hill, Exeter Township, PA	Rhaetian	*Rhynchosauroides* sp., *Batrachopus cf. B. gracilis*, *Brachychirotherium* sp., *Chirotherium lulli*, *Atreipus* sp., *Grallator parallelus*	75	40	35	10	6	1	14	modified from Szajna and Hartline (*20)* LA *C. lulli*, LA *Atreipus*
206	Blomidon	39	Fundy	Red Head, Rossway, Nova Scotia	?Rhaetian	*Rhynchosauroides* sp., *Apatopus cf. A. lineatus*, *Brachychirotherium, cf. Atreipus* sp., *Grallator parallelus*, *Anchisauripus tuberosus*	na	na	na	18	3	3	50	(*27*)
207	Passaic	40	Newark	Monacacy Hill , Amity Township, PA	?Rhaetian	*Rhynchosauroides* sp., *Brachychirotherium* sp., *Atreipus* sp.	8	2	20	na	2	1	33	(*16*)
208	Passaic	41	Newark	Victoria Hill, Amity Township, PA	?Rhaetian	*Rhynchosauroides* sp., *Apatopus lineatus*, New Taxon B, *Grallator parallelus*, *Anchisauripus tuberosus*	7	5	42	25	3	2	40	FA *Batrachopus cf. B. gracilis* (*16*)
208	Passaic	42	Newark	Douglassville, Amity Township, PA	?Norian	*Rhynchosauroides* sp., *Gwyneddichnium* sp., *?Batrachopus sp.*, *Brachychirotherium* sp., *Atreipus* sp., *Grallator parallelus*	5	200	98	10	4	2	33	modified from ref. (*8*)
209	Balls Bluff	43	Culpeper	Floris, VA	Norian	*Apatopus sp.*	na	na	na	na	1	0	0	(*21)*
209	Balls Bluff	44	Culpeper	Manassas National Park, VA	Norian	*Rhynchosauroides* sp.	na	na	na	na	1	0	0	(*22)*
210	Passaic	45	Newark	East Greenville	Norian	*Atreipus* sp.	0	6	100	14	0	1	100	(*16*)
211	Balls Bluff	46	Culpeper	Culpeper Crushed Stone Quarry, Stevensburg. VA	Norian	*Rhynchosauroides sp.*, *Brachychirotherium spp..* *Anchisauripus tuberosus*, *Anchisauripus sp.*	na	na	na	25	2	2	50	(*23)*
211	Passaic	47	Newark	Rutherford, NJ	Norian	*Rhynchosauroides* sp., *Apatopus* sp., *Brachychirotherium* sp., unnamed dinosaurian genus 1, *Atreipus* sp., *Grallator parallelus*, *Anchisauripus tuberosus*	50	50	50	16	3	4	57	FA *Anchisauripus tuberosus* Modified from ref. (*13*)

214	Passaic	48	Newark	Limrick Airport Business Campus, Limerick, PA	Norian	*Rhynchosauroides* sp., *Atreipus* sp., *Grallator parallelus*	6	6	50	5	1	2	67	(*16*)
214	Passaic	49	Newark	Sanatoga Commons, Liberty Hill, Sanatoga, PA	Norian	*Gwyneddichnium* sp., *Atreipus* sp.	2	2	50	11	1	1	50	(*16*)
214	Passaic	50	Newark	Sanatoga Auto Body Shop, Sanatoga, PA	Norian	*Rhynchosauroides* sp., *Brachychirotherium* sp., *Atreipus* sp.	32	8	20	14	2	1	33	(*16*)
215	Passaic	51	Newark	Smith-Clark Quarry, Milford, NJ	Norian	*Rhynchosauroides* sp., *R. hyperbates*, *Apatopus lineatus*, *Chirotherium lulli*, *Brachychirotherium* sp., *Atreipus* sp., *Grallator parallelus*, *new genus 2*	25	200	89	12	5	4	44	FA *C. lulli*. Modified from ref. (*13*)
215	Passaic	52	Newark	Sanatoga Quarry, Sanatoga, PA	Norian	*Rhynchosauroides* sp., *Brachychirotherium* sp., *Atreipus acadianus*, New Genus 1	900	250	22	10	2	2	50	Modified from ref. (*13*)
215	Blomidon	53	Fundy	Paddy Island area, Medford, Nova Scotia	Norian	*Rhynchosauroides* sp., *R. hyperbates*, *Apatopus lineatus*, *Chirotherium lulli*, *Brachychirotherium*, *Atreipus*, unnamed dinosaurian genus 1	na	na	na	na	5	3	38	
216	Passaic	54	Newark	Heather Glen, Limerick, PA	Norian	*Rhynchosauroides* sp, *Atreipus* sp	12	3	20	12	1	1	50	(*16*)
216	Passaic	55	Newark	Graterford Prison, Graterford, PA	Norian	*Rhynchosauroides* sp., *Atreipus* sp.	20	200	91	12	1	1	50	
217	Passaic	56	Newark	Nishisackawick Creek,	Carno-Norian	*Rhynchosauroides* sp., *Brachychirotherium* sp., *Atreipus* sp.	50	80	62	13	2	1	33	Modified from ref. (*13*)

217	Passaic	57	Newark	Mainland, PA	Carno-Norian	*Rhynchosauroides* sp., *Gwyneddichnium* sp., *Brachychirotherium* sp., *Atreipus* sp., *Grallator parallelus*	20	25	56	10	3	2	40	(*16*)
217	Passaic	58	Newark	Ridge Pike & Township Ln. Rd., Trappe, PA	Carno-Norian	*Rhynchosauroides* sp., *Brachychirotherium* sp., *Atreipus* sp., *Grallator parallelus*	38	12	24	10	2	2	50	(*16*)
218	Passaic	59	Newark	Blooming Glen Quarry, Blooming Glen, PA	Carnian	*Rhynchosauroides* sp., *Apatopus lineatus*, *Gwyneddichnium* sp., *Brachychirotherium* sp., *Atreipus* sp.	21	6	22	15	4	1	20	(*16*)
219	Lockatong	60	Newark	Upper Fairview, PA	Carnian	*Rhynchosauroides* sp., *Brachychirotherium* sp., indt. dinosaur	28	2	7	na	2	1	33	(*16*)
221	Lockatong	61	Newark	Arcola, PA	Carnian	*Rhynchosauroides* sp., *R. hyperbates*, *Gwyneddichnium* sp., *Apatopus* sp., *Brachychirotherium* sp., *Atreipus* sp., *Grallator parallelus*	200	10	5	12	5	2	29	FA *R. hyperbates*, Modified from ref. (*13*)
222	Lockatong	62	Newark	Gwynedd, PA	Carnian	*Gwyneddichnium* sp., *?Atreipus* sp.	20	2	9	12	1	1	50	FA *Gwyneddichnium* (*13*)
222	Stockton	63	Newark	Grandview and South Nyack, NY	Carnian	*Brachychirotherium* sp., *Atreipus* sp.	4	2	33	12	1	1	50	(*16*)
222	Stockton	64	Newark	Haverstraw (south), NY	Carnian	*Brachychirotherium* sp., *Grallator parallelus*	3	2	40	7	1	1	50	FA *Grallator parallelus*. Modified from ref. (*24*)
222	Stockton	65	Newark	Haverstraw (north), NY	Carnian	*Rhynchosauroides* sp., *Apatopus* sp., *Brachychirotherium* sp., *Atreipus* sp., *?Grallator parallelus* sp.	10	4	29	9	3	2	40	FA listed taxa; oldest Newark basin track assemblage? Modified from ref. (24)

Table 2, continued: Osteological Taxa

Age Ma	Formation	Abbrev-iation	Basin	Locality	Age	Osteological Taxon	Comments
199	Portland	66	Hartford	Hines Quarry, Longmeadow, MA	Sinemurian	protosuchian *Stegomus longipes*	type specimen, partial skeleton and skull (*17*)
201	McCoy Brook	67	Fundy	Wasson Bluff, Cumberland County, Nova Scotia	Hettangian	protosuchian *Protosuchus micmac*	Abundant skeleteal elements, site also has produced abundant prosauropod dinosaurs, rare ornithischian and possible theropod dinosaur teeth and bones, and abundant sphenosuchian skeletons and elements, and rare trithelodonts (*25*)
202	Passaic	68	Newark	Pathfinder Meadows, Exeter Township	Rhaetian	protosuchian *Protosuchus* sp., *Hypsognathus fennerii*	*Protosuchus*: osteoderms, jaw, postcranial fragments. *Hypsognathus*, abundant skulls, partial skeletons and individual bones and teeth (*16*)
202	Passaic	69	Newark	Walnut Street, Exeter Township, PA	Rhaetian	phytosauria indet.	teeth (*16*)
202	Passaic	70	Newark	Clifton, NJ	Rhaetian	*Hypsognathus fennerii*	type specimen, partial skeleton and mandibles (*26*)
205	Passaic	71	Newark	Passaic, NJ	Rhaetian	*Hypsognathus fennerii*	several partial skulls and skeletons (*26*)
206	Passaic	72	Newark	Passaic, NJ	Rhaetian	*Hypsognathus fennerii*	partial skull (*26*)
206	Blomidon	73	Fundy	Red Head, Rossway, Annapolis Co., Nova Scotia	Norian-Rhaetian	phytosauria indet.	rostrum, fragmentary mandible, osteoderm (*27*)
210	Passaic	74	Newark	East Greenville	Norian	*Hypsognathus fennerii*	partial skull (*26*)
211	Passaic	75	Newark	Hosensack Creek, lower Milford, PA	Norian	phytosaur: *Clepsysaurus pennsylvanicus*	teeth, skull and postcranial fragments (*28*)
214	Passaic	76	Newark	Sanatoga Auto Body Shop, Sanatoga, PA	Norian	phytosauria indet.	postcranial elements and teeth (*16*)
215	Passaic	77	Newark	Smith-Clark Quarry, Milford, NJ	Norian	phytosauria indet.	tooth (*16*)
215	Blomidon	78	Fundy	Paddy Island area, Medford, Nova Scotia	Norian	*Hypsognathus* cf. *H. fennerii*	Complete skull and fragmentary postcranial elements , partial mandible (26)
221	Lockatong	79	Newark	Granton Quarry, North Bergen, NJ	Carnian	phytosaur, cf. *Rutiodon*	partial juvenile skull (*29*)
222	Stockton	80	Newark	Edgewater, NJ	Carnian	*Rutiodon manhattanensis*	partial postcranial skeleton (*30*)

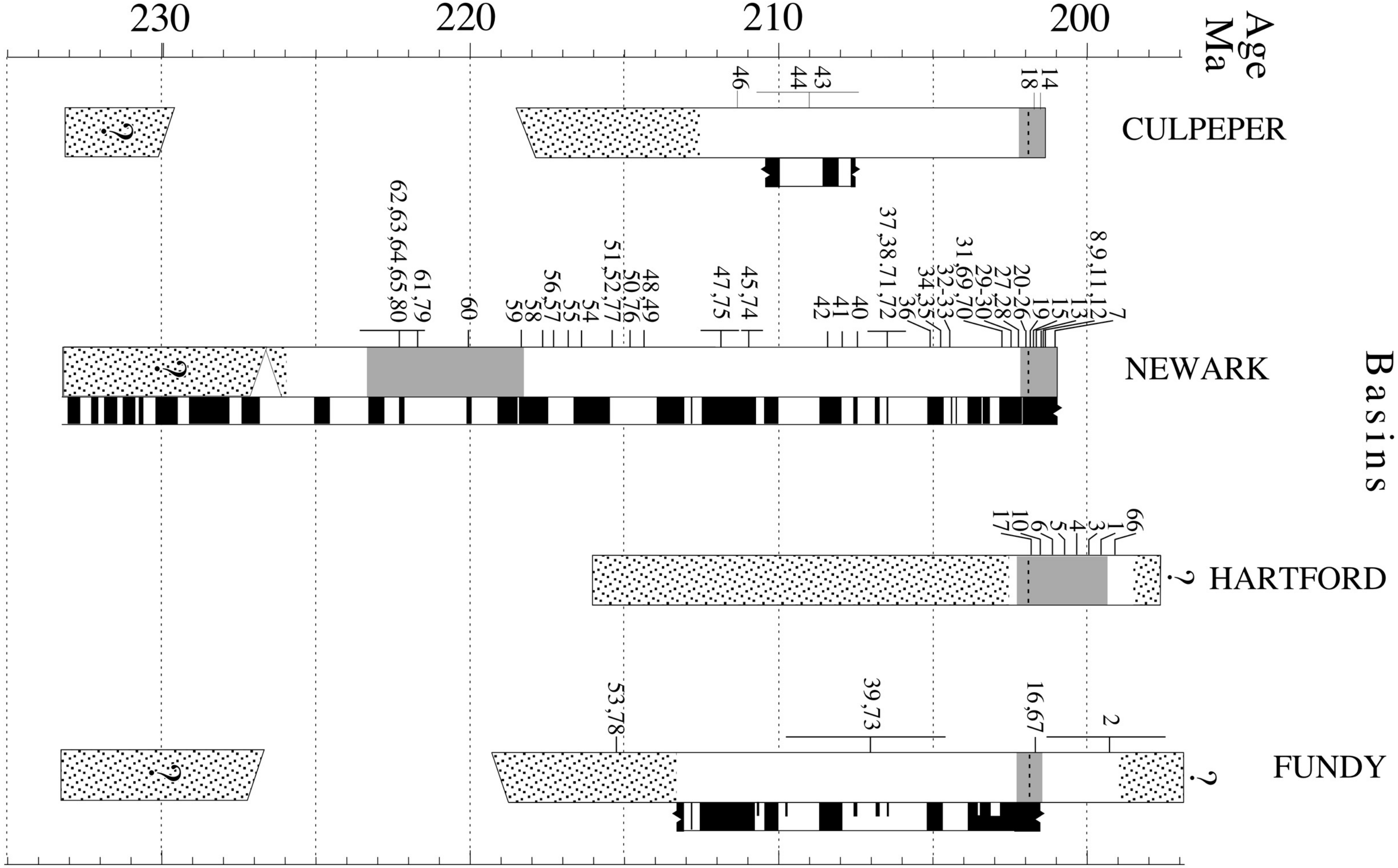
Age
Ma
230
220
210
200
Basins
CULPEPER
NEWARK
HARTFORD
FUNDY

Figure 1

Supplemental Material, Table 3: Concentrations of elements at the four sections shown is Supplemental Material Figure 3 (*31*,*32*,*33*). LOI, represents loss on ignition and corresponds roughly to organic matter content plus water. Depth is depth above (+) or below (-) base of blue-gray sandstone: first number is top of sample, second is bottom. (--), indicates problems with the mechanics of processing the sample (e.g. vial damage). The prefixes 1, 2, 3, and g correspond to samples from sections I, II, III, and Grist Mills sections. Coordinates for localities given in ref. *34*.

Sample	1TJ-1	1TJ-2	1TJ-3	1TJ-4	1TJ-5	1TJ-6	1TJ-7	1TJ-8	1TJ-9	1TJ-10	1TJ-11	2TJ-12	2TJ-13	2TJ-14	2TJ-15	2TJ-16	2TJ-17	2TJ-18	2TJ-19
Depth (cm)	0,+10	0, -5	-5,-10	-10,-14	-14,-22	-22,-34	-34,-42	-42,51	-51,-60	-60,-79	-79,-111	+8,0	0,-9	-9,-14	-14,-25	-25,-35	-35,-43	-43,-50	-50,-56
Ir ppt(*35)*	97±19	< 80	25±10	96±19	76±17	71±17	40±12	35±12	56±15	--	--	21±9	119±21	103±20	<85	61±15	23±9	73±17	35±12
SiO2 %	75.1	31.0	49.2	62.7	64.2	53.3	56.8	68.6	69.3	70.8	77.7	44.4	77.9	53.0	52.6	56.1	58.9	70.2	56.6
TiO2 %	0.75	0.55	0.83	0.89	0.97	0.98	1.01	0.94	0.95	0.92	0.75	0.44	0.68	0.7	0.92	0.97	0.98	0.85	1.08
Al2O3 %	10.9	11.0	18.5	17.8	16.7	17.5	19.5	15.0	14.7	13.2	10.1	17.8	8.0	12.6	20.0	20.5	15.7	12.4	21.4
Fe2O3 %	5.10	4.13	8.06	4.96	5.92	13.4	8.77	4.50	4.72	3.59	3.36	5.83	6.21	9.12	9.06	7.95	13.14	7.30	6.05
MnO %	0.04	0.02	<0.01	0.14	0.13	<0.01	0.15	0.11	0.07	0.14	0.35	0.70	<0.01	0.09	1.96	<0.01	0.03	0.32	<0.01
MgO %	0 .34	1.15	1.2	0.87	0.88	0.92	1.29	1.07	1.08	1.05	0.77	4.16	0.11	0.97	1.31	1.23	0.82	0.64	2.02
CaO %	0.19	2.24	1.34	0.37	0.53	0.23	0.32	0.28	0.29	0.28	0.24	20.0	0.19	1.66	0.62	0.41	0.25	0.23	0.52
Na2O %	0.31	1.76	0.36	0.40	0.48	0.66	0.32	0.85	0.86	3.84	0.88	0.85	0.55	0.47	0.24	0.26	0.58	0.92	0.53
K2O %	2.23	2.19	3.51	3.55	3.29	4.16	4.64	3.04	3.09	1.58	1.81	3.46	1.79	2.96	4.8	4.87	3.64	2.43	5.09
P2O5 %	0.11	0.09	0.12	0.04	0.06	0.12	0.13	0.10	0.10	0.10	0.07	0.16	0.10	0.19	0.15	0.13	0.17	0.21	0.13
LOI %	4.93	46.0	16.7	8.04	6.80	8.41	7.11	5.33	5.20	4.9	3.58	0.92	4.78	17.86	8.59	7.43	6.19	4.41	7.15
TOTAL	99.97	100.07	99.84	99.73	99.90	99.69	100.01	99.82	100.35	100.46	99.64	98.70	100.29	99.64	100.23	99.81	100.33	99.97	100.5
Sc ppm	10.0	21.5	22.4	19.7	19.0	16.8	19.3	14.5	13.2	12.0	8.75	9.17	7.22	15.4	19.8	18.8	15.3	10.6	22.1
V ppm	174	159	249	135	137	170	171	112	111	109	94	318	189	475	280	273	141	107	172
Cr ppm	66	221	151	98	98	93	102	76	73	70	48	110	51	49	111	106	84	64	111
Co ppm	4.5	13.4	12.9	2.9	3.9	3.9	6.2	6.8	7.3	7.8	43.5	1.8	2.7	3.4	4.5	3.9	4.3	6.1	19.6
Ni ppm	17	68	33	13	15	18	24	26	29	38	35	88	35	30	21	18	51	22	43
Cu ppm	7	485	180	21	45	71	49	28	45	30	110	147	5	106	52	54	30	31	107
Zn ppm	169	185	146	86.4	100	153	167	134	163	166	142	155	133	304	230	169	246	179	186
As ppm	61	30	272	77	78	42	69	24	25	49	10	16	111	34	134	92	72.7	26	23
Se ppm	10	9	6	3	3	3	2	2	< 3	3	1	16	18	35	22.5	10	2.35	6	2
Br ppm	1.6	0.3	10.9	2.5	0.8	0.6	1.0	0.8	0.5	1.4	0.6	19.9	1.1	9.3	3.6	2.6	0.67	0.7	1.2
Rb ppm	96.1	102	202	201	199	180	202	136	123	109	73.1	25.8	75.7	110	222	194	146	93.7	236
Sr ppm	74	142	122	119	111	102	119	83	87	81	58	111	49	78	111	117	84	66	147
Y ppm	20	274	80	35	35	28	33	34	35	37	35	94	24	32	26	32	29	31	44
Zr ppm	233	426	138	294	242	220	217	386	417	441	365	340	297	150	143	224	207	354	267
Nb ppm	13	6	12	22	21	16	17	20	19	20	14	3	12	12	16	19	16	14	22
Sb ppm	2.73	8.88	11.9	4.94	7.71	2.60	4.02	1.68	1.63	6.50	0.83	2.07	3.40	7.55	4.11	4.68	6.69	1.63	1.96
Cs ppm	4.41	6.45	12.5	12.1	10.4	9.81	12.0	6.82	6.30	5.53	3.57	2.08	2.81	7.89	13.5	11.8	7.00	4.26	15.4
Ba ppm	363	286	465	431	473	504	549	450	468	388	295	492	284	334	551	538	476	345	607
La ppm	36.7	66.2	70.4	66.3	57.5	50.5	64.8	51.5	51.3	53.4	39.7	16.5	35.7	42.9	66.5	57.9	45.0	41.7	74.8
Ce ppm	72.3	125	151	116	102	104	132	95.4	97.6	90.8	80.9	49.8	70.8	87.2	118	108	83.2	80.4	147
Nd ppm	32.4	148	91.3	61.6	46.0	47.2	58.0	45.7	47.4	43.9	40.5	75.8	33.1	44.3	51.6	50.1	36.8	36.8	71.9
Sm ppm	5.63	57.5	23.7	9.93	9.29	7.21	9.42	7.48	7.54	7.74	8.58	31.8	5.68	10.6	8.51	8.15	6.84	6.08	10.8
Eu ppm	1.10	12.8	4.43	1.54	1.51	1.32	1.53	1.24	1.30	1.34	1.82	6.53	1.07	2.38	1.28	1.37	1.18	1.17	1.95
Gd ppm	3.87	49.6	17.6	6.5	6.51	4.93	6.07	6.56	6.54	6.30	6.69	24.1	3.98	8.12	4.96	5.03	5.16	5.46	8.34
Tb ppm	0.55	8.19	2.65	0.90	0.94	0.70	0.84	1.06	1.05	0.98	1.02	3.67	0.57	1.23	0.65	0.74	0.77	0.89	1.27
Tm ppm	0.38	2.40	1.15	0.63	0.54	0.48	0.52	0.66	0.67	0.68	0.55	1.32	0.38	0.58	0.45	0.45	0.46	0.54	0.76
Yb ppm	2.75	16.5	7.32	4.53	3.71	3.48	3.65	4.64	4.70	4.80	3.68	8.02	2.71	3.76	3.20	3.09	3.18	3.79	5.27
Lu ppm	0.44	2.16	1.03	0.71	0.55	0.56	0.56	0.68	0.73	0.73	0.56	1.16	0.41	0.57	0.48	0.48	0.48	0.60	0.77
Hf ppm	6.68	4.26	4.87	7.01	7.29	5.15	5.98	11.2	12.3	12.6	9.66	14.4	8.47	9.39	4.46	4.83	6.40	10.9	6.81
Ta ppm	0.89	0.77	1.18	1.49	1.40	1.37	1.24	1.38	1.36	1.23	0.85	0.23	0.72	0.95	0.48	1.05	1.07	1.04	1.60
Ir ppb(*36*)	< 1	< 1	< 2	< 1	< 1	0.1	< 1	< 1	< 2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 1	< 2
Au ppb	2	0.4	3	2	3	1	2	< 5	< 5	5	0.8	2	< 4	1	2	1	0.4	0.4	1
Th ppm	10.1	10.2	18.2	18.4	17.5	15.2	17.2	15.2	15.2	14.6	11.5	3.36	8.98	11.7	17.0	15.5	13.2	12.9	18.1
U ppm	6.11	18.6	46.4	13.2	12.8	6.57	8.76	7.13	7.77	25.4	5.04	28.5	6.08	33.3	12.9	10.3	11.3	7.11	8.43
K / U	3030	977	628	2233	2134	5256	4397	3539	3301	516	2981	1008	2444	738	3089	3925	2674	2837	5012
Th / U	1.65	0.55	0.39	1.39	1.37	2.31	1.96	2.13	1.96	0.57	2.28	0.12	1.48	0.35	1.32	1.50	1.17	1.81	2.15
La / Th	3.63	6.49	3.87	3.60	3.29	3.32	3.77	3.39	3.38	3.66	3.45	4.91	3.98	3.67	3.91	3.74	3.41	3.23	4.13
Zr / Hf	34.9	100.0	28.3	41.9	33.2	42.7	36.3	34.4	33.9	35.0	37.8	23.6	35.1	16.0	32.1	46.3	32.3	32.5	39.2
Hf / Ta	7.51	5.53	4.13	4.70	5.21	3.76	4.82	8.12	9.04	10.2	11.4	62.6	11.8	9.88	9.29	4.60	5.98	10.5	4.26
La / Yb	13.3	4.01	9.62	14.6	15.5	14.5	17.8	11.1	10.9	11.1	10.8	2.06	13.2	11.4	20.8	18.7	14.2	11.0	14.2
Eu/ Eu*	0.72	0.73	0.66	0.59	0.59	0.68	0.62	0.54	0.57	0.59	0.73	0.72	0.69	0.78	0.60	0.65	0.61	0.62	0.63

TABLE 3, CONTINUED: CONCENTRATIONS OF ELEMENTS AT THE FOUR SECTIONS SHOWN IN FIGURE 8

Sample Depth (cm)	3TJ-20 +15,0	3TJ-21 0,-5	3TJ-22 -5,-9	3TJ-23 -9,-13	3TJ-24 -13,-22	3TJ-25 -22,-29	3TJ-25A -29,-36	gTJ-26 +3,0	gTJ-27 0,-5	gTJ-28 -5,-9	gTJ-29 -9,-21	gTJ-30 -21,-31	gTJ-31 -31,-40	gTJ-32 -40,-47	gTJ-33 -47,-51	gTJ-34 -51,-57	gTJ-35 -57,-62	gTJ-36 -62,-65
Ir ppt (*35*)	158±25	285±33	87±18	114±21	34±11	48±14	39±12	60±15	83±18	177±26	113±21	116±21	19±9	83±18	97±19	28±10	**30**	**25**
SiO2 %	74.3	57.3	60.1	57.2	76.5	17.5	75.1	78.8	58.4	65.1	71.4	61.2	60.3	70.9	51.8	54.5	71.2	72.8
TiO2 %	0.9	1.17	1.22	1.22	0.86	0.26	0.90	0.75	1.00	0.94	0.85	0.94	0.94	0.12	0.87	0.93	0.97	0.77
Al2O3 %	11.0	19.9	20.2	19.8	11.9	5.22	12.2	9.7	20.8	16.4	12.6	17.0	18.4	11.7	20.5	20.9	14.1	12.1
Fe2O3 %	5.57	7.59	4.81	6.14	3.42	2.34	4.04	3.19	5.24	6.07	5.50	8.10	6.76	3.29	6.17	5.55	4.02	3.99
MnO %	<0.01	0.01	<0.01	<0.01	<0.01	0.68	<0.01	0.04	<0.01	<0.01	0.02	<0.01	0.01	<0.01	0.07	0.05	<0.01	<0.01
MgO %	0.49	1.18	1.15	1.25	0.45	1.63	0.52	0.56	2.16	1.58	1.22	1.9	1.94	0.48	2.70	2.86	1.34	1.26
CaO %	0.25	0.35	0.34	0.52	0.25	41.8	0.27	0.52	0.66	0.49	0.45	0.52	0.5	0.25	1.48	1.37	0.47	1.27
Na2O %	0.80	0.42	0.46	0.61	0.93	0.93	1.04	0.80	0.39	0.31	0.77	0.27	0.35	0.11	0.22	0.24	0.86	0.84
K2O %	2.21	4.81	5.05	4.68	2.59	1.07	2.19	2.01	5.12	4.09	2.91	4.26	4.67	2.43	5.12	5.19	3.32	2.63
P2O5 %	0.13	0.11	0.09	0.12	0.07	0.10	0.08	0.11	0.21	0.13	0.26	0.14	0.13	0.12	0.13	0.22	0.07	0.08
LOI %	4.78	7.19	6.82	8.88	3.55	28.5	3.83	3.44	5.76	4.72	4.15	5.94	5.96	8.63	11.14	7.44	4.46	4.43
TOTAL	100.38	100.02	100.19	100.38	100.42	100.04	100.15	99.86	99.71	99.88	100.15	100.25	99.92	97.98	100.19	99.27	100.80	100.17
Sc ppm	10.9	18.9	20.2	23.5	11.0	10.8	11.5	8.32	21.8	16.4	11.1	17.1	16.0	5.8	17.2	20.3	12.7	9.23
V ppm	187	316	232	330	124	223	118	107	179	143	99	138	154	29	182	198	100	85
Cr ppm	92	165	145	183	83	81	73	49	109	89	59	87	84	21	87	86	68	48
Co ppm	4.9	4.2	3.3	4.9	3.7	3.5	3.3	11.0	24.2	16.7	12.4	17.7	14.6	5.5	21.9	20.8	10.3	9.7
Ni ppm	33	23	17	21	18	18	19	32	52	48	49	52	51	17	48	14	29	26
Cu ppm	10	45	19	49	7	20	19	55	242	74	16	<2	43	48	392	227	66	42
Zn ppm	264	486	379	441	188	233	222	49.1	104	93.4	72.7	107	99.1	27.1	124	147	76.1	40.3
As ppm	33	56	35	52	31	33	27	8	26	13	8	94	10	9	16	30	8	5
Se ppm	4	4	3	6	3	2	4	< 1	2	1	1	< 2	1	2	< 2	2	2	1
Br ppm	0.9	1.9	1.9	8	0.5	1.1	0.9	0.6	0.3	0.5	0.5	2.6	0.2	0.5	0.6	0.6	0.5	0.4
Rb ppm	98.1	163	197	194	100	101	102	93.7	251	184	129	211	179	39.7	212	18.0	155	105
Sr ppm	83	194	203	158	84	89	86	57	100	79	64	80	85	348	106	106	78	363
Y ppm	33	48	44	67	31	36	38	30	44	40	42	40	35	28	35	39	37	70
Zr ppm	350	263	215	220	366	428	396	363	271	254	335	246	177	106	153	156	479	29
Nb ppm	18	22	24	21	17	17	18	13	21	20	17	19	18	<3	18	19	20	304
Sb ppm	1.92	6.06	3.74	3.91	3.15	2.75	2.50	1.26	1.81	2.13	1.22	4.78	2.02	0.74	1.08	1.66	1.15	16
Cs ppm	4.57	8.77	11.0	12.6	4.47	4.49	4.26	4.80	13.7	9.80	6.47	12.6	10.6	1.89	11.7	14.0	8.45	5.19
Ba ppm	324	459	504	503	414	495	361	349	552	484	358	576	508	132	521	545	563	435
La ppm	41.9	49.9	60.2	61.0	44.8	50.4	45.8	45.8	62.4	47.7	40.0	58.6	43.9	17.1	56.5	54.6	52.4	36.2
Ce ppm	74.9	90.9	99.3	106	75.8	88.9	87.6	89.0	108	92.0	80.5	98.8	87.3	38.4	97.7	99.4	102	70.1
Nd ppm	33.8	49.0	48.6	60.3	39.1	44.5	42.1	43.6	51.8	43.1	44.9	52.5	34.8	24.9	44.1	40.3	49.7	34.9
Sm ppm	7.01	9.15	9.67	13.3	7.16	7.68	7.27	8.12	11.9	8.42	8.77	9.47	7.14	7.56	7.70	9.08	7.97	5.93
Eu ppm	1.35	1.69	1.46	2.79	1.11	1.39	1.48	1.49	1.93	1.73	1.79	1.94	1.27	1.63	1.50	2.02	1.38	1.12
Gd ppm	5.68	6.43	6.41	10.7	5.41	6.86	6.66	6.01	9.1	6.69	7.17	7.65	5.14	6.38	5.36	7.96	7.15	5.03
Tb ppm	0.88	0.93	0.90	1.66	0.81	1.12	1.10	0.89	1.38	1.03	1.12	1.19	0.75	1.01	0.77	1.29	1.17	0.82
Tm ppm	0.52	0.56	0.56	0.87	0.49	0.67	0.69	0.52	0.68	0.57	0.63	0.66	0.45	0.39	0.52	0.62	0.70	0.49
Yb ppm	3.63	3.85	3.89	5.86	3.41	4.62	4.85	3.58	4.50	3.88	4.33	4.50	3.10	2.43	3.72	4.05	4.81	3.43
Lu ppm	0.55	0.58	0.60	0.92	0.52	0.70	0.72	0.53	0.62	0.59	0.64	0.67	0.47	0.37	0.53	0.60	0.72	0.52
Hf ppm	10.8	5.28	5.79	7.27	7.88	13.5	12.3	10.4	6.42	6.55	8.77	6.37	4.46	1.22	4.18	11.4	13.2	8.90
Ta ppm	1.05	1.16	1.32	1.41	1.21	1.22	1.23	0.82	1.24	1.10	1.01	1.35	0.92	0.21	1.03	1.28	1.54	0.96
Ir ppb (*36*)	< 1	< 1	< 1	0.5	< 1	0.2	0.2	< 1	< 1	< 1	< 1	< 1	< 1	< 1	0.2	< 1	< 1	< 1
Au ppb	1	0.4	6	10	0.2	0.4	1	0.4	< 20	2	1	2	2	2	2	2	0.4	0.5
Th ppm	11.8	13.3	15.0	16.2	12.2	14.3	13.8	11.5	17.7	13.9	12.1	15.5	12.2	3.17	14.5	15.1	16.2	10.9
U ppm	6.15	7.22	9.09	15.0	7.07	5.12	5.17	2.87	6.52	3.3	3.47	10.6	4.06	4.29	3.80	7.21	5.00	3.24
K / U	2983	5530	4612	2590	3041	1735	3516	5814	6519	10289	6962	3336	9549	4702	11185	5976	5512	2141
Th / U	1.92	1.84	1.65	1.08	1.73	2.79	2.67	4.01	2.71	4.21	3.49	1.46	3.00	0.74	3.82	2.09	3.24	3.36
La / Th	3.55	3.75	4.01	3.77	3.67	3.52	3.32	3.98	3.53	3.43	3.31	3.78	3.60	5.39	3.90	3.62	3.23	3.32
Zr / Hf	32.4	49.8	37.1	30.3	46.4	31.7	32.2	34.9	42.1	38.7	38.2	38.6	39.7	86.5	36.6	13.7	36.3	3.26
Hf / Ta	10.3	4.55	4.39	5.16	6.51	11.1	10.0	12.7	5.18	5.95	8.68	4.72	4.85	5.81	4.06	8.91	8.57	9.27
La / Yb	11.5	13.0	15.5	10.4	13.1	10.9	9.44	12.8	13.9	12.3	9.24	13.0	14.2	7.04	15.2	13.5	10.9	10.6
Eu/ Eu*	0.65	0.67	0.57	0.72	0.55	0.59	0.65	0.65	0.57	0.70	0.69	0.70	0.64	0.72	0.71	0.73	0.56	0.63

Supplemental Material Table 4: Average Ir values for the four sites in Supplemental Material Figure 3 and Table 4 (*32*).

Depth (cm)	average IR
-2	59.0
-1	84.0
0	84.0
1	141.2
2	91.1
3	80.9
4	109.8
5	121.9
6	118.1
7	101.5
8	77.0
9	75.8
10	75.8
11	75.8
12	75.8
13	62.0
14	62.0
15	66.3
16	65.0
17	65.0
18	65.0
19	55.5
20	60.8
21	60.8
22	36.5
23	30.0
24	46.7
25	43.7
26	43.7
27	43.7
28	65.0
29	61.0
30	61.0
31	61.0
32	61.0
33	68.0
34	68.0
35	68.0
36	33.5
37	33.5
38	33.5
39	33.5
40	34.5
41	34.5
42	34.5
43	34.5
44	32.0
45	25.0

Captions for Supplemental Material

Supplemental Material Figure 1, Detailed locality information for Figure 1 of paper. Numbers adjacent to ticks at specific stratigraphic levels refer to localities listed in Supplemental Material Table 2.

Supplemental Material Figure 2: Detailed sections for footprint localities (numbers), pollen- and spore-producing levels (P), and macrofossil plant localities (M). Numbers for footprint localities refer to Supplemental Material Table 2.

Supplemental Material Figure 3: Measured sections for four along strike sections and the average Ir concentrations (*34. 35*). Data from Supplemental Material Tables 2, 3, and 4. Note that the highest Ir levels tend to be associated with the white-weathering claystone or adjacent coaly unit (Sections 1-III). However, in the Grist Mills section, the highest Ir is within a red claystone under a light gray siltstone. We believe this red claystone correlates with some part of the white claystone in the other sections, but contains hematite because it was formed under a more oxidizing environment, closer to the border fault. In addition, there is another gray claystone lower in the Grist Mills section without an adjacent an Ir anomaly. Because, red units have the lowest organic C content (oxidizing depositional and diagenetic environment) and black units the highest organic C content (reducing depositional and diagenetic environment), it is clear that there is no consistent pattern between the Ir anomaly and redox state of the strata, arguing against a diagenetic origin of the Ir anomaly. Note also that the uppermost Ir maximum in Section I, is within a gray sandstone containing visible clasts of white claystone, and the relatively high Ir levels probably reflect a reworked clast eroded from the underlying white claystone.

Supplemental Material Figure 4: Detail and added contextual information for Figure 2 of text showing position detail of boundary section in the Jacksonwald Syncline Composite section as well as correlation to two other Newark basin boundary sections, paleomagnetic polarity data, and footprint and pollen and spore assemblage distribution. Note that “new taxon B” is the term applied to an unnamed form by (*8*), and cly, md, and ss, refer to claystone, mudstone, and sandstone, respectively. Average Ir and pollen and spore percentages from Supplemental Material Figure 3. Interval of time represented by Jacksonwald syncline detailed section based on linear extrapolation from the average accumulation rate implied by the astronomical calibration of the Jacksonwald syncline composite section. Correlation throughout the Newark basin is based on the distinctive magnetic polarity and cycle stratigraphy and the basalts.

References and Notes

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15. We are especially grateful to the many amateur paleontologists who allowed us access to their collections, without which this paper would have been impossible. Most of the Late Triassic age footprint assemblages with quantitative data are in the private collections of M.J.S. and B.W.H. Most of the Clifton locality data are from the collections of Donald Carter, Fred Cassel, and Ken McKim.
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33. Material consisted of channel samples (i.e. contiguous, continuously sampled intervals) covering an average of 3 cm. Samples were manually crushed in plastic wrap, then mechanically in an alumina (ceramic) jaw crusher, and powdered using an automatic agate mill. Analyses for major and selected trace elements was done by standard X-ray fluorescence spectrometry (XRF) procedures (for information on standards, procedures, accuracy and precision, see W. U. Reimold, C. Koeberl, J. Bishop, Geochim. Cosmochim. Acta, **58**, 2689, 1994). The rest of the elements, except the ICS Ir (see ref. *36*), were measured using instrumental neutron activation analysis (INAA). For details on the method, instrumentation, procedures, standards, data reduction, accuracy, precision, etc., see C. Koeberl, J. Radioanalytic. Nuclear Chem., **168**, 47 (1993). Samples were irradiated at the TRIGA Mark II type reactor at the Atominstitut der Österreichischen Universitäten in Vienna for 7 hours at a flux of about 2 x 10^{12} $ncm^{-2}s^{-1}$.
34. Section I, lat 40°18’76”, long 075°50’56”; Section II, lat 40°18’76”, long 075°50’55”; Section III, lat 40°18’81”, long 075°50’38”; Grist Mills, lat 40°18’85”, long 075°51’20”.
35. Ir content was measured with the ICS (iridium coincidence spectrometry) system at the Institute of Geochemistry at the University of Vienna. Crushed and powdered samples of about 50 mg each, as well as standards, were sealed into high purity quartz glass tubes, packed into aluminum foil and an aluminum capsule, and irradiated for 24 to 48 at a flux of about 7 x 1013 ncm-2s-1. After a cooling period of about ten weeks, the samples were first measured for five to eight hours. The lines of 192Ir at 316 and 468 keV were used, and the method requires that only coincident signals at both lines are used for further processing. Samples that yielded results close to the detection limit (ca. 5 ppt) were measured for at least another 24 hours. The precision of the Ir measurements follows a logarithmic error function with the lowest relative errors in the highest concentrations (e.g., 21±9 ppt vs. 285±33 ppt). For details on this method (standards, instrumentation, data reduction, precision, accuracy, etc.), see C. Koeberl, and H. Huber, *J. Radioanalytic. Nuclear Chem*., **244**, 655. (2000).
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