

ph 5 n/4 sec 11

Energy Resources of Indiana, Inc.
Phegely Farms, Inc. #1
NW¼ NW¼ NE¼ sec. 14, T. 6 N., R. 10 W.
Sullivan Co.
Altitude, 430 ft, ground level
by
Nelson R. Shaffer

Unit	Description	Depth		Thick- ness	Sample
	Mississippian System:				
	Borden Group				
	New Providence Shale, 14.2 ft cored				
1	Shale, dark gray (N4.75) with slight blue-green tone, fine grained, but some micaceous and silt grains, numerous irregular carbonaceous patches cut bedding, minor pyrite, minor white to yellow sand grains; mineralized, diagonal fracture at 2491.2	2490.0	2491.4		
2	Shale, as above but with glauconite and pyrite-rich beds	2491.4	2491.6		
3	Shale, as unit 1 with light gray pyritiferous lenses at 2491.7, 2492.0, and 2492.1, phosphate (?) nodules at 2491.7	2491.6	2492.5		
4	Sample removed - Mound	2492.5	2492.8		
5	Shale, medium dark gray (N3.5) with minor silt grains large carbonaceous fragment 2493.3	2492.8	2493.7		
6	Shale, like unit 5, but highly fractured with many slickensides	2493.7	2494.5		
7	Sample removed - Battelle	2494.5	2495.0		
8	Shale, dark gray (N3.5) with glauconite disseminated and in band 2495.4, pyrite nodule 2495.6, abundant darker carbonaceous bands 2492.5-.6, calcite-filled diagonal fracture 2495.2-2495.5	2495.0	2499.5		
9	Shale, medium dark gray with appreciable quartz sand and more pyrite than above. Triangular (cross section) dolomite, quartz and pyrite bodies with apices up or down and bases parallel to bedding. Small 1-3 mm circular segregations of brown-gray phosphate (?) on bedding	2499.5	2500.3		
10	Shale, as above but lacking triangular features, becomes more pyritiferous (small disseminated pyrite) with fewer and finer organics downward	2500.3	2503.9		
11	Mudstone, dark gray (N4) with abundant glauconite abundant, pyrite, fracture continues and is coated with dolomite, light brown, cream or clear and a resinous dark brown material	2503.9	2504.2		
	Mississippian-Devonian System:				

	New Albany Shale, 125.3 ft cored				
	Grassy Creek Member, 85.3 ft cored				
12	Shale, black (N2), carbonaceous, thin bedded with (0.1 mm) silt bands at 0.1' below contact, pyrite abundant, as disseminated subhedral crystals and in discrete thin beds, fracture continues filled with white calcite to 2505.3, disseminated coalified material; pyrite rich beds at 2505.3 (1mm), 2505.35 (5mm)	2504.2	2505.5		
13	Sample removed - Battelle	2505.5	2505.9		
14	Shale, black (N2 to N2.5) with thick beds of silt, carbonate and pyrite at 2506.4 (30 mm), 2507.3 (10 mm), 2507.4 (7 mm), 2508.0 (15 mm); fractures 2505.9 - 2506.4, 2506.5 - 2508.7, diagonal fracture 2506.1 - 2506.2. Hard spherical bodies with calcite and pyrite fill 2506.1 - (5 mm) and 2506.4 (15 mm) cut bedding, white carbonate replacement 2506.4, also filled burrows	2505.9	2508.1		
15	Shale, as unit 14 but with thin silt bands and discrete vitrain fragments. Silt and pyrite bands at 2508.2 (3 mm), 2580.6 (1 mm), 2509.2 (double), 2510.1 (4 mm), 2510.3 (2 mm), 2510.4 (3 mm), 2510.5 (3 mm) 2510.8 (5 mm), 2511.4 (20 mm), 2512.5 (qtz. rich); bedding plane 2510.4 has numerous plant fragments, conodonts, lingula, and spores; pyrite filled burrow 2510.8; fracture continues to 2508.7	2508.1	2512.4		
16	Shale, like unit 14, but with numerous pyrite masses and few thick silt and pyrite beds. Silt beds with pyrite 2512.5 (16 mm), 2512.6 (5 mm), 2514.2 (10 mm)	2512.4	2515.3		
17	Sample removed - Battelle	2515.3	2515.7		
18	Shale, black (N1.75N2.25), with prominent silt and pyrite beds having graded (?) bedding and thin pyrite laminae, silt and pyrite beds 2516.1 (30 mm), 2516.9 (4 mm), 2517.0 (10 mm), 2517.7 (5 mm), 2518.0, (9 mm), 2519.3 (10 mm); pyrite laminae 2517.1, 2518.0, 2518.3, 2518.4, 2518.7; massive pyrite lens, 2518.0, 2518.5, 2519.3 (often have marcasite borders); vertical fractures 2515.7 - 2516.9, 2517.2 - 2519.0.	2515.7	2519.4		
19	Shale black (N-2) pyrite lens 2520.4, silt and pyrite bed 2519.1 (1 mm)	2519.4	2521.2		
20	Sample removed - Mound	2521.2	2521.5		
21	Shale black thin-bedded (N2) as above; pyrite, silt, and calcite beds-2521.6 (7 mm); diagonal fracture 2523.0 - 2523.15, 2523.3 - 2523.4, 2523.55 - 2523.65; mineralized vertical fracture 2523.5 to 2528.04 massive pyrite 2521.6, 2523.2; pyrite laminae, 2522.1, 2522.3, 2522.4, 2523.2, 2523.3, 2524.1; considerable discing 2523.6 - 2527.2	2521.5	2524.2		

22	Shale, as above but characterized by angular pyrite masses, shard-like in form. Also contains white rhombs of dolomite (?). Pyrite laminae 2524.4, 2524.8, 2527.2, 2527.6, 2527.8; more numerous downward; pyrite mass 2524.3, 2525.5, 2525.6, 2526.6, 2527.9; mineralized vertical fracture continues to 2527.9, diagonal fracture 2526.0 - 2526.3; bedding plane with spores 2527.55	2524.2	2527.9		
23	Sample removed - Battelle	2527.9	2528.2		
24	Shale, black (N2.25 - N2.5), compact with numerous thin discontinuous pyrite laminae, few thin white silt beds, coalified wood fragments parallel to bedding) many large pyrite nodules; massive pyrite - 2528.2, 2528.4, 2529.1, 2530.1, 2530.2, 2530.4, 2530.7; pyrite laminae - 2528.6, 2528.8, 2529.0, 2529.2, 2529.6, 2529.8, 2530.3; lens of coarse plant fragments 2528.9; vertical fracture 2528.3 - 2528.9	2528.2	2530.7		
25	Shale as above but rich in spore cases, very few pyrite laminae, no pyrite masses	2530.7	2531.4		
26	Shale like unit 24 with abundant pyrite laminae massive pyrite, spores persist to 2531.8; massive pyrite - 2531.6, 2531.9, 2532.2, 2532.4, 2532.5, 2532.8, 2533.2, 2533.5, 2533.6, 2533.9, 2534.2, 2534.5, 2534.7, 2534.8, 2535.4; pyrite and silt beds - 2531.8, 2532.8 (2 mm), 2533.4, 2533.9, 2535, 2535.2; diagonal fracture 2535.3- 2535.4	2531.4	2535.4		
27	Shale like 24 but lacking large pyrite masses, silt bed 2536.1 (with pyrite-filled burrows); vitrain on bedding 2536.4; small pyrite blebs 2535.9, 2536.0	2535.4	2536.5		
28	Sample removed - Battelle	2536.5	2536.9		
29	Shale as unit 27; massive pyrite - 2537.1, 2537.4, 2537.6, 2538.3, 2538.7, 2539.8; pyrite and silt beds - 2538 (5 mm), 2538.7 (3 mm), 2538.9 (5 mm) 2539.4 (2 mm), 2539.8 (2 mm); pyrite laminae 2537.4, vitrain-rich bed 2539.2	2536.9	2539.8		
30	Shale, black to dark gray (N3) with few silt and pyrite beds, many laminae, pyrite masses - 2540.5, 2540.9, 2541.5, pyrite laminae 2540.5, 2541.1, 2541.3, 2541.7, 2542.1, silt and pyrite bed 2541.5 (3 mm), 2542.3 (5 mm); diagonal fracture 2541.0 - 2541.1.	2539.8	2542.4		
31	Shale, black (N2.5-N3) with abundant disseminated pyrite; pyrite mass 2542.8, 2543, 2543.8 (large), 2544.8 (angular); pyrite laminae 2543.7, 2543.8, 2543.9, 2544.4, 2544.8, (4 mm) 2545.1; silt band 2544.9 (7 mm); diagonal fracture 2542.7-542.8	2542.4	2545.1		
32	Shale, black (N2.5-N3), rich in spores, less pyrite, slight brown tone; pyrite 2545.6, 2546.9, 2547.8	2545.1	2547.1		
33	Sample removed - Battelle	2547.1	2547.5		

34	Shale, black (N2) with few irregular very dark greyish brown beds (10YR3/2), abundant thin gray carbonate laminae, numerous spores decreasing downward; pyrite nodule 2548.2, 2548.8; silt and pyrite bed 2548.5; vertical fracture 2548 - 2548.1	2547.5	2549.2		
35	Sample removed - Mound	2549.2	2549.7		
36	Shale, dark gray (N3.5N3.75), with more brownish material especially at 2551.6, 2552.8; abundant spores, pyrite masses 2550, 2550.1, 2551.2, 2551.6, 2553.9; laminae 2551.1, 2551.5, 2551.8, 2551.9	2549.7	2554.3		
37	Sample removed - Battelle	2554.3	2554.8		
38	Shale, black (N2.5-N3) slightly brown, contains spores abundant locally but decreasing downward to 2558.7; dark gray-brown bed 2559.3; pyrite masses- 2555.1, 2555.4, 2555.7, 2555.9, 2556.6, 2556.8, 2557.3, 2561.2, 2561.4; lens- 2555.7; pyrite laminae 2555.6, 2557.1, 2557.8; silt and pyrite beds 2557.3, 2557.9, 2560.6, 2561.5	2554.8	2561.8		
39	Shale, dark gray-brown (10YR3/2) with numerous black patches and abundant disseminated pyrite but few large nodules;; pyrite mass 2563.2, 2564.7, 2565; silt and pyrite bed 2564.1, 2564.2; random mineralized diagonal fractures 2563.4-2563.5; 2564.1 bedding plane slickensided (?)	2561.8	2565.2		
40	Sample removed - Battelle	2565.2	2565.6		
41	Shale like unit 39 but black material dominates; pyrite nodules - 2566.3, 2566.7, 2567.8, 2567.9, 2569, 2569.1, 2570.2, pyrite burrow-fill 2566.1, 2568 (small); pyrite beds 2566.4, 2567.1, 2569.5 (4 mm); numerous diagonal fractures 2567.7-2568 filled with carbonate and minor blue unknown mineral; fracture 2568.7 - 2568.8	2565.6	2570.5		
42	Sample removed - Indiana Geological Survey (Hutchinson)	2570.5	2571.5		
43	Shale like unit 41 pyrite masses 2571.9 - 2572, 2572, 2572.6, 2573.7, 2573.9, 2574.4, 2574.8; pyrite lenses - 2574.0-2574.1 and 2574.6 - 2574.7	2571.5	2575.3		
44	Sample removed - Illinois Geological Survey (Dickerson)	2575.3	2575.6		
45	Shale as unit 41, pyrite nodules - 2576, 2576.4, 2576.8, 2576.9, 2577 (large), 2577.3; pyrite lenses 2576.2 - 2576.4, 2577.1; vertical fracture 2575.8-2578.5	2575.6	2577.7		
46	Shale, like unit 41 but with abundant spores and little pyrite	2577.7	2578.5		
47	Sample removed - mound (fracture ends in this interval)	2578.5	2579.0		
48	Shale like above, but with more silt beds and blacker; dark brown beds at 2580.2, 2580.5, 2582.2-2582.3, 2582.5-2583, 2584.2, 2584.4; spore-rich unit 2579.2-2579.4, 2579.8-2580.9; pyrite masses - 2579.3, 2579.4, 2579.6, 2579.8, 2579.9, 2580, 2580.7, 2581, 2581.4; 2583.3, 2583.4, 2583.8, 2583.9, 2584, 2584.8; pyrite laminae 2580.8; vitrain lens 2581; silt and pyrite bed; 2582.3, 2582.4, 2583.1, 2583.2 (2 mm), 2584.3, 2584.6, 2584.8, 2585; vertical fracture 2580.1-2585.7	2579.0	2585.2		
49	Sample removed - Battelle	2585.2	2585.6		

50	Shale, mostly black with dark brown beds at 2588.5, 2588.7-2588.85, 2589.3-2589.5; pyrite masses 2585.7, 2586.5, 2586.8, 2587.4, 2587.8, 2588.2 (burrow), 2589.1, 2589.3, 2589.4; silt (?) beds 85.7, 2586.1, 2586.3, 2586.9, 2587, 2587.1 (4 mm), 2587.5, 2587.7, 2587.8, 2588.3, (double) 2589; diagonal fracture 2589-2589.9, vertical fracture from above to 2585.7 and 2589.3-2590.4	2585.6	2589.5		
	Creek Member, 23.2 ft cored				
51	Shale, olive gray (5Y4/2) with black interbeds, abundant pyrite, numerous plant fragments, bottom 1-2 cm. pink-brown finely crystalline dolomite containing plumose black patches, lower boundary irregular and pyrite rich; pyrite 2589.6, 2589.7, 2589.9, 2590, 2590.2, 2590.5	2589.5	2590.6		
52	Shale like unit 50	2590.6	2590.8		
53	Argillaceous dolomite (N4 - N6) light gray, finely crystalline, pyritiferous, with irregular white calcite fossil fillings. Thin green clay beds at base and top.. Unit is lens-shaped, .1' brown shale then thin irregular green shale at borders	2590.8	2591.6		
54	Shale, dark olive gray (5Y3/2), beds dip parallel to dolomite lens, diagonal fractures 2591.9	2591.6	2592.1		
55	Shale black to dark brown with numerous lighter colored irregular dolomite-rich beds 2592.6-2592.9, 2593.4, 2593.5, 2593.7, 2593.9, 2594, 2594.2, 2594.5; pyrite 2593.3, 2593.4, 2593.5, 2593.6; pyrite bed 2594 (10 mm)	2592.1	2594.5		
56	Shale alternating black (N2) to dark brown, lacks light colored dolomite lenses of above, pyrite 2594.9, 2595.1, 2595.2	2594.5	2595.3		
57	Sample removed - Battelle	2595.3	2595.7		
58	Shale, black to dark brown, pyrite increasing downward, fewer silt beds; brown beds 2595.9-2596+, 2596.3-2596.4, 2597.7, 2597.2, 2597.4, 2497.6, 2598, 2598.3, 2598.4, 2598.8, 2599.4, 2599.8, 2599.9, 2600.2, 2600.3, 2600.5 (burrow), 2600.8, 2601.1, 2601.3, 2601.4, 2601.5, 2601.7, 2601.8, 2602.6, 2602.7; silt bands-2597, 2598.2, 2599, 2599.2 (10 mm), 2599.6, 2600 (5 mm), 2600.4, 2601.1, 2601.5 (with pyrite), 2602.6; vitrain lens - 2596.7; spore-rich zone 2600-2600.5, vertical fracture 2598.0 - 2602.3	2595.7	2602.7		
59	Sample removed	2602.7	2604.0		
60	Shale, dark brown with black beds, disseminated carbonate and thin silt and carbonate beds - 2604.3, 2604.7, 2604.9, 2606, 2606.4, 2606.8, 2607, 2608.6, 2609, 2609.1, 2609.6, 2610, 2611.6 (5 mm); pyrite masses - 2604.1, 2604.3 2604.9, 2605.3, 2605.7, 2606.2, 2606.4, 2606.5, 2606.8, 2607, 2607.3, 2607.7, 2607.9, 2608, 2608.9, (large), 2609.3, 2609.4, 2609.6, 2609.8, 2610, 2610.1, 2610.2, 2610.5, 2610.8, 2611.6, 2611.7, 2611; pyrite laminae 2608, 2608.8, 2611.8; vertical fracture 2606-2609.2, 2606.4-2606.6, 2610.5-2618.9 (mineralized in part)	2604.0	2611.6		

61	Shale like unit 60, with numerous pyrite bodies that cut across bedding; pyrite - 2612.1, 2612.5; carbonate and silt band 2612.7 (15 mm); fracture continues	2611.6	2612.7		
	Blocher Member, 16.8 ft cored				
62	Shale, black very fine grained, shows silky luster (slickensides) on bedding, large pyrite nodules; diagonal fracture 2612.9-2613, fracture continues	2612.7	2613.2		
63	Shale, black (N2) with few brown beds, numerous pyrite laminae - 2613.3, 2613.4, 2613.6, 2614.2, 2614.4, 2614.5, 2614.6, 2614.8, 2615.1; pyrite masses - 2613.9, 2614.3, 2615.5, 2615.6, 2616.5, 2616.8, 2617.4, 2617.7; carb. and silt beds - 2513.9, 2514.2, 2515.5 (pyrite-rich), 2515.8 (FeS ₂ -rich), 2517.2; fracture ends 2618.9; beds begin to dip at 2617.9	2613.2	2618.8		
64	Dolomite, fine grained, dark gray brown argillaceous, with pyrite 2618.95, lens-shaped	2618.8	2619.2		
65	Shale, like unit 63 with abundant dolomite as disseminated grains or in 2 types of beds, one nearly pure silt and carbonate, one with much pyrite and minor unknown green mineral (apatite?) 2619.4, 2619.5, 2619.6, 2620.5, 2620.6, 2621, 2621.1, 2621.5, 2621.4, 2621.6, 2621.8, 2622.1, 2622.2, 2622.3, 2622.5, thick carbonate bed 2619.6; brown unit - 2519.2; diagonal fracture 2620.8, vertical fractures 2621.2-2621.4, 2621.4, 2621.5-2623.3	2619.2	2622.8		
66	Shale, black (N2.25) with dark brown tone, fewer silt and carbonate bands except at base - 2623.3 2623.5, 2623.7, 2623.8; coarse carbonate beds - 2623.2, 2623.5; fracture continues to 2623.3; beds still dipping	2622.8	2624.0		
67	Shale, dolomitic with prominent carbonate beds, lower contact very irregular, pyrite mass - 2624.2, 2624.3, 2624.5; beds may be graded	2624.0	2624.6		
68	Shale, black (N2.5) with dark brown unit, much disseminated coarse carbonate, pyrite abundant, decreases downward; pyrite masses 2624.8; pyrite bed; 2624.9; silt and carbonate beds 2624.9, 2625.3, 2626.5; brachiopod fillings and vitrain 2625.3 - 2625.5, 2626.2; small diagonal fracture 2625.2 - 2625.5	2624.6	2626.5		
69	Shale, like unit 67, also has numerous beds of shell-rich carbonate and a few pyrite laminae 2627.5, 2627.7; pyrite bodies - 2626.7, 2627, 2627.2, 2627.3; 2628, 2628.2, 2628.4, 2628.6-2629.4 (many) carbonate beds 2627.9, 2628, 2628.1, 2628.2, 2628.3; beds begin to dip at 2627; small diagonal fracture 2626.5-2626.6 vertical fractures 2627.2-2627.7, 2628.2-2629.3	2626.5	2629.5		
	Devonian System:				
	Muscatatuck Group				
	North Vernon Limestone, 0.3 ft cored				
70	Limestone, brownish-gray fossiliferous, (crinoids) medium grained, upper contact irregular with 0.2' greenish-brown clay	2629.5	2629.3		

70	Limestone, light gray with brown tone (5Y7/1), medium crystalline; fossiliferous, with large corals, bryozoans, brachiopods, and crinoid fragments, minor pyrite; organic material in stringers; porous; 2631.2-.3 fossil hash sl. brown; 2632.4-.6 coarsely xalline zone	2629.3	2633.5	4.2	NS00-0025
71.1	Like unit 70 but with large chert nodule and very large stylolite coated with brittle, lustrous, slickensided organic material, special sample of this 2633.9 (?)	2633.5	2633.9		NS00-0026
71.2	Like unit 70 but with large chert nodule and very large stylolite coated with brittle, lustrous, slickensided organic material, special sample of this 2633.9 (?)				NS00-0027
72	Limestone, light gray with brown tone (10YR7/1), very fossiliferous with large corals and bryozoans; matrix medium to fine crystalline; fossil-bearing, porcellaneous white to light buff chert at top and 2637.0; minor opalescent small chert nodules in upper part; trace organics and pyrite; 2635.1 large white calcite fill	2633.9	2637.4	3.5	NS00-0028
73	Limestone, like above but lighter color and without chert; slightly finer grained; generally lacks large corals of unit above; numerous black laminae especially, 2637.9-2638.3; stylolite 2639.6; minor glauconite in lower part; traces pyrite	2637.4	2640.1	2.7	NS00-0029
74	Shale, dark greenish gray with very dark brown interbeds; slightly calcareous; burrowed with pyrite fills; glauconite common; bottom contact irregular	2640.1	2640.2	0.1	NS00-0030
75	Limestone, light gray, (10YR7/1) medium to fine-grained; fossiliferous, but less so than above units; minor pyrite and organic stringers; stylolite 2642.2	2640.2	2642.7	2.5	NS00-0031
76	Limestone, like unit 75 but with 40% a cream to blue-gray chalky fossil-bearing chert	2642.7	2643.1	0.4	NS00-0032
77	Shale, calcareous dark greenish gray and black burrowed with pyrite fills; glauconite common; contacts irregular	2643.1	2643.3	0.2	NS00-0033
78	Limestone, like unit 75; well developed stylolites 2643.4 and at top	2643.3	2644.2	0.9	NS00-0034
79	Chert, light gray to gray brown, fossil bearing; porcellaneous	2644.2	2644.5	0.3	NS00-0035
80.1	Like unit 75 with lenses of coarser biofragmental material; fossil-bearing chert and flint (30%) 2645.2-2646.0, lower part oilstained and gray blue, upper part light gray brown; basal 0.5 feet coarse biosparite	2644.5	2646.5	2.0	NS00-0036
80.2	Like unit 75 with lenses of coarser biofragmental material; fossil-bearing chert and flint (30%) 2645.2-2646.0, lower part oilstained and gray blue, upper part light gray brown; basal 0.5 feet coarse biosparite				NS00-0037
80.3	Like unit 75 with lenses of coarser biofragmental material; fossil-bearing chert and flint (30%) 2645.2-2646.0, lower part oilstained and gray blue, upper part light gray brown; basal 0.5 feet coarse biosparite				NS00-0038
	Skip to 2724.0				
	Jeffersonville Limestone				

81	Limestone, grayish brown (10YR5/2), micritic matrix with large spar fossil fragments (bryozoans, brachiopods); healed vertical fractures	2724.0	2726.2	2.2	NS00-0039
82	Limestone, light brownish gray (10YR6/2); pelletal; fossiliferous (mainly bryozoans, brachiopods), frequently whole; with major (20%) chalky light grayish brown siliceous limestone, sparsely fossiliferous and irregular in shape; lenses of coarser fossil hash; irregular black organic (?) stringers common; minor chert; stylolites, 2734.6, 2735.2; below about 2735 lose pellets and becomes micritic	2726.2	2736.5	10.2	NS00-0040
83	Limestone, light gray (10YR7/1), biomicrite 2736.5 with large fossils (crinoids and brachiopods mainly); few intraclasts (?); large stylolite 2737	2736.5	2741.5	5.0	NS00-0041
84	Limestone, light gray; coarse fossils in pellet (?) and micrite matrix abundant siliceous limestone patches (15%) with succrosic texture, slightly silt; minor brown chert; large stylolite, 2745.5; 2748.2, 2749.7, 2751.4; trace orange ZnS 27548.2 in coral	2741.5	2754.4	12.9	NS00-0042

INDIANA GEOLOGICAL SURVEY

Core Description

Energy Resources of Indiana, Inc.

Phegley Farms, Inc. #1

NW¼ NW¼ NE¼ sec. 14, T. 6 N., R. 10 W. - Sullivan Co.

Altitude, 430 ft, ground level

by

Nelson R. Shaffer

Mississippian System:

Borden Group

New Providence Shale, 14.2 ft cored

- | | Depth
(ft) |
|--|----------------|
| 1. Shale, dark gray (N4.75) with slight blue-green tone, fine grained, but some micas and silt grains, numerous irregular carbonaceous patches cut bedding, minor pyrite, minor white to yellow sand grains; mineralized, diagonal fracture at 2491.2..... | 2490.0- 2491.4 |
| 2. Shale, as above but with glauconite and pyrite-rich beds..... | 2491.4- 2491.6 |
| 3. Shale, as unit 1 with light gray pyritiferous lenses at 2491.7, 2492.0, and 2492.1, phosphate (?) nodules at 2491.7..... | 2491.6- 2492.5 |
| 4. Sample removed - Mound..... | 2492.5- 2492.8 |
| 5. Shale, medium dark gray (N3.5) with minor silt grains large carbonaceous fragment 2493.3..... | 2492.8- 2493.7 |
| 6. Shale, like unit 5, but highly fractured with many slickensides..... | 2493.7- 2494.5 |
| 7. Sample removed - Battelle..... | 2494.5- 2495.0 |
| 8. Shale, dark gray (N3.5) with glauconite disseminated and in band 2495.4, pyrite nodule 2495.6, abundant darker carbonaceous bands 2492.5- .6, calcite-filled diagonal fracture 2495.2 - 2495.5.... | 2495.0- 2499.5 |
| 9. Shale, medium dark gray with appreciable quartz sand and more pyrite than above. Triangular (cross section) dolomite, quartz and pyrite bodies with apices up or down and bases parallel to bedding. Small 1-3 mm circular segregations of brown-gray phosphate (?) on bedding..... | 2499.5- 2500.3 |
| 10. Shale, as above but lacking triangular features, becomes more pyritiferous (small disseminated pyrite) with fewer and finer organics downward... | 2500.3- 2503.9 |
| 11. Mudstone, dark gray (N4) with abundant glauconite abundant, pyrite, fracture continues and is coated with dolomite, light brown, cream or clear and a resinous dark brown material..... | 2503.9- 2504.2 |

Mississippian-Devonian System:

New Albany Shale, 125.3 ft cored

Grassy Creek Member, 85.3 ft cored

- | | |
|--|----------------|
| 12. Shale, black (N2), carbonaceous, thin bedded with (0.1 mm) silt bands at 0.1' below contact, pyrite abundant, as disseminated subhedral crystals and in discrete thin beds, fracture continues filled with white calcite to 2505.3, disseminated coalified material; pyrite rich beds at 2505. (1mm), 2505.35 (5mm)..... | 2504.2- 2505.5 |
|--|----------------|

13. Sample removed - Battelle..... 2505.5- 2505.9
14. Shale, black (N2 to N2.5) with thick beds of silt, carbonate and pyrite at 2506.4 (30 mm), 2507.3 (10 mm), 2507.4 (7 mm), 2508. (15 mm); fractures 2505.9 - 2506.4, 2506.5 - 2508.7; diagonal fracture 2506.1 - 2506.2. Hard spherical bodies with calcite and pyrite fill 2506.1 -(5 mm) and 2506.4 (15 mm) cut bedding, white carbonate replacement 2506.4, also filled burrows..... 2505.9- 2508.1
15. Shale, as unit 14 but with thin silt bands and discrete vitrain fragments. Silt and pyrite bands at 2508.2 (3 mm), 2580.6 (1 mm), 2509.2 (double), 2510.1 (4 mm), 2510.3 (2 mm), 2510.4 (3 mm), 2510.5 (3 mm) 2510.8 (5 mm), 2511.4 (20 mm), 2512.5 (qtz. rich); bedding plane 2510.4 has numerous plant fragments, conodonts, lingula, and spores; pyrite filled burrow 2510.8; fracture continues to 2508.7..... 2508.1- 2512.4
16. Shale, like unit 14, but with numerous pyrite masses and few thick silt and pyrite beds. Silt beds with pyrite 2512.5 (16 mm), 2512.6 (5 mm), 2514.2 (10 mm)..... 2512.4- 2515.3
17. Sample removed - Battelle..... 2515.3- 2515.7
18. Shale, black (N1.75N2.25), with prominent silt and pyrite beds having graded (?) bedding and thin pyrite laminae, silt and pyrite beds 2516.1 (30 mm), 2516.9 (4 mm), 2517.0 (10 mm), 2517.7 (5 mm), 2518.0, (9 mm), 2519.3 (10 mm); pyrite laminae 2517.1, 2518.0, 2518.3, 2518.4, 2518.7; massive pyrite lens, 2518.0 2518.5, 2519.3 (often have marcasite borders); vertical fractures 2515.7 - 2516.9, 2517.2 - 2519.0. 2515.7- 2519.4
19. Shale black (N-2) pyrite lens 2520.4, silt and pyrite bed 2519.1 (1 mm)..... 2519.4- 2521.2
20. Sample removed - Mound..... 2521.2- 2521.5
21. Shale black thin-bedded (N2) as above; pyrite, silt, and calcite beds-2521.6 (7 mm); diagonal fracture 2523.0 - 2523.15, 2523.3 - 2523.4, 2523.55 - 2523.65; mineralized vertical fracture 2523.5 to 2528.0; massive pyrite 2521.6, 2523.2; pyrite laminae, 2522.1, 2522.3, 2522.4, 2523.2, 2523.3, 2524.1; considerable discing 2523.6 - 2527.2..... 2521.5- 2524.2
22. Shale, as above but characterized by angular pyrite masses, shard-like in form. Also contains white rhombs of dolomite (?). Pyrite laminae 2524.4, 2524.8, 2527.2, 2527.6, 2527.8; more numerous downward; pyrite mass 2524.3, 2525.5, 2525.6, 2526.6, 2527.9; mineralized vertical fracture continues to 2527.9, diagonal fracture 2526.0 - 2526.3; bedding plane with spores 2527.55..... 2524.2- 2527.9
23. Sample removed - Battelle..... 2527.9- 2528.2
24. Shale, black (N2.25 - N2.5), compact with numerous thin discontinuous pyrite laminae, few thin white silt beds, coalified wood fragments parallel to bedding, many large pyrite nodules; massive pyrite - 2528.2, 2528.4, 2529.1, 2530.1, 2530.2, 2530.4, 2530.7; pyrite laminae - 2528.6, 2528.8, 2529.0, 2529.2, 2529.6, 2529.8, 2530.3; lens of coarse plant fragments 2528.9; vertical fracture 2528.3 - 2528.9..... 2528.2- 2530.7

Fracture 2509.2 also

25. Shale as above but rich in spore cases, very few pyrite laminae, no pyrite masses..... 2530.7- 2531.4
26. Shale like unit 24 with abundant pyrite laminae massive pyrite, spores persist to 2531.8; massive pyrite - 2531.6, 2531.9, 2532.2, 2532.4, 2532.5, 2532.8, 2533.2, 2533.5, 2533.6, 2533.9, 2534.2, 2534.5, 2534.7, 2534.8, 2535.4; pyrite and silt beds - 2531.8, 2532.8 (2 mm), 2533.4, 2533.9, 2535, 2535.2; diagonal fracture 2535.3-2535.4..... 2531.4- 2535.4
27. Shale like 24 but lacking large pyrite masses, silt bed 2536.1 (with pyrite-filled burrows); vitrain on bedding 2536.4; small pyrite blebs 2535.9, 2536.0..... 2535.4- 2536.5
2536.5- 2536.9
28. Sample removed - Battelle.....
29. Shale as unit 27; massive pyrite - 2537.1, 2537.4, 2537.6, 2538.3, 2538.7, 2539.8; pyrite and silt beds - 2538 (5 mm), 2538.7 (3 mm), 2538.9 (5 mm) 2539.4 (2 mm), 2539.8 (2 mm); pyrite laminae 2537.4, vitrain-rich bed 2539.2..... 2536.9- 2539.8
30. Shale, black to dark gray (N3) with few silt and pyrite beds, many laminae, pyrite masses - 2540.5, 2540.9, 2541.5, pyrite laminae 2540.5, 2541.1, 2541.3, 2541.7, 2542.1, silt and pyrite bed 2541.5 (3 mm), 2542.3 (5 mm); diagonal fracture 2541.0 - 2541.1..... 2539.8- 2542.4
31. Shale, black (N2.5-N3) with abundant disseminated pyrite; pyrite mass 2542.8, 2543, 2543.8 (large), 2544.8 (angular); pyrite laminae 2543.7, 2543.8, 2543.9, 2544.4, 2544.8, (4 mm) 2545.1; silt band 2544.9 (7 mm); diagonal fracture 2542.7-2542.8..... 2542.4- 2545.1
32. Shale, black (N2.5-N3), rich in spores, less pyrite, slight brown tone; pyrite 2545.6, 2546.9, 2547.8..... 2545.1- 2547.1
2547.1- 2547.5
33. Sample removed - Battelle.....
34. Shale, black (N2) with few irregular very dark greyish brown beds (10YR3/2), abundant thin gray carbonate laminae, numerous spores decreasing downward; pyrite nodule 2548.2, 2548.8; silt and pyrite bed 2548.5; vertical fracture 2548 - 2548.1..... 2547.5- 2549.2
2549.2- 2549.7
35. Sample removed - Mound.....
36. Shale, dark gray (N3.5N3.75), with more brownish material especially at 2551.6, 2552.8; abundant spores, pyrite masses 2550, 2550.1, 2551.2, 2551.6, 2553.9; laminae 2551.1, 2551.5, 2551.8, 2551.9..... 2549.7- 2554.3
2554.3- 2554.8
37. Sample removed - Battelle.....
38. Shale, black (N2.5-N3) slightly brown, contains spores abundant locally but decreasing downward to 2558.7; dark gray-brown bed 2559.3; pyrite masses- 2555.1, 2555.4, 2555.7, 2555.9, 2556.6, 2556.8, 2557.3, 2561.2, 2561.4; lens- 2555.7; pyrite laminae 2555.6, 2557.1, 2557.8; silt and pyrite beds 2557.3, 2557.9, 2560.6, 2561.5..... 2554.8- 2561.8

39. Shale, dark gray-brown(10YR3/2) with numerous black patches and abundant disseminated pyrite but few large nodules; pyrite mass 2563.2, 2564.7, 2565; silt and pyrite bed 2564.1, 2564.2; random mineralized diagonal fractures 2563.4-2563.5; 2564.1 bedding plane slickensided (?)..... 2561.8- 2565.2
40. Sample removed - Battelle..... 2565.2- 2565.6
41. Shale like unit 39 but black material dominates; pyrite nodules - 2566.3, 2566.7, 2567.8, 2567.9, 2569, 2569.1, 2570.2, pyrite burrow-fill 2566.1, 2568 (small); pyrite beds 2566.4, 2567.1, 2569.5 (4 mm); numerous diagonal fractures 2567.7-2568 filled with carbonate and minor blue unknown mineral; fracture 2568.7 - 2568.8..... 2565.6- 2570.5
42. Sample removed - Indiana Geological Survey (Hutchinson)..... 2570.5- 2571.5
43. Shale like unit 41, pyrite masses 2571.9 - 2572, 2572, 2572.6, 2573.7, 2573.9, 2574.4, 2574.8; pyrite lenses - 2574.0-2574.1 and 2574.6 - 2574.7..... 2571.5- 2575.3
44. Sample removed - Illinois Geological Survey (Dickerson)..... 2575.3- 2575.6
45. Shale as unit 41, pyrite nodules - 2576, 2576.4, 2576.8, 2576.9, 2577 (large), 2577.3; pyrite lenses 2576.2 - 2576.4, 2577.1; vertical fracture 2575.8-2578.5..... 2575.6- 2577.7
46. Shale, like unit 41 but with abundant spores and little pyrite..... 2577.7- 2578.5
47. Sample removed - mound (fracture ends in this interval)..... 2578.5- 2579.0
48. Shale like above, but with more silt beds and blacker; dark brown beds at 2580.2, 2580.5, 2582.2-2582.3, 2582.5-2583, 2584.2, 2584.4; spore-rich unit 2579.2-2579.4, 2579.8-2580.9; pyrite masses - 2579.3, 2579.4, 2579.6, 2579.8, 2579.9, 2580, 2580.7, 2581, 2581.4; 2583.3, 2583.4, 2583.8, 2583.9, 2584, 2584.8; pyrite laminae 2580.8; vitrain lens 2581; silt and pyrite bed; 2582.3, 2582.4, 2583.1, 2583.2 (2 mm), 2584.3, 2584.6, 2584.8, 2585; vertical fracture 2580.1-2585.7..... 2579.0- 2585.2
49. Sample removed - Battelle..... 2585.2- 2585.6
50. Shale, mostly black with dark brown beds at 2588.5, 2588.7-2588.85, 2589.3-2589.5; pyrite masses 2587.7, 2586.5, 2586.8, 2587.4, 2587.8, 2588.2 (narrow), 2589.1, 2589.3, 2589.4; silt (?) beds 2585.7, 2586.1, 2586.3, 2586.9, 2587, 2587.1 (4 mm), 2587.5, 2587.7, 2587.8, 2588.3, (double) 2589; diagonal fracture 2589-2589.9, vertical fracture from above to 2585.7 and 2589.3-2590.4..... 2585.6- 2589.5

X Sweetland Creek Member, 23.2 ft cored

- (51. Shale, olive gray (5Y4/2) with black interbeds, abundant pyrite, numerous plant fragments, bottom 1-2 cm. pink-brown finely crystalline dolomite containing plumose black patches, lower boundary irregular and pyrite rich; pyrite 2589.6, 2589.7, 2589.9, 2590, 2590.2, 2590.5..... 2589.5- 2590.6
2590.6- 2590.8
52. Shale like unit 50.....
- (53. Argillaceous dolomite (N4 - N6) light gray, finely crystalline, pyritiferous, with irregular white calcite fossil fillings. Thin green clay beds at base and top. Unit is lens-shaped, .1' brown shale then thin irregular green shale at borders..... 2590.8- 2591.6
54. Shale, dark olive gray (5Y3/2), beds dip parallel to dolomite lens, diagonal fractures 2591.9..... 2591.6- 2592.1
55. Shale black to dark brown with numerous lighter colored irregular dolomite-rich beds 2592.6- 2592.9, 2593.4, 2593.5, 2593.7, 2593.9, 2594, 2594.2, 2594.5; pyrite 2593.3, 2593.4, 2593.5, 2593.6; pyrite bed 2594 (10 mm)..... 2592.1- 2594.5
56. Shale alternating black (N2) to dark brown, lacks light colored dolomite lenses of above, pyrite 2594.9, 2595.1, 2595.2..... 2594.5- 2595.3
2595.3- 2595.7
57. Sample removed - Battelle.....
58. Shale, black to dark brown, pyrite increasing downward, fewer silt beds; brown beds - 2595.9- 2596+, 2596.3-2596.4, 2597.7, 2597.2, 2597.4, 2497.6, 2598, 2598.3, 2598.4, 2598.8, 2599.4, 2599.8, 2599.9, 2600.2, 2600.3, 2600.5 (burrow), 2600.8, 2601.1, 2601.3, 2601.4, 2601.5, 2601.7, 2601.8, 2602.6, 2602.7; silt bands- 2597, 2598.2, 2599, 2599.2 (10 mm), 2599.6, 2600 (5 mm), 2600.4, 2601.1, 2601.5 (with pyrite), 2602.6; vitrain lens - 2596.7; spore-rich zone 2600-2600.5, vertical fracture 2598.0 - 2602.3..... 2595.7- 2602.7
2602.7- 2604.0
59. Sample removed - Battelle.....
- (60. Shale, dark brown with black beds, disseminated carbonate and thin silt and carbonate beds - 2604.3, 2604.7, 2604.9, 2606, 2606.4, 2606.8, 2607, 2608.6, 2609, 2609.1, 2609.6, 2610, 2611.6 (5 mm); pyrite masses - 2604.1, 2604.3 2604.9, 2605.3, 2605.7, 2606.2, 2606.4, 2606.5, 2606.8, 2607, 2607.3, 2607.7, 2607.9, 2608, 2608.9, (large), 2609.3, 2609.4, 2609.6, 2609.8, 2610, 2610.1, 2610.2, 2610.5, 2610.8, 2611.6, 2611.7, 2611; pyrite laminae 2608, 2608.8, 2611.8; vertical fracture 2606-2609.2, 2606.4 - 2606.6, 2610.5-2618.9 (mineralized in part)..... 2604.0- 2611.6

61. Shale like unit 60, with numerous pyrite bodies that cut across bedding; pyrite - 2612.1, 2612.5; carbonate and silt band 2612.7 (15 mm); fracture continues..... 2611.6- 2612.7
- X Blocher Member, 16.8 ft cored
62. Shale, black very fine grained, shows silky luster (slickensides) on bedding, large pyrite nodules; diagonal fracture 2612.9-2613, fracture continues 2612.7- 2613.2
63. Shale, black (N-2) with few brown beds, numerous pyrite laminae - 2613.3, 2613.4, 2613.6, 2614.2, 2614.4, 2614.5, 2614.6, 2614.8, 2615.1; pyrite masses - 2613.9, 2614.3, 2615.5, 2615.6, 2616.5, 2616.8, 2617.4, 2617.7; carb. and silt beds - 2513.9, 2514.2, 2515.5 (pyrite-rich), 2515.8 (FeS₂-rich), 2517.2; fracture ends 2618.9; beds begin to dip at 2617.9..... 2613.2--2618.8
64. Dolomite, fine grained, dark gray brown argillaceous, with pyrite 2618.95, lens-shaped..... 2618.8- 2619.2
65. Shale, like unit 63 with abundant dolomite as disseminated grains or in 2 types of beds, one nearly pure silt and carbonate, one with much pyrite and minor unknown green mineral (apatite?) 2619.4, 2619.5, 2619.6, 2620.5, 2620.6, 2621, 2621.1, 2621.5, 2621.4, 2621.6, 2621.8, 2622.1, 2622.2, 2622.3, 2622.5, thick carbonate bed 2619.6; brown unit - 2519.2; diagonal fracture 2620.8, vertical fractures 2621.2-2621.4, 2621.4, 2621.5-2623.3..... 2619.2- 2622.8
66. Shale, black (N2.25) with dark brown tone, fewer silt and carbonate bands except at base - 2623.3 2623.5, 2623.7, 2623.8; coarse carbonate beds - 2623.2, 2623.5; fracture continues to 2623.3; beds still dipping..... 2622.8- 2624.0
67. Shale, dolomitic with prominent carbonate beds, lower contact very irregular, pyrite mass - 2624.2, 2624.3, 2624.5; beds may be graded..... 2624.0- 2624.6
68. Shale, black (N-2.5) with dark brown unit, much disseminated coarse carbonate, pyrite abundant, decreases downward; pyrite masses 2624.8; pyrite bed; 2624.9; silt and carbonate beds 2624.9, 2625.3, 2626.5; brachiopod fillings and vitrain 2625.3 - 2625.5, 2626.2; small diagonal fracture 2625.2 - 2625.5..... 2624.6- 2626.5
69. Shale, like unit 67, also has numerous beds of shell-rich carbonate and a few pyrite laminae 2627.5, 2627.7; pyrite bodies - 2626.7, 2627, 2627.2, 2627.3; 2628, 2628.2, 2628.4, 2628.6-2629.4 (many) carbonate beds 2627.9, 2628, 2628.1, 2628.2, 2628.3; beds begin to dip at 2627; small diagonal fracture 2626.5-2626.6 vertical fractures 2627.2-2627.7, 2628.2-2629.3..... 2626.5- 2629.5

Devonian System:

Muscatatuck Group

North Vernon Limestone, 0.3 ft cored

70. Limestone, brownish-gray fossiliferous, (crinoids)
medium grained, upper contact irregular with
0.2' greenish-brown clay.....

2629.5- 2629.8

Phegley Core (continued)

	<u>Description</u>	<u>Interval</u> <u>(ft.)</u>	<u>Thickness</u> <u>(ft.)</u>	<u>Pe 142</u>
10. Sample No. NS #25	Limestone, light gray with brown tone (5Y7/1), medium crystalline; fossiliferous, with large corals, bryozoans, brachiopods, and crinoid fragments, minor pyrite; organic material in stringers; porous; 2631.2-.3 fossil hash sl. brown; 2632.4-.6 coarsely xalline zone.....	2630 B → 2633D	4.2	
71 #26	Like unit 70 but with large chert nodule and very large stylolite coated with brittle, lustrous, slickensided organic material, special sample of this 2633.9 (?).....	2633 E → 2633 G		
#27	Limestone, light gray with brown tone (10YR7/1), very fossiliferous with large corals and bryozoans; matrix medium to fine crystalline; fossil-bearing, porcellaneous white to light buff chert at top and 2637.0; minor opalescent small chert nodules in upper part; trace organics and pyrite; 2635.1 large white calcite fill.....	2633.5-2633.9		
72 #28	Limestone, like above but lighter color and without chert; slightly finer grained; generally lacks large corals of unit above; numerous black laminae especially, 2637.9-2638.3; stylolite 2639.6; minor glauconite in lower part; traces pyrite.....	2634 A → 2637 B	3.5	
73 #29	Shale, dark greenish gray with very dark brown interbeds; slightly calcareous; burrowed with pyrite fills; glauconite common; bottom contact irregular.....	2637 C → 2640	2.7	
74 #30	Limestone, light gray, (10YR7/1) medium to fine-grained; fossiliferous, but less so than above units; minor pyrite and organic stringers; stylolite 2642.2.....	2640.1-2640.2	0.1	
75 #31	Limestone, like unit 75 but with 40% a cream to blue-gray chalky fossil-bearing chert.....	2640 B → 2642 C	2.5	
76 #32	Shale, calcareous dark greenish gray and black, burrowed with pyrite fills; glauconite common; contacts irregular.....	2642.7-2643.1	0.4	
77 #33	Limestone, like unit 75; well developed stylolites 2643.4 and at top.....	2643 A	0.2	
78 #34	Chert, light gray to gray brown, fossil bearing; porcellaneous.....	2643 B → 2644	0.9	
79 #35	Like unit 75 with lenses of coarser biofragmental material; fossil-bearing chert and flint (30%) 2645.2-2646.0, lower part oilstained and gray blue, upper part light gray brown; basal 0.5 feet coarse biosparite.....	2644 A → 2644 B	0.3	
80 #36	Like unit 75 with lenses of coarser biofragmental material; fossil-bearing chert and flint (30%) 2645.2-2646.0, lower part oilstained and gray blue, upper part light gray brown; basal 0.5 feet coarse biosparite.....	2644 C → 2645 A	0.7	
#37	Like unit 75 with lenses of coarser biofragmental material; fossil-bearing chert and flint (30%) 2645.2-2646.0, lower part oilstained and gray blue, upper part light gray brown; basal 0.5 feet coarse biosparite.....	2645.2 → 2645 F	0.7	
#38	Like unit 75 with lenses of coarser biofragmental material; fossil-bearing chert and flint (30%) 2645.2-2646.0, lower part oilstained and gray blue, upper part light gray brown; basal 0.5 feet coarse biosparite.....	2646.0 → 2646 B	0.6	
	-Skip to 2724.0-	2644.5-2646.5	2.0	
Jeffersonville Limestone				
81 #39	Limestone, grayish brown (10YR5/2), micritic matrix with large spar fossil fragments (bryozoans, brachiopods); healed vertical fractures.....	2724 A → 2726 A	2.2	

82. #40 Limestone, light brownish gray (10YR6/2);
 pelletal; fossiliferous (mainly bryozoans, brachiopods), frequently whole; with major (20%) chalky light grayish brown siliceous limestone, sparsely fossiliferous and irregular in shape; lenses of coarser fossil hash; irregular black organic (?) stringers common; minor chert; stylolites, 2734.6, 2735.2; below about 2735 lose pellets and becomes micritic.....2726.2-27- 10.2
 2736.5 2726B → 2736C
83. #41 Limestone, light gray (10YR7/1), biomicrite with large fossils (crinoids and brachiopods mainly); few intraclasts (?); large stylolite 2737.....2736.5-2741.5 5.0
 2736D → 2741B
84. #42 Limestone, light gray; coarse fossils in pellet (?) and micrite matrix abundant siliceous limestone patches (15%) with succrosic texture, slightly silt; minor brown chert; large stylolite, 2745.5; 2748.2, 2749.7, 2751.4; trace orange ZnS 27548.2 in coral.....2741.5-2754.4 12.9
 2742A - 2754B