UPPER FLORIDAN AQUIFER

HYDROGEOLOGIC INVESTIGATION REPORT

VOLUME 2

APPENDICES

INDIANTOWN COGENERATION PROJECT

Prepared for

PG&E-BECHTEL GENERATING COMPANY

August 1991

Bechtel Corporation
Gaithersburg, Maryland

APPENDIX A

LITHOLOGIC LOG OF IPW-1

BECHTEL GAITHERSBURG,MD

WELL LOG	PROJECT: INDIANTOWN COGENERATION PLANT	JOB NO. 20524	SHEET NO. 1 OF 22	WELL NO. IPW-1

SITE	COORDINATES	LOGGED BY:
Process Well No. 1	N 984313.00; E 814902.00	R. Blodnikar

BEGUN	COMPLETED	DRILLER	DRILL MAKE AND MODEL	SCREEN	CASING DIAMETER/LENGTH	TOTAL DEPTH
5-21-91	7-3-91	Drilling Serv., Inc. D. Spencer	Midway 1500M	N/A	20"/ 102' 10"/ 496'	1702.0

HOLE DIAM.	EL. TOP CASING	GROUND EL.	DEPTH/EL. GROUND WATER	AQUIFER
0'-102' 26" 102'-498' 16" 498'-1702' 8"	20": 35.21 10": -37.38	34.9	▽ 16.1/51.0	Upper Floridian

ELEV.	DEPTH	THICKNESS	SAMPLE	GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, CHARACTER OF WATER RETURN, DRILLING, ETC
34.9						
32.4					FORT THOMPSON/ANASTASIA FORMATION	Start drilling at 1110 hrs. using 14" dia. drag bit from ground surface to 5'; replace bit with 14" dia. tricone rock bit and 28" reamer; drilling fluid Baroid quik-jel and water from on-site Shallow aquifer supply well from 0' to 780'. Total for day 5'. 5/22/91: Continue drilling 28" dia. hole from 5'; cuttings samples obtained at 10' intervals; desander run continuously to clean drilling fluid. 0'- 42': Avg. drilling rate 0.7'/min.
29.9	5				0.0' - 2.5' Very light gray (N8) and black (N1) SAND, moist, fine-coarse grained, most fine-medium, slightly silty, loose; little organic material, roots and decomposing vegetation. 2.5' - 5.0' Grayish black (N2), CEMENTED SAND, dense, fine-coarse grained, most medium, grains angular to subangular; mainly quartz and feldspar with organic cement; few to little fines; few roots and decomposed vegetation.	
	10				5.0' - 12.0' Dark yellowish orange (10YR 6/6) grading to moderate yellowish brown (10YR 5/4) SILTY SAND, fine-coarse grained, angular to subrounded, quartz and feldspar; little fines, silty; orange and black staining.	
	15				12.0' - 20.0' Dark yellowish brown (10YR 4/2) SILTY SAND, fine-coarse grained, most fine-medium grained, subrounded-rounded; mainly quartz and feldspar with few very fine black grains (phosphorite?), trace sphene and apatite grains.	
	20				20.0' - 30.0' Pale yellowish brown (10YR 6/2) SILTY SAND, very fine-fine sand; little fines, silty, non plastic.	22'-42': Viscosifier added to drilling fluid to lift heavier cuttings.
	25					
	30				30.0' - 40.0' Light olive gray (5Y 6/1) SILTY SAND, very fine-medium grained, most very fine-fine, subangular to rounded; mainly quartz, few black grains (phosphorite?); little fines, silty.	
	35					
-5.1	40				40.0' - 50.0' Light olive gray (5Y 6/1) SAND, very fine to medium grained, most very fine-fine, subrounded-rounded; mainly quartz, few fine rounded black grains (phosphorite?); trace fines, silty.	40': Most of sample obtained from desander.
	45					
	50				50.0' - 60.0' Light olive gray (5Y 6/1) SAND, very fine-coarse grained, most very fine-fine, subrounded-rounded; mainly quartz, little fine black grains (phosphorite?); trace fines, silty and clayey.	50': Mix additional drilling fluid.
	55					55': Add 16 oz. viscosifier to drilling fluid.
-25.1	60				58.0' - 60.0' Few shells and shell fragments, pelecypod, small, white (N9) to pinkish gray (5YR 8/1).	
	65				60.0' - 70.0' Medium dark gray (N4) SAND and white (N9) to pinkish gray (5YR 8/1) SHELLS and shell fragments; sand, fine-medium grained, most medium, subangular-subrounded; mainly quartz, little fine black rounded grains (phosphorite); shells and shell fragments to 1/4", most coarse sand to fine gravel size.	60'-75': Rain delays.
		19.0				

SITE		WELL NO.
Process Well No. 1	Update: 8-5-91 Template: GAWATWE	IPW-1

BECHTEL GAITHERSBURG, MD

WELL LOG	PROJECT	JOB NO.	SHEET NO.	WELL NO.
	INDIANTOWN COGENERATION PLANT	20524	2 OF 22	IPW-1

ELEV.	DEPTH	THICKNESS	SAMPLE	GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC
	75				70.0' - 79.0' Medium dark gray (N4) SILTY SAND, AND WHITE (N9) to pinkish gray (5YR 8/1) SHELLS AND SHELL FRAGMENTS, soft; sand, fine-medium grained, most medium, subrounded-rounded, mainly quartz with few black rounded grains (phosphorite?); shells and shell fragments to 1/8" most 1/32"-1/16", gastropods and pelecypods; some fines, silty.	72'-75': Increase in discharge from desander.
-44.1						
-46.1	80				79.0' - 81.0' Medium light gray (N6) CEMENTED SAND, hard, fine-medium sand, subrounded-rounded; mainly quartz in a calcareous matrix.	78': Mix additional drilling fluid; stop drilling due to wet brake on kelly winch.
					CALOOSAHATCHEE MARL	79': Stop drilling for day; condition fluid; 40 sacks quik-jel used to this depth; helper on-site over night to maintain fluid level in hole.
	85				81.0' - 90.0' Light gray (N7) and medium light gray (N6) SHELL HASH, soft; shells and shell fragments, white, pink, black and gray, coarse sand and fine-medium gravel size, gastropods and pelecypods; some sand, light gray (N7), fine-coarse, most medium, mainly quartz, trace black rounded grains; trace silt.	5/23/91: Continue drilling from 79'; no significant cave in hole. 79'-81': Rig chatters, hard layer, slow rotation. 84': Mix additional drilling fluid. 84'-102': Drilling rate 0.4'/min.
	90				90.0' - 100.0' Greenish gray (5GY 6/1) SHELL HASH, soft; shells and shell fragments, pink, white, gray and black, sand size to 1.5", most 1/8" to 1/2", gastropods and pelecypods; little sand, fine-coarse, most medium, subangular- subrounded, mainly quartz; trace fines, non plastic.	
	95				98.0' - 104.0' Thin light gray (N7) clay lenses, plastic.	
	100				100.0' - 110.0' Medium gray (N5) SANDY SHELL HASH, shells and shell fragments, soft, white to light pink, some appear bleached, thin, gastropods and pelecypods, sand size to 1", most 1/8"; some sand, fine-coarse, subrounded-rounded, mainly quartz.	102': Total depth of 28" dia. hole; condition drilling fluid; set 104.1' of 20" dia.x0.375" wall casing to 101.6'below ground surface; 3 sets of centralizers welded to casing to center in hole. Annulus grouted with 5.5 yds. Type I cement. 162 gallons water/yd. Grout pumped from bottom of casing. Complete at 1600 hr. 5/24/91: Remove 20" casing to 0.4' above ground surface. Grout level 16.5' below top of casing. Add 1 yd. grout to annulus by tremie method. Continue drilling at 1500 hrs with 8 7/8" dia. finger bit. Drill grout 98'-99' and 100'-103.5'. 100'-110': Sample contaminated with grout and semi-consolidated drilling fluid.
	105					
	110				110.0' - 120.0' Very light gray (N8) and white (N9) SANDY SHELL HASH, soft; shells and shell fragments, white, gray, pink, some translucent, sand size to 1", most 1/8", gastropods and pelecypods; some sand, fine-coarse, most medium, subrounded-rounded, mainly quartz, trace fine rounded black phosphorite grains; slightly cohesive.	
	115					
-85.1	120				TAMIAMI FORMATION	
					120.0' - 130.0' Light olive gray (5Y 6/1) to medium dark gray (N4) SHELLS AND CEMENTED SAND, shells and shell fragments, white, gray, pink, most thin and slightly translucent, sand size to 3/4", most 1/8"; sand fine-coarse grained, subrounded-rounded, mainly quartz with black phosphorite grains; weakly cemented with carbonate cement; shells and shell fragments with thin layers of weakly cemented sand and shell fragments.	
	125					
	130				130.0' - 140.0' Light olive gray (5Y 6/1) to medium dark gray (N4) SHELLS AND CEMENTED SAND, same as 120.0' - 130.0', except decrease in loose shells.	
	135					
	140				140.0' - 150.0' Light olive gray (5Y 6/1) and yellowish gray (5Y 8/1) SHELLS AND CEMENTED SAND, soft to moderately hard; shells, white, pink and light gray, sand size to 1", most 1/8", most thick wall, trace translucent shells, gastropod and pelecypod; sand, fine-coarse grained, most fine-medium, subangular-subrounded, mainly quartz, with trace fine, rounded black grains, weakly cemented with calcareous cement; breaks readily into 1/8" - 3/16" fragments; few fines, non plastic.	140': Total depth for day; repair kelly hose leak. 5/25/91: Continue drilling from 140'; approx. 2' of cave in hole.
	145					

SITE			WELL NO.
Process Well No. 1	Update: 8-5-91 Template: GAWATWE2		IPW-1

BECHTEL GAITHERSBURG, MD

WELL LOG	PROJECT: INDIANTOWN COGENERATION PLANT	JOB NO. 20524	SHEET NO. 3 OF 22	WELL NO. IPW-1

ELEV.	DEPTH	THICKNESS	SAMPLE	GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC
	155				150.0' - 160.0' Yellowish gray (5Y 8/1) CEMENTED SAND AND SHELLS, medium hard; sand, fine-coarse, most medium, subrounded-rounded, mainly quartz with shells and shell fragments weak to moderately cemented in a calcareous matrix, scattered shell casts; shells mostly white and gray, coarse sand size to 1/8", most 1/16", gastropods, pelecypod and coral pieces, appear bleached; trace fines. 152.0' - 155.0' Cemented sand lense.	152'-160': Light chatters.
	160				160.0' - 168.0' Yellowish gray (5Y 8/1) CEMENTED SAND AND SHELLS, same as 150.0' - 160.0' except few black fine phosphorite grains; mixed shell layers and cemented sand and shell layers, hard and soft.	160'-720': No mud loss.
	165					
-133.1					HAWTHORN GROUP - PEACE RIVER FORMATION	
	170				168.0' - 180.0' Medium greenish gray (5GY 5/1) SANDY CLAY AND SHELLS, soft; clay, plastic; little sand, very fine-fine, mainly quartz, some shell fragments, coarse sand size to 1/4", most 1/8"-3/16". 168.0' - 170.0' Hard, dry, clay fragments, plastic.	170'-180': Very soft, rapid penetration, approx. 3'/min.
	175					
	180				180.0' - 190.0' Medium greenish gray (5GY 5/1) SANDY CLAY, soft; clay, plastic; few sand, very fine-medium, most very fine-fine; trace light gray silt lenses.	180'-190': Penetration rate: 2'/min.
	185					
	190				190.0' - 200.0' Medium greenish gray (5GY 5/1) SANDY CLAY, loose to stiff; clay, plastic; little sand, fine-medium, most fine; scattered fragments of hard, dry clay; trace medium light gray (N6) silt lenses; with lenses of fine to coarse shell fragments.	190'-200': Penetration rate: 2.5'/min.
	195					
	200				200.0' - 210.0' Medium greenish gray (5GY 5/1) SANDY CLAY, same as 190.0' - 200.0', except increase in medium light gray (N6) sandy silt lenses.	200'-220': Penetration rate: 2.5'/min.
	205					
	210				210.0' - 220.0' Medium greenish gray (5GY 5/1) SANDY CLAY, same as 200.0' - 210.0'.	
	215					
	220				220.0' - 230.0' Medium greenish gray (5GY 5/1) SANDY CLAY, soft; clay, calcareous, plastic; few sand, very fine-fine; trace hard indurated clay lenses.	220': Drilling fluid greenish-tan color.
	225					
-195.1						

SITE		WELL NO.
Process Well No. 1	Update: 8-5-91 Template: GAWATWE2	IPW-1

BECHTEL GAITHERSBURG, MD

WELL LOG	PROJECT	JOB NO.	SHEET NO.	WELL NO.
	INDIANTOWN COGENERATION PLANT	20524	4 OF 22	IPW-1

ELEV.	DEPTH	THICKNESS	SAMPLE	GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC
	230				230.0' - 240.0' Medium greenish gray (5GY 5/1) SANDY CLAY AND CLAY, loose to stiff; clay, calcareous, plastic; little sand, fine-medium, most fine, mainly quartz; trace silt lenses; trace shells, very light brown (5YR 7/4) pelecypods.	230'-240': Penetration rate: 2'/min.
	235					
	240				240.0' - 245.0' Medium greenish gray (5GY 5/1) SANDY CLAY AND CLAY, same as 230.0' - 240.0'.	
-210.1	245				245.0' - 251.0' Medium greenish gray (5GY 5/1) SHELLS AND SHELL FRAGMENTS, angular fragments sand size to 1/8", most 1/16", gray and tan, gastropods and pelecypods; little sand, fine-coarse, most medium, trace black grains.	
-216.1	250				251.0' - 260.0' Medium greenish gray (5GY 5/1) SANDY CLAY AND CLAY, soft; clay, calcareous, plastic; sand, very fine-medium grained, most fine, trace black grains; scattered silt lenses.	250'-270': Penetration rate: 3.3'/min.
	255					
-225.1	260				260.0' - 270.0' Medium greenish gray (5GY 5/1) CLAY AND CLAYEY SAND, soft; clay, calcareous, plastic, with trace very fine sand; sand, fine-medium, most fine, with few pink and white, soft, shells and shell fragments, sand size to 1/4".	
	265					
	270				270.0' - 280.0' Dark olive green (10Y 4/2) CLAY AND CLAYEY SAND, soft; clay-calcareous, plastic; clayey sand lenses dry, sand fine-medium, most fine; few shells and shell fragments, many thin.	270'-280': Penetration rate: 1'/min., add water to mud pit to thin out drilling fluid.
	275					
	280				280.0' - 290.0' Dark olive green (10Y 4/2) CLAY AND SANDY CLAY, soft; clay, calcareous, plastic; sandy clay - little sand, very fine; trace shells and shell fragments.	280'-290': Penetration rate: 2'/min.
	285					
-255.1	290				290.0' - 300.0' Dark olive green (10Y 4/2) CLAY, soft; calcareous, high plasticity, few very fine sand; trace tan shells.	290'-300': Penetration rate: 3.3'/min.
	295					
	300				300.0' - 310.0' Dark olive green (10Y 4/2) CLAY, same as 290.0' - 300.0'.	300'-310': Penetration rate: 1.4'/min.; drilling fluid light olive green.
	305					

SITE		WELL NO.
Process Well No. 1	Update: 8-5-91 Template: GAWATWE2	IPW-1

BECHTEL GAITHERSBURG, MD

WELL LOG	PROJECT	JOB NO.	SHEET NO.	WELL NO.
	INDIANTOWN COGENERATION PLANT	20524	5 OF 22	IPW-1

ELEV.	DEPTH	THICKNESS	SAMPLE	GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC
	310				310.0' - 320.0' Dark olive green (10Y 4/2) CLAY, same as 290.0' - 300.0', with trace coarse sand.	310'-320': Penetration rate: 3.3'/min.
	315					
	320				320.0' - 330.0' Dark olive green (10Y 4/2) CLAY, same as 290.0' - 300.0', with trace coarse sand.	320'-340': Penetration rate: 2.5'/min.
	325					
	330				330.0' - 340.0' Dark olive green (10Y 4/2) CLAY, same as 290.0' - 300.0', with trace coarse sand and trace gray silt lenses.	
	335					
	340				340.0' - 350.0' Dark olive green (10Y 4/2) CLAY, same as 290.0' - 300.0', with trace coarse sand and trace gray and olive green silt lenses.	
	345					
	350				350.0' - 360.0' Dark olive green (10Y 4/2) CLAY, slightly stiff; calcareous, high plasticity; few very fine sand; trace white and dark gray limy sandstone lenses; trace olive green silt lenses.	350'-360': Redrill interval several times due to squeezing of hole.
	355					
	360				360.0' - 370.0' Dark olive green (10Y 4/2) CLAY, slightly stiff with indurated lenses; calcareous, high plasticity; few very fine-coarse sand, most fine.	
	365					
	370				370.0' - 380.0' Dark olive green (10Y 4/2) CLAY, same as 360.0' - 370.0'.	370'-380': Slight chatters.
	375					
	380				378.0' - 380.0' Thin layers of soft, white (N9), limestone, shell and coral fragments; highly porous, vuggy. 380.0' - 390.0' Dark olive green (10Y 4/2) CLAY, stiff, calcareous, high plasticity; trace coarse sand; scattered indurated clay lenses.	380'-390': Penetration rate: 3.3'/min.
	385					
-355.1						

SITE			
Process Well No. 1	Update: 8-5-91 Template: GAWATWE2	WELL NO. IPW-1	

BECHTEL GAITHERSBURG, MD

WELL LOG	PROJECT: INDIANTOWN COGENERATION PLANT	JOB NO. 20524	SHEET NO. 6 OF 22	WELL NO. IPW-1

ELEV.	DEPTH	THICKNESS	SAMPLE	GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC
-357.1	395				390.0' - 392.0' Grayish black (N2) to medium dark gray (N4) DOLOMITIC CHERT, very hard; microcrystalline; conchoidal fragments. 392.0' - 400.0' Yellowish gray (5Y 7/2) SANDY LIMESTONE and grayish olive (10Y 7/2) CLAY; sandy limestone - hard, moderately strong, sand fine-medium grained, most medium, carbonate cement, low visible porosity, with fossil molds; clay - soft to indurated, calcareous, high plasticity.	390'-392': Penetration rate: 0.2'/min.; hard drilling, rig chatters. 392'-410': Scattered chatters, hard and soft layers.
-365.1	400 405				400.0' - 410.0' Grayish olive (10Y 7/2) CLAY, white (N9) CLAY, and yellowish gray (5Y 7/2) SANDY LIMESTONE; olive clay - medium hard, indurated, high plasticity (more than 50% of the interval); white clay - very soft, creamy texture, medium plasticity; sandy limestone - hard, moderately strong, sand, fine-medium grained, most medium, carbonate cement, low visible porosity, with fossil molds.	
-375.1	410 415				410.0' - 420.0' Greenish gray (5GY 6/1) SILTY CLAY, medium gray (N5) CEMENTED SAND AND SHELLS and very light gray (N8) LIMESTONE; clay - soft, medium plasticity (most of interval), cemented sand and shells - fine-medium sand, subangular-subrounded, weakly cemented, mainly quartz with few shells and shell fragments, few black fine rounded phosphate grains, milky; limestone - weak, brittle, massive, microcrystalline.	410'-415': Moderate rig chatters.
-385.1	420 425 430				420.0' - 434.0' Greenish gray (5GY 6/1) SILTY CLAY, medium gray (N5) CEMENTED SAND AND SHELLS and very light gray (N8) LIMESTONE, same as 410.0' - 420.0', with lenses of olive gray (5Y 4/1) CLAY, high plasticity.	420'-430': Penetration rate: 1.4'/min. 430'-440': Penetration rate: 1'/min.
-399.1	435				434.0' - 440.0' Greenish gray (5GY 6/1) SILTY CLAY and olive gray (5Y 4/1) CLAY; silty clay - soft, medium plasticity, milky, with few shells, shell fragments and coral, few black fine-medium phosphate grains; clay - high plasticity.	
-405.1	440 445				440.0' - 450.0' Greenish gray (5GY 8/1) CLAY, very stiff; highly plastic, phosphatic, with few shell and limestone fragments; very light gray (N8) sandy clay lenses, sand fine-coarse, most fine-medium.	Total depth for day 440'. 5/28/91: Drilling fluid 4' below top of casing; continue drilling from 440'.
	450 455 460				450.0' - 464.0' Light olive gray (5Y 6/1) CLAY with lenses of light bluish gray (5B 7/1) to medium gray (N5) SILTY CLAY; clay - calcareous, high plasticity; silty clay - stiff, dry, phosphatic; some shell and light yellowish gray (5Y 9/1) coral fragments, hard.	
-429.1	465				464.0' - 468.0' Yellowish gray (5Y 8/1) LIMESTONE, hard; fossiliferous, shells and coral fragments, few sand fine-medium grain size, softer layers above and below phosphatic. 468.0 - 475.0' Yellowish gray (5Y 8/1) LIMESTONE AND CLAY; limestone sandy, fine-medium, medium hard, very fine grained, milky; clay - light	464'-468': Difficult penetration - add water to mud pit.

SITE		WELL NO.
Process Well No. 1	Update: 8-5-91 Template: GAWATWE2	IPW-1

BECHTEL GAITHERSBURG, MD

WELL LOG	PROJECT: INDIANTOWN COGENERATION PLANT	JOB NO. 20524	SHEET NO. 7 OF 22	WELL NO. IPW-1

ELEV.	DEPTH	THICKNESS	SAMPLE	GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC
					gray, calcareous, plastic.	
-440.1	475				475.0' - 480.0' Moderate olive gray (5Y 4/2) CLAY, and yellowish gray (5Y 8/1) and light gray (N7) LIMESTONE; clay - stiff, dry, few very fine sand, medium plasticity; with lenses of limestone - sandy, mainly fine-medium quartz, weakly cemented in calcareous matrix, chalky, fossiliferous, slight porosity; alternating hard and soft layers.	
	480				480.0' - 490.0' Moderate olive gray (5Y 4/2) CLAY, and yellowish gray (5Y 8/1) and light gray (N7) LIMESTONE, same as 475.0' - 480.0'.	
	485					
	490				490.0' - 496.0' Moderate olive gray (5Y 4/2) CLAY, and yellowish gray (5Y 8/1) and light gray (N7) LIMESTONE, same as 475.0' - 480.0'.	
-461.1	495				496.0' - 500.0' Yellowish gray (5Y 8/1) to medium gray (N5) LIMESTONE, SILTSTONE AND CLAY, hard and soft lenses, chalky, calcareous, few dark rounded phosphate grains; limestone and clay same as 475.0' - 480.0'.	
	500				500.0' - 510.0' Very pale orange (10YR 8/2) SANDY LIMESTONE and gray (N5) SANDY SILTSTONE with thin white (N9) CLAY LENSES; sandy limestone - weak, sand fine-coarse grained, most fine-medium, mainly quartz, weak cementation; siltstone - hard, indurated, little sand, very fine to fine grained; clay - soft, calcareous, chalky; few rounded, fine-coarse, black phosphate grains.	Interim depth 500'; ream pilot hole to 16" dia.; hole reamed to 300' at end of shift. 5/29/91: Fluid level in hole 9' below ground surface in AM; hole reamed to 498' TD of 16" hole 5/30/91: Install 500' of 10" dia. x 0.025" wall steel casing (10 1/4" ID) to 495.5' below ground surface; stabilizers placed at about 44' intervals; annulus grouted from bottom up through 2" PVC pipe placed at 420'. 12.5 yds. grout with 148.5 gal water per yard; complete grouting at 1600 hrs. Run temperature log at 0000 5/31 5/31/91: Grout level in AM at 48'; pump out drilling fluid from annulus and place 2 yds. of grout by tremie method. Perform casing integrity test. 6/3/91: Cut 4.12' of 10" casing and add 10" flange and 1.8' "T" to top of 10" casing. Fluid level in well at 9.25' below top of 20" casing. Enter hole with 7 7/8" dia. tricone button bit. Grout encounterd at 396'. Drill grout plug to 401'. Continuous grout 424' to 440', total cleaned at end of shift. 6/4/91: Ream out casing with 9 7/8" dia. bit to 496'. Remove 9 7/8" bit and continue hole advancement with 7 7/8"dia tricone button bit.Drilling fluid light olive green. 520'-530': Penetration rate: 0.2'/min., slowed by clay; Total depth for day 540'. 6/5/91 Fluid level ia AM 10.6' below top of 10" casing, light olive green color.
	505					
	510				510.0' - 520.0' Mixed very pale orange (10YR 8/2) SANDY LIMESTONE and gray (N5) SANDY SILTSTONE with thin very pale orange (10YR 8/2) CLAY LENSES; same as 500.0' - 510.0', with scattered shells and shell fragments.	
	515					
	520				520.0' - 530.0' Very pale orange (10YR 8/2) SANDY LIMESTONE and gray (N5) SANDY SILTSTONE with thin white (N9) CLAY LENSES; same as 500.0' - 510.0', with scattered shells and shell fragments.	
	525					
-495.1	530				530.0' - 540.0' Light gray (N7) CHALKY CLAY, soft, some sand, fine-coarse, mainly quartz and fine shell fragments, very weak cementation, chalky, fossiliferous; with dark gray (N3) hard siltstone lenses.	
	535					
-505.1	540				540.0' - 550.0' Yellowish gray (5Y 8/1) SANDY CLAY, soft to medium hard; weak to moderately cemented lenses; clay plastic, calcareous, chalky; some sand very fine to fine, variable sand content in individual lenses; few shell fragments, coarse sand size; trace black phosphate grains.	
	545					
-515.1						

SITE		WELL NO.
Process Well No. 1	Update: 8-5-91 Template: GAWATWE2	IPW-1

BECHTEL GAITHERSBURG, MD

WELL LOG	PROJECT: INDIANTOWN COGENERATION PLANT	JOB NO. 20524	SHEET NO. 8 OF 22	WELL NO. IPW-1

ELEV.	DEPTH	THICKNESS	SAMPLE	GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC
					550.0' - 557.0' Yellowish gray (5Y 7/2) CLAY, medium gray (N5) CLAYEY SAND and medium gray (N5) SANDY LIMESTONE; clay soft to stiff, plastic, slightly silty with scattered shells; clayey sand soft, cohesive, fine to medium grained; sandy limestone fine grained, hard, well cemented.	550'-580': Penetration rate: 1'/min.
-522.1	555				557.0' - 570.0' Yellowish gray (5Y 7/2) SANDY LIMESTONE with lenses of olive gray (5Y 4/1) CLAY and yellowish gray (5Y 7/2) CLAY; sandy limestone weak to moderately cemented, fine grained, fossiliferous - corals and shells, slightly chalky; olive gray clay, silty, slightly indurated, noncalcareous, plastic; yellowish gray clay, calcareous, plastic, chalky.	557'-565': Light rig chatters.
	560					
	565					
-535.1	570				570.0' - 586.0' Yellowish gray (5Y 7/2) SANDY CLAY and medium gray (N5) CLAYEY SAND; sandy clay dominant; soft with inclusions of weakly cemented very pale orange (10YR 8/2) sandy limestone and shells and shell fragments, phosphatic, fine-coarse sand size; chalky.	
	575					
	580					580'-590': Penetration rate: 1'/min.
-551.1	585				586.0' - 590.0' Medium olive gray (5Y 5/1) SANDY CLAY, very stiff, calcareous, plastic; some sand very fine-fine; little phosphate grains fine sand size; few very pale orange (10YR 8/2) shells, shell fragments and limestone fragments.	
-555.1	590				590.0' - 600.0' Dark greenish gray (5GY 4/1) CLAY, soft to medium stiff; plastic, few very fine sand and silt, noncalcareous, trace shells and shell fragments.	590'-600': Penetration rate: 0.2'/min.; drill rate slowed to keep bit from plugging.
	595					
-565.1	600				600.0' - 610.0' Medium olive gray (5Y 5/1) and yellowish gray (5Y 8/1) SANDY CLAY, stiff; plastic, calcareous, some sand very fine-fine.	600'-620': Penetration rate: 0.3'/min.
	605					
	610				610.0' - 620.0' Yellowish gray (5Y 8/1) SANDY CLAY, stiff; plastic, calcareous; some sand very fine-fine, trace phosphate grains; trace shells.	
	615					
	620				620.0' - 630.0' Yellowish gray (5Y 8/1) SANDY CLAY with lenses of very light gray (N8) CLAY and medium gray (N5) SANDSTONE; sandy clay - plastic, calcareous, some sand very fine-fine; light gray clay very soft, chalky, slightly phosphatic; sandstone - hard, very fine grained, mainly quartz.	620'-626': Intermittent chatters.
	625					

SITE		WELL NO.
Process Well No. 1	Update: 8-5-91 Template: GAWATWE2	IPW-1

BECHTEL GAITHERSBURG, MD

WELL LOG	PROJECT: INDIANTOWN COGENERATION PLANT	JOB NO. 20524	SHEET NO. 9 OF 22	WELL NO. IPW-1

ELEV.	DEPTH	THICKNESS	SAMPLE	GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC
	630				630.0' - 640.0' Very pale orange (10YR 8/2) to very light olive gray (5Y 6/1) SANDY CLAY and SANDY LIMESTONE; clay - soft, calcareous, milky; some sand very fine-fine, angular to rounded grains, fossiliferous; sandy limestone - hard, fossiliferous, fine grained.	
	635					
	640				640.0' - 650.0' White (N9) and light olive gray (5Y 6/1) SANDY CLAY and very pale orange (10YR 8/2) to light gray (N7) LIMESTONE; clay - soft, calcareous, plastic; some sand very fine-fine; limestone - hard, fine grained, sandy, fossiliferous, weakly cemented, chalky; trace phosphate.	639': Rig chatters. 640'-660': Penetration rate: 0.5'/min.
	645					
-615.1	650				650.0' - 660.0' Light olive gray (5Y 6/1) and very light gray (N8) CLAY, soft to stiff, plastic, sandy, fossiliferous, fine shell fragments, chalky with thin limestone lenses.	
	655					
-625.1	660				660.0' - 670.0' Light yellowish gray (5Y 7/2) SANDY CLAY, soft, calcareous, plastic; some sand angular-rounded, trace shells and shell fragments.	660': Pump out mud pit and add water to thin drilling fluid.
	665					
	670				670.0' - 680.0' Light yellowish gray (5Y 7/2) SANDY CLAY, same as 660.0' - 670.0'.	670'-680': Penetration rate: 1.1'/min.
	675					
-645.1	680				HAWTHORN GROUP - ARCADIA FORMATION 680.0' - 690.0' Yellowish gray (5Y 8/1) to very light gray (N8) LIMESTONE AND SHELLS, hard, moderately cemented, fine grained, with shells and shell fragments, chalky; scattered sandy clay lenses; trace phosphate.	680'-710': Penetration rate: 1.4'/min.
	685					
	690				690.0' - 700.0' Yellowish gray (5Y 8/1) to very light gray (N8) LIMESTONE AND SHELLS, same as 680.0' - 690.0', with grayish black (N2) fine to coarse sand size grains, calcareous.	
	695					
-665.1	700				700.0' - 710.0' Yellowish gray (5Y 7/2) to very pale orange (10YR 8/2) LIMESTONE, grayish black (N2) SAND and very pale orange (10YR 8/2) SANDY CLAY; limestone - hard, fossiliferous, shells very light gray (N8) to pinkish gray (5YR 8/1) weak to moderately cemented; sand - rounded, fine-coarse, rounded, phosphate; sandy clay - soft, calcareous, chalky, few sand very fine-fine, phosphatic.	
	705					

SITE		WELL NO.
Process Well No. 1	Update: 8-5-91 Template: GAWATWE2	IPW-1

BECHTEL GAITHERSBURG, MD

WELL LOG	PROJECT: INDIANTOWN COGENERATION PLANT	JOB NO. 20524	SHEET NO. 10 OF 22	WELL NO. IPW-1

ELEV.	DEPTH	THICKNESS	SAMPLE	GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC
					710.0' - 720.0' Yellowish gray (5Y 7/2) to very pale orange (10YR 8/2) LIMESTONE, grayish black (N2) SAND and very pale orange (10YR 8/2) SANDY CLAY, same as 700.0' - 710.0' with scattered quartz grains.	710'-720': Penetration rate: 0.9'/min. 712'-717': Slight rig chatters.
	715					
	720				720.0' - 730.0' Very light gray (N8) LIMESTONE AND SHELLS, hard, fresh, well cemented, sandy fine-medium, mainly quartz; shells and shell fragments, white (N9), pinkish gray (5YR 8/1) and very pale orange (10YR 8/2) fine-coarse, weakly cemented; few grayish black (N2) phosphate grains.	720'-740': Penetration rate: 1.4'/min. 720'-730': Scattered rig chatters; hold back on penetration.
	725					
-695.1	730				SUWANNEE LIMESTONE	
					730.0' - 740.0' Very light gray (N8) LIMESTONE AND SHELLS, same as 720.0' - 730.0', trace of black sand grains.	
	735					
-705.1	740				740.0' - 750.0' Yellowish gray (5Y 8/1) LIMESTONE, moderately cemented, open lattice work cemented grains, sugary, brittle, subrounded, medium grained, chalky; some shells same as 720.0' - 730.0', few very fine-fine sand; moderate porosity.	Total depth for day 740'. 6/6/91: Water level in AM 16.6' below ground surface; no cave in hole, no squeezing; contine drilling from 740'.
	745					
	750				750.0' - 760.0' Yellowish gray (5Y 8/1) and light gray (N7) LIMESTONE; yellowish gray limestone same as 740.0' - 750.0', except trace shells; light gray limestone, hard, fresh, well cemented, crystalline.	
	755					
-725.1	760				OCALA LIMESTONE	760': Drill fluid very light olive green, temp 81.5 degrees F. Loose circulation, use compressed air assist to regain circulation; fill mud pit with water. 760'-770': Free fall, minimal rotation.
					760.0' - 770.0' Yellowish gray (5Y 8/1) SANDY LIMESTONE, pinkish gray (5YR 8/1) SHELL FRAGMENTS and light gray (N7) LIMESTONE; sandy limestone - moderately cemented, sugary texture, subrounded - rounded medium-coarse grains cemented into open lattice structure, chalky, moderate porosity; shell fragments - coarse sand-fine gravel size; gray limestone - hard, fresh, well cemented, crystalline; few dark phosphate grains.	
	765					
	770				770.0' - 780.0' Yellowish gray (5Y 8/1) SANDY LIMESTONE, pinkish gray (5YR 8/1) SHELL FRAGMENTS and light gray (N7) LIMESTONE, same as 760.0' - 770.0', with pinkish gray (5Y 8/1) shelly limestone, medium hard.	770'-780': Very little resistance.
	775					
	780				780.0' - 788.0' Light pinkish gray (5YR 9/1) SANDY LIMESTONE, moderately hard, moderately cemented, fossiliferous, subangular-subrounded sand and shell fragments, with shell molds, gastropod fragments, slightly vuggy; some sugary texture, most massive.	780': Circulate hole using compressed air assist for 20 min.; well start flowing; set up for reverse air drilling. After 30 min discharge dark color with H2S odor; obtain sample for field and lab analysis after well flowing for 1.5 hrs.; continue drilling from 780' using reverse air drilling.
	785					
-753.1					788.0' - 800.0' Moderate brown (5YR 4/4) to dark yellowish brown 10YR 4/2) DOLOMITE, hard, brittle, sugary texture, fine-coarse grained, most	780'-790': Penetration rate:

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Process Well No. 1	Update: 8-5-91 Template: GAWATWE2	IPW-1

BECHTEL GAITHERSBURG, MD

WELL LOG	PROJECT	JOB NO.	SHEET NO.	WELL NO.
	INDIANTOWN COGENERATION PLANT	20524	11 OF 22	IPW-1

ELEV.	DEPTH	THICKNESS	SAMPLE	GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC
					medium-coarse, open vugs, some vugs partially filled with shell fragments, moderate porosity. 790' - 800.0' Light pinkish gray (5YR 8/1) and very light gray (N8) limestone lenses, low porosity, trace black clay.	0.6'/min. 780'-1707': Samples obtained from drill rod discharge. Cuttings allowed to settle in mud pit. Flow from well directed to main drainage ditch via temporary ditch excavated from well to drain. 791': Rig chatters.
	795					
-765.1	800				800.0' - 810.0' Light pinkish gray (5YR 9/1) SANDY LIMESTONE and yellowish gray (5Y 8/1) SAND; sandy limestone - hard, well cemented, fossiliferous, vuggy, with shell casts, fine grained, chalky; sand - fine grained, weakly cemented, calcareous, few shells; trace light gray (N7) hard, crystalline limestone.	800': Flow estimated at 300 gpm. 800': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. 800'-840': Penetration rate: 0.5'/min. - 0.8'/min.
	805					
-775.1	810				810.0' - 820.0' Light pinkish gray (5YR 9/1) LIMESTONE, same as 780.0' - 788.0', except decrease in vugs, slightly harder, few shell fragments.	
	815				816.0' - 820.0' Light gray (N7) limestone lenses, massive, vuggy, fractured, some fractures filled with black hard mineralization; trace light gray and medium gray clay.	814': Slight chatters.
-785.1	820				AVON PARK LIMESTONE/LAKE CITY LIMESTONE 820.0' - 830.0' Very pale orange (10YR 8/2) SANDY LIMESTONE, hard, weak to moderate cementation, massive to sugary texture, vuggy, fossiliferous, mostly shell fragments, scattered small cone shaped fossils, sand fine-medium, chalky; few clay plastic.	820': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis.
	825					
-795.1	830				830.0' - 840.0' Very pale orange (10YR 8/2) and light gray (N7) LIMESTONE, same as 760.0' - 770.0', sugary texture, vuggy, moderate porosity, with few clay, chalky, plastic.	
	835					
	840				840.0' - 850' Very pale orange (10YR 8/2) and light gray (N7) LIMESTONE, same as 760.0' - 770.0', slightly softer, sugary texture, massive to sandy, numerous cone shaped fossils, moderate porosity; trace gray clay, chalky. 843.0' Grayish black (N3) massive limestone lense, hard, strong, with fossils molds.	840': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. 840'-850': Penetration rate: 0.4'/min.; rate decreased to prevent bit from plugging; discharge from drill rods cream colored.
	845					
	850				850.0' - 860.0' Pinkish gray (5YR 8/1) and pale yellowish brown (10YR 6/2) LIMESTONE; weak, sugary texture, moderately cemented, fossiliferous, with molds and tubes, small (0.1") conical fossils and echinoids to 1/2", chalky, vuggy, moderate porosity; with thin lense of light gray sandy limestone.	
	855					856': Slight rig chatters.
-825.1	860				860.0' - 870.0' Very pale orange (10YR 8/2) to grayish orange (10YR 7/4) SANDY LIMESTONE and very light gray (N8) LIMESTONE; sandy limestone - weak to moderately cemented, sugary to massive, medium coarse grained, fossiliferous, incl. conical fossils and echinoids, high visible porosity; limestone - hard, slightly clayey, scattered vugs, low porosity.	860': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. Total depth for day 860'; well allowed to flow overnight. 6/7/91: Composite water sample 496'-860' obtained for field and laboratory water quality analysis. No sediment in hole at start of
	865					
-835.1						

SITE		WELL NO.
Process Well No. 1	Update: 8-5-91 Template: GAWATWE2	IPW-1

BECHTEL GAITHERSBURG, MD

WELL LOG	PROJECT: INDIANTOWN COGENERATION PLANT	JOB NO. 20524	SHEET NO. 12 OF 22	WELL NO. IPW-1

ELEV.	DEPTH	THICKNESS	SAMPLE	GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC
	875				870.0' - 878.0' Pinkish gray (5YR 8/1), yellowish gray (5Y 7/2) and very light gray (N8) LIMESTONE; pinkish and yellowish gray limestone - weakly cemented, sugary to massive, angular-rounded grains, fossiliferous with molds, decrease in vugs, chalky, scattered shells, moderate porosity; light gray limestone - hard, massive, low porosity; dark gray vuggy limestone lense with thin black veins in interval.	
-843.1					878.0' - 881.0' Moderate brown (5YR 4/4) DOLOMITE, weakly cemented, sugary texture, vuggy, fine-medium grained brittle.	
-846.1	880				881.0' - 890.0' Very pale orange (10YR 8/2) and pinkish gray (5YR 8/1) LIMESTONE and very light gray (N8) CLAY with trace moderate brown (5YR 4/4) DOLOMITE; limestone - same as 870.0' - 878.0', except moderately cemented, lower visible porosity; light gray clay, milky, calcareous, plastic with coarse angular fragments of limestone.	880': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. 880'-890': Penetration rate: 0.6'/min.
	885					
-855.1	890				890.0' - 900.0' Light olive gray (5Y 6/1) CALCAREOUS SANDSTONE and very pale orange (10YR 8/2) and pinkish gray (5YR 8/1) LIMESTONE; sandstone - moderately cemented, hard, granular, fine-medium grained, calcareous cement; limestone - moderately hard, well cemented, dense, granular, fossiliferous, trace vugs, low visible porosity.	890'-900': Penetration rate: 0.4'/min.
	895					
-865.1	900				900.0' - 910.0' Very pale orange (10YR 8/2) and pinkish gray (5YR 8/1) SANDY AND SILTY LIMESTONE, weak to moderate cementation, sugary to dense, vugs filled with light brown transparent calcite, fossiliferous incl. small conical shells and echinoids, chalky, low to moderate porosity.	900': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis.
	905					
	910				910.0' - 920.0' Very pale orange (10YR 8/2) and pinkish gray (5YR 8/1) SANDY AND SILTY LIMESTONE, same as 900.0' - 910.0', increase in dense portion, fine grained, with corals and echinoids, absence of small conical shells, trace thin black vein filling.	910': Discharge from drill rods milky white.
	915					916': Slightly bumpy drilling.
	920				920.0' - 930.0' Very pale orange (10YR 8/2) and pinkish gray (5YR 8/1) SANDY AND SILTY LIMESTONE, same as 900.0' - 910.0', dense, finer grained.	920': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. 920'-930': Penetration rate: 1.7'/min.
	925					
	930				930.0' - 940.0' Very pale orange (10YR 8/2) and pinkish gray (5YR 8/1) SANDY AND SILTY LIMESTONE, same as 900.0' - 910.0', except moderately hard, fine-medium grained, with corals and echinoids, absence of small conical shells, absence of vugs, low visible porosity.	930'-940': Penetration rate: 0.4'/min.
	935					
	940				940.0' - 950.0' Pale orange (10YR 7/2) and pinkish gray (5YR 8/1) SANDY AND SILTY LIMESTONE, same as 900.0' - 910.0'; sandier, medium-coarse grained, grains weakly cemented, with small conical fossils, low to moderate porosity; trace gray, hard, crystalline limestone.	940': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. 940'-960': Penetration rate: 0.5'/min.-0.6'/min.
	945					

SITE			WELL NO.
Process Well No. 1	Update: 8-5-91 Template: GAWATWE2		IPW-1

BECHTEL GAITHERSBURG, MD

WELL LOG	PROJECT: INDIANTOWN COGENERATION PLANT	JOB NO. 20524	SHEET NO. 13 OF 22	WELL NO. IPW-1

ELEV.	DEPTH	THICKNESS	SAMPLE GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC
				950.0' - 960.0' Pale orange (10YR 7/2) and pinkish gray (5YR 8/1) SANDY AND SILTY LIMESTONE, same as 900.0' - 910.0'; increase in shells with small conical fossils, corals and molds, dense, trace thin black vein filling, low visible porosity.	
	955				
	960			960.0' - 970.0' Very pale orange (10YR 8/2) and pinkish gray (5YR 8/1) SANDY AND SILTY LIMESTONE, same as 900.0' - 910.0', weak, with thin lense of moderate brown (5YR 4/4) granular dolomite.	960'-980': Penetration rate: 0.4'/min.; formation softer, hold back on drilling rate.
	965				
	970			970.0' - 980.0' Very pale orange (10YR 8/2) and pinkish gray (5YR 8/1) SANDY AND SILTY LIMESTONE, same as 900.0' - 910.0', weakly cemented, granular layers with dense, fine grained, harder, siltier layers; trace black vein filling, slight visible porosity.	
	975				
-945.1	980			980.0' - 990.0' Yellowish-gray (5Y 7/2) LIMESTONE, soft to moderately hard, weak to moderately cemented, granular texture, coquinoid, highly fossiliferous incl. small cone shaped fossils, echinoids and corals, medium-coarse grained, subrounded-rounded; moderate porosity.	980': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. Total depth for day 980'; repair kelly winch brake. 6/10/91: Esitmated flow in AM 450-490 gpm.; complete repairs on kelly winch; composite water sample 496'-980' obtained for field and laboratory water quality analysis; continue drilling from 980'; no cave in hole.
	985				
	990			990.0' - 1000.0' Yellowish gray (5Y 7/2) LIMESTONE, same as 980.0' - 990.0', with CHALKY LIMESTONE, soft, very fine grained, fossiliferous, chalky, medium plasticity, low porosity; with thin lenses of dark gray (N3) limestone, hard, very fine grained, fossiliferous.	980'-1060': Penetration rate: 0.6'/min. rate: 988'-989': Slight chatters; discharge milky white.
	995				
-965.1	1000			1000.0' - 1010.0' Very pale orange (10YR 8/2) SANDY LIMESTONE, moderately strong to strong, weak to well cemented, sugary to dense, fine-medium grained, sugary portion subrounded-rounded grains, fossiliferous incl. small cone shaped fossils, slight decrease in fossils, coquinoid; dense portion, hard, fine grained, fossiliferous mainly coral and shell molds.	1000': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. 1000'-1010': Penetration rate: 0.9'/min.
	1005				
	1010			1010.0' - 1020.0' Yellowish gray (5Y 8/1) SANDY LIMESTONE, same as 1000.0' - 1010.0', decrease in dense chalky lenses.	1010'-1020': Penetration rate: 0.6'/min.
	1015				
	1020			1020.0' - 1030.0' Yellowish gray (5Y 7/2) SANDY LIMESTONE, same as 1000.0' - 1010.0', with scattered lenses of light gray (N7) and dark gray (N3) massive, hard, crystalline limestone, fine grained, fossiliferous, with thin black filling in veins and fractures.	1020': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. Total depth for day 1020' 6/11/91: Composite water sample 496'-1020' obtained for field and laboratory water quality analysis. Continue drilling from 1020': no
	1025				

SITE	Update: 8-5-91 Template: GAWATWE2	WELL NO.
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BECHTEL GAITHERSBURG, MD

WELL LOG	PROJECT: INDIANTOWN COGENERATION PLANT	JOB NO. 20524	SHEET NO. 14 OF 22	WELL NO. IPW-1

ELEV.	DEPTH	THICKNESS	SAMPLE	GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC
					1030.0' - 1040.0' Yellowish gray (5Y 7/2) SANDY LIMESTONE, same as 1000.0' - 1010.0' with trace hard gray limestone.	cave in hole. 1020'-1050': Penetration rate: 0.7-0.9'/min.
	1035					
	1040				1040.0' - 1050.0' Yellowish orange (10YR 8/2) SANDY LIMESTONE, same as 1000.0' - 1010.0', except finer grained, more cohesive, trace brownish gray (5YR 4/1) shale, soft, very thin bedded.	1040': Drill rod discharge milky tan. 1040': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis.
	1045					
	1050				1050.0' - 1060.0' Yellowish gray (5Y 7/2) SANDY LIMESTONE, same as 1000.0' - 1010.0', with trace light gray (N6) shale, soft, very thin bedded; and, moderate brown (5YR 4/4) calcareous sandstone, granular, fine grained.	1050'-1060: Penetration rate: 0.5'/min.
	1055					
	1060				1060.0' - 1070.0' Yellowish orange (10YR 8/2) SANDY LIMESTONE, same as 1000.0' - 1010.0', except finer grained, more cohesive, with lenses of light gray (N7) massive, hard, crystalline limestone.	1060': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. 1060'-1070': Penetration rate: 1.1'/min. 1067'-1070': Weak rig chatters.
	1065					
	1070				1070.0' - 1080.0' Yellowish gray (5Y 7/2) SANDY LIMESTONE, same as 1000.0' - 1010.0', massive portion, hard, strong, vuggy, low to moderate porosity, fossil incl. small cone shaped fossils, coral, echnoids, some filled with secondary calcite; trace light gray (N7) massive, hard, crystalline limestone.	1070'-1080': Penetration rate: 0.6'/min. 1072'-1073': Slight rig chatters.
	1075					
	1080				1080.0' - 1090.0' Yellowish gray (5Y 7/2) SANDY LIMESTONE, same as 1000.0' - 1010.0', except most of interval granular limestone, slightly vuggy, slight porosity; with a trace of black, grayish black (N2) to medium gray (N5) dolomitic limestone, hard, vuggy.	1080': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. 1080'-1090': Penetration rate: 0.6'/min.
	1085					
-1055.1	1090				1090.0' - 1100.0' Very pale orange (10YR 8/2) to moderate yellowish brown (10YR 5/4) LIMESTONE, moderately hard, weak to moderately cemented, granular texture, fine to medium grained, fossiliferous, incl. small conical fossils, echinoids, coral, low to moderate visible porosity; trace thin black veins and fracture filling; thin lenses of light gray (N7) and dark gray (N3) massive, crystalline limestone, with small vugs, fossiliferous.	
	1095					
-1065.1	1100				1100.0' - 1110.0' Very pale orange (10YR 8/2) SANDY LIMESTONE, moderately hard, weak to moderately cemented, granular to shaley texture, fossiliferous, small conical shells absent, slightly vuggy, most filled, little sand fine-medium grained, quartz and calcite, slightly chalky, trace thin black vein filling.	1100': Slight rig chatters; water sample obtained from drill rod discharge, after clearing, for field water quality analysis. 1100'-1120': Penetration rate: 0.2'/min.
	1105					

SITE			WELL NO.
	Process Well No. 1	Update: 8-5-91 Template: GAWATWE2	IPW-1

BECHTEL GAITHERSBURG, MD

WELL LOG	PROJECT: INDIANTOWN COGENERATION PLANT	JOB NO. 20524	SHEET NO. 15 OF 22	WELL NO. IPW-1

ELEV.	DEPTH	THICKNESS	SAMPLE	GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC
					1110.0' - 1118.0' Very pale orange (10YR 8/2) SANDY LIMESTONE, same as 1100.0' - 1110.0' except coarser grained, moderate porosity.	
	1115					
-1083.1					1118.0' - 1122.0' Dark yellowish brown (10YR 4/2) DOLOMITE, hard, fresh, well cemented, massive, crystalline.	1118'-1120': Slight increase in flow.
	1120					1120': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis.
-1087.6					1122.0' - 1130.0' Very pale orange (10YR 8/2) and pinkish gray (5YR 8/1) LIMESTONE, orange limestone - weakly cemented, granular texture, sugary, medium - coarse grained, weak grain to grain contact, moderate visible porosity; pinkish gray limestone - hard, well cemented, fine-coarse grained, low porosity; with thin lenses of dark gray (N3) dolomite, hard, fine grained.	1120-1160': Penetration rate: 0.5'/min. 1122': Slight rig chatters.
	1125					
	1130				1130.0' - 1140.0' Very pale orange (10YR 8/2) and pinkish gray (5YR 8/1) LIMESTONE; pale orange limestone - moderately hard to hard, weak to moderate cementation, granular texture, fine-coarse grained, fossiliferous, incl. small conical fossils, shell fragments and coral, small vugs, moderate porosity; pinkish gray limestone - hard, massive, well cemented, fine-coarse grained, fossiliferous, low permeability.	
	1135					
	1140				1140.0' - 1150.0' Very pale orange (10YR 8/2) and pinkish gray (5YR 8/1) LIMESTONE, same as 1130.0' - 1140.0'.	1140': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis.
	1145					
	1150				1150.0' - 1160.0' Very pale orange (10YR 8/2) and pinkish gray (5YR 8/1) LIMESTONE, same as 1130.0' - 1140.0', some plucking of grains in granular portion.	1150'-1160': Hold back on drilling rate; increase in fines; discharge dark tan color.
	1155					
	1160				1160.0' - 1170.0' Very pale orange (10YR 8/2) and pinkish gray (5YR 8/1) LIMESTONE, same as 1130.0' - 1140.0', with thin lenses of medium dark gray (N4) hard, vuggy limestone, moderate to high porosity, lenses less than 1' in thickness.	1160': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. 1160'-1170': Penetration rate: 0.6'/min.
	1165					
-1135.1	1170				1170.0' - 1180.0' Mixed very pale orange (10YR 8/2), pinkish gray (5YR 8/1), yellowish gray (5Y 8/1) SANDY LIMESTONE AND LIMESTONE and light gray (N7) to medium dark gray (N4) LIMESTONE AND DOLOMITE and bluish white (5B 9/1) CLAY; orange and yellowish gray limestone same as 1130.0' - 1140.0', fine-medium grained; pinkish gray limestone - hard, dense, massive, well cemented, fine-coarse grained, most fine-medium, slightly chalky, low to moderate porosity; light to dark gray limestone and dolomite - hard, dense, well cemented, coarse crystalline, fossiliferous, vuggy; with lense (< 1' thickness) of bluish white clay, soft, plastic.	1170'-1180': Penetration rate: 0.4'/min.; drill rod discharge milky tan color.
	1175					
	1180				1180.0' - 1190.0' Mixed very pale orange (10YR 8/2), pinkish gray (5YR 8/1), yellowish gray (5Y 8/1) SANDY LIMESTONE AND LIMESTONE and light gray (N7) to medium dark gray (N4) LIMESTONE AND DOLOMITE; same as 1170.0' - 1180.0' except absence of clay and small conical fossils; dolomite fine-medium grained; trace grayish purple (5P 4/2) dolomite.	1180': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. Total depth for day 1180'. 6/12/91: Composite water sample 496'-1180' obtained for field and laboratory water quality analysis; flow in AM about 450 gpm. Continue drilling from 1180': no
	1185					
-1155.1						

SITE			WELL NO.
Process Well No. 1	Update: 8-5-91 Template: GAWATWE2		IPW-1

BECHTEL GAITHERSBURG, MD

WELL LOG	PROJECT: INDIANTOWN COGENERATION PLANT	JOB NO. 20524	SHEET NO. 16 OF 22	WELL NO. IPW-1

ELEV.	DEPTH	THICKNESS	SAMPLE GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC
	1195			1190.0' - 1200.0' Pale orange (10YR 7/2), pinkish gray (5YR 8/1) and yellowish gray (5Y 8/1) SANDY LIMESTONE AND LIMESTONE; pale orange and yellowish gray sandy limestone - soft to moderately hard, weakly cemented, fine-coarse grained, subrounded-rounded, quartz and shells and shell fragments, absence of small conical fossils, honeycomb structure, little filling, moderate visible porosity; pinkish gray limestone - hard, dense, fine-medium grained, fossiliferous, some molds, coral and shells, low to moderate porosity; scattered thin black vein filling and fracture coating.	cave in hole. 1180'-1200': Penetration rate: 0.5'/min.; drill rod discharge light gray, milky.
	1200			1200.0' - 1210.0' Pale orange (10YR 7/2), pinkish gray (5YR 8/1) and yellowish gray (5Y 8/1) SANDY LIMESTONE AND LIMESTONE; same as 1190.0' - 1200.0', most of interval pale orange sandy limestone; with thin lenses of very light gray (N8) to medium light gray (N6) limestone - fine grained, vuggy, low porosity.	1200': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. 1200'-1210': Penetration rate: 0.7'/min.
	1205				
	1210			1210.0' - 1220.0' Yellowish gray (5Y 8/1) SANDY LIMESTONE, soft to moderately hard, weak to moderately cemented, granular honeycomb structure partially filled, fine-medium grained, fossiliferous, incl. small conical fossils, echinoids, coral and shell fragments, chalky; trace pinkish gray hard, dense, fine grained layers.	1210'-1220': Penetration rate: 0.6'/min.
	1215				
	1220			1220.0' - 1230.0' Yellowish gray (5Y 8/1) SANDY LIMESTONE, same as 1210.0' - 1220.0', with thin black veins and staining on some surfaces, secondary calcite filling of sand dollar fragments; thin lense of moderate brown (5YR 4/4) secondary calcite with black coating on smooth surface.	1220': Drill rod discharge dark gray black; flow 475 - 480 gpm; water sample obtained from drill rod discharge, after clearing, for field water quality analysis. 1220'-1240': Penetration rate: 0.6'/min.
	1225				
-1195.1	1230			1230.0' - 1240.0' Yellowish gray (5Y 8/1) SANDY LIMESTONE and moderate brown (5YR 4/4) DOLOMITE; sandy limestone - moderately hard, moderately cemented, fine-medium grained, subrounded-rounded grains, granular texture, highly fossiliferous, incl. small conical fossils, echinoids, and rounded shell fragments, low to moderate visible porosity; dolomite similar to sandy limestone without fossils, slightly harder, grains rounded; trace white clay, chalky, plastic; trace very light gray (N8) and light gray (N7) massive, hard limestone.	
	1235				
-1205.1	1240			1240.0' - 1250.0' Yellowish gray (5Y 8/1) SANDY LIMESTONE, soft to moderately hard, weak to moderately cemented, granular, fine-medium grained, subrounded-rounded, highly fossiliferous, incl. small conical fossils, echinoids, and shell fragments; some clay filling between grains, soft, chalky, low to moderate porosity.	1240': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. Additional sample obtained for TDS analysis. 1240'-1250': Penetration rate: 0.6'/min.
	1245				
	1250			1250.0' - 1260.0' Yellowish gray (5Y 8/1) SANDY LIMESTONE, same as 1240.0' - 1250.0'.	1250'-1260': Penetration rate: 0.5'/min.
	1255				1255': Stop drilling to allow water to clear; reduce drilling rate.
	1260			1260.0' - 1270.0' Yellowish gray (5Y 8/1) SANDY LIMESTONE, same as 1240.0' - 1250.0', slightly harder, absence of small conical fossils and echinoids.	1260': Drill rod discharge tan color; heavy with cuttings. 1260': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. 1260'-1270': Penetration rate: 0.5'/min.
	1265				

SITE			WELL NO.
Process Well No. 1	Update: 8-5-91 Template: GAWATWE2		IPW-1

BECHTEL GAITHERSBURG, MD

WELL LOG	PROJECT: INDIANTOWN COGENERATION PLANT	JOB NO. 20524	SHEET NO. 17 OF 22	WELL NO. IPW-1

ELEV.	DEPTH	THICKNESS	SAMPLE	GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC
	1275				1270.0' - 1280.0' Yellowish gray (5Y 8/1) SANDY LIMESTONE and light gray (N7) to dark gray (N3) LIMESTONE and very light gray (N8) CLAY; sandy limestone - moderately hard, moderate to well cemented, granular, fine-medium grained, subrounded-rounded, fossiliferous, coral, shell fragments and shells, absence of small conical fossils and echinoids, chalky; gray limestone - hard, dense, massive, fossiliferous, with shell molds, low porosity.	1270'-1280': Penetration rate: 0.4'/min.
	1280				1280.0' - 1290.0' Yellowish gray (5Y 8/1) SANDY LIMESTONE, same as 1240.0' - 1250.0', moderately to strongly cemented, with loose layers, low visible porosity.	1279': Slight rig chatters. 1280': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. 1280'-1290': Penetration rate: 0.6'/min.
	1285					
	1290				1290.0' - 1300.0' Yellowish gray (5Y 8/1) SANDY LIMESTONE, same as 1240.0' - 1250.0', moderately to strongly cemented, with loose layers, low visible porosity.	1290'-1300': Penetration rate: 0.3'/min.
	1295				1295.0' - 1297.0' Light gray (N7) to medium gray (N5) limestone, hard, dense, fine grained, slightly vuggy, low porosity, with grayish brown (5YR 3/2) calcareous clay, stiff, firm.	1295'-1297': Heavy rig chatters
	1300				1300.0' - 1310.0' Yellowish gray (5Y 7/2), pinkish gray (5YR 8/1), very pale orange (10YR 8/2) and moderate brown (5YR 4/4) SANDY LIMESTONE; yellowish gray and moderate brown-soft to moderately hard, weakly cemented, granular texture, fine-coarse grained, most fine-medium, fossiliferous, incl. small conical fossils, echinoids, shells and shell fragments, slightly vuggy; pinkish gray limestone - soft to firm, moderately cemented, very fine grained silty and clayey, chalky, moderate porosity; with very light gray (N8) to medium gray (N5) limestone, hard, dense, fossiliferous with molds, some filled with secondary minerals.	1300': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. 1300'-1320': Penetration rate: 0.4'/min.
	1305					
	1310				1310.0' - 1320.0' Very pale orange (10YR 8/2) to yellowish gray (5Y 7/2) SANDY LIMESTONE, soft to moderately hard, weak to moderately cemented, granular, fine-medium grained, fossiliferous as above, slightly vuggy; with thin lenses of shaley limestone, soft to moderately hard, dense; with thin black veins, irregular.	
	1315					1320': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. Total depth for day 1320'.
	1320				1320.0' - 1330.0' Very pale orange (10YR 8/2) to yellowish gray (5Y 7/2) SANDY LIMESTONE, hard, dense, well cemented, granular, fine grained oolitic, fossiliferous, absence of small coiled fossils; some shelly lenses, hard, chalky, low porosity; trace thin irregular black bands.	6/13/91: Composite water sample 496'-1320' obtained for field and laboratory water quality analysis. Well flow in AM about 475 - 480 gpm. Continue drilling from 1320'. 1320'-1360': Penetration rate: 0.5'/min.
	1325					
	1330				1330.0' - 1340.0' Yellowish gray (5Y 7/2) SANDY LIMESTONE and very pale orange (10YR 8/2) LIMESTONE moderately hard, weak to moderately cemented, granular texture, fine-medium grained, fossiliferous, incl. small conical fossils, echinoids, coral and shells, low to moderate porosity; pale orange limestone - soft to moderately hard, very fine grained, chalky, vuggy, moderate porosity.	
	1335					
	1340				1340.0' - 1350.0' Very pale orange (10YR 8/2) SANDY LIMESTONE, soft, weakly cemented, granular texture, dense, fossiliferous, chalky and clayey, low porosity.	1340': Drill rod discharge light tan to light brown. 1340': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis.
	1345					

SITE		WELL NO.
Process Well No. 1	Update: 8-5-91 Template: GAWATWE2	IPW-1

BECHTEL GAITHERSBURG, MD

WELL LOG	PROJECT	JOB NO.	SHEET NO.	WELL NO.
	INDIANTOWN COGENERATION PLANT	20524	18 OF 22	IPW-1

ELEV.	DEPTH	THICKNESS	SAMPLE	GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC
	1355				1350.0' - 1360.0' Very pale orange (10YR 8/2) SANDY LIMESTONE and light gray (N7) to medium light gray (N6) LIMESTONE; sandy limestone-moderately weak to moderately strong, moderately cemented, granular texture, fine-medium grained, most fine grained, fossiliferous, absence of small conical fossils, low porosity; gray limestone - weak to moderately cemented, strong, granular texture, very vuggy, fossiliferous, highly porous.	1350': Drill rod discharge light tan, milky.
	1360				1360.0' - 1370.0' Medium light gray (N6) and yellowish gray (5Y 7/2) SANDY LIMESTONE, same as 1330.0' - 1340.0' except color change, pores in gray limestone filled with white to very light gray chalky clay, low to moderate porosity.	1359': Drill rig chatters. 1360': Well flow about 525 gpm. 1360': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. 1360'-1380': Penetration rate: 0.6'-0.7'/min.
	1365					
	1370				1370.0' - 1380.0' Yellowish gray (5Y 7/2) to very pale orange (10YR 8/2) SANDY LIMESTONE, same as 1310.0' - 1320.0' except chalky, most of pores filled with clay, low porosity; absence of shaley lenses.	
	1375					
	1380				1380.0' - 1390.0' Yellowish gray (5Y 7/2) to very pale orange (10YR 8/2), SANDY LIMESTONE, same as 1310.0' - 1320.0' except chalky, most of pores filled with clay, low porosity; absence of shaley lenses.	1380': Strong H2S odor; water sample obtained from drill rod discharge, after after clearing, for field water quality analysis. 1380'-1390': Penetration rate: 0.6'/min. 1383': Light rig chatters.
	1385					
	1390				1390.0' - 1400.0' Yellowish gray (5Y 7/2) and moderate brown (5YR 4/4) SANDY LIMESTONE, soft to moderately hard, weak to moderately cemented, granular texture, fine grained, fossiliferous, incl. small conical fossils and echinoids, vuggy, low porosity.	1390'-1400': Penetration rate: 0.3'/min.; Drill rod discharge light tan color.
	1395					
	1400				1400.0' - 1410.0' Yellowish gray (5Y 7/2) SANDY LIMESTONE and light olive gray (5Y 6/1) to medium light gray (N6) SHALEY LIMESTONE; sandy limestone same as 1390.0' - 1400.0' with hard, well cemented, very fine grained, clayey limestone.	1400': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. Well flow about 500 gpm. 1400'-1410': Penetration rate: 0.6'/min.
	1405					
	1410				1410.0' - 1413.0' Yellowish gray (5Y 7/2) SANDY LIMESTONE, soft to moderately hard, weak to moderately cemented, granular, fine-medium grained, fossiliferous, absence of small conical fossils, slight visible porosity; with thin medium gray (N3) dolomite lenses, hard, very well cemented, crystalline, very fine grained.	1412': Weak rig chatters. 1413'-1419': Hard rig chatters; drilling rate 0.3'/min.
-1378.1	1415				1413.0' - 1419.0' Moderate brown (5YR 4/4) to dark yellowish brown (10YR 4/2) DOLOMITE, very hard, well cemented, fine grained, thin black coating on fracture surfaces, low visible porosity.	
-1384.1	1420				1419.0' - 1430.0' Yellowish gray (5Y 7/2) SANDY LIMESTONE, soft to hard, weak to strongly cemented, dense, granular, fine-medium grained, fossiliferous, incl. small conical fossils and shell fragments, low porosity.	1419'-1420': Soft. 1420': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. 1420'-1430': Penetration rate: 0.4'/min.
	1425					

SITE		WELL NO.
Process Well No. 1	Update: 8-5-91 Template: GAWATWE2	IPW-1

BECHTEL GAITHERSBURG, MD

WELL LOG	PROJECT	JOB NO.	SHEET NO.	WELL NO.
	INDIANTOWN COGENERATION PLANT	20524	19 OF 22	IPW-1

ELEV.	DEPTH	THICKNESS	SAMPLE	GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC
					1430.0' - 1440.0' Yellowish gray (5Y 7/2) SANDY LIMESTONE, same as 1419.0' - 1430.0' with scattered scoraceous fragments.	1430'-1440': Penetration rate: 0.8'/min.; discharge milky white.
	1435					
	1440				1440.0' - 1451.0' Yellowish gray (5Y 7/2) SANDY LIMESTONE, same as 1419.0' - 1430.0'.	1440': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. 1440'-1450': Penetration rate: 0.6'/min.
	1445					
						1448': Light rig chatters.
-1416.1	1450					1450'-1460': Penetration rate: 0.3'/min.
-1418.1					1451.0' - 1452.0' Light gray (N7) to medium light gray (N6) LIMESTONE, hard, well cemented, granular, fine grained, slightly vuggy, low to moderate porosity.	1451'-1453': Moderate rig chatters.
-1420.1	1455				1452.0' - 1455.0' Yellowish gray (5Y 7/2) SANDY LIMESTONE, same as 1419.0' - 1430.0'.	1455'-1456': Hard.
-1422.1					1455.0' - 1457.0' Moderate brown (5YR 4/4) to dark yellowish brown (10YR 4/2) DOLOMITE, very hard, well cemented, fine grained, thin black coating on fracture surfaces, low visible porosity.	
	1460				1457.0' - 1464.0' Yellowish gray (5Y 7/2) SANDY LIMESTONE, moderately soft to hard, weak to strongly cemented, dense, granular, fine grained, fossiliferous, incl. small conical fossils, echinoids and shell fragments, low porosity.	1460': Flow rate about 500 pm. Water sample obtained from drill rod discharge, after clearing, for field water quality analysis.
-1429.1						1460'-1480': Penetration rate: 0.3'/min.
	1465				1464.0' - 1468.0' Moderate brown (5YR 4/4) to dark yellowish brown (10YR 4/2) DOLOMITE, very hard, well cemented, fine-medium grained, thin black coating on fracture surfaces, low visible porosity.	1463': Heavy rig chatters.
-1433.1					1468.0' - 1477.0' Medium gray (N7) LIMESTONE, hard, well cemented, crystalline, fossiliferous, molds and fine shells, low visible porosity.	
	1470					1469': Softer. 1469'-1472': Rig chatters.
						1472'-1473': Hard.
	1475					1474'-1477': Smooth and hard.
-1442.1						
-1444.1					1477.0' - 1479.0' Very light gray (N8) to white (N9) CLAY, soft, plastic, with fine angular rock fragments.	1477'-1478': Drill rod discharge milky white.
	1480				1479.0' - 1483.0' Yellowish gray (5Y 7/2) and light gray (N7) to medium gray (N5) SANDY LIMESTONE; yellowish gray limestone, weak, poorly cemented, granular, fine-medium grained, fossiliferous, incl. small coiled fossils and echinoids; gray limestone - hard, well cemented, granular texture, moderate porosity.	1480': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. Total depth for day 1480'.
-1448.1						6/14/91: Composite water sample 496'-1480' obtained for field and laboratory water quality analysis. Flow in AM about 500 gpm. Continue drilling from 1480'; no cave in hole.
	1485				1483.0' - 1490.0' Moderate brown (5YR 4/4) to dark yellowish brown (10YR 4/2) DOLOMITE and light gray (N7) and pinkish gray (5YR 8/1) LIMESTONE AND SHALEY LIMESTONE; dolomite - hard, crystalline, very fine-medium grained, somewhat translucent, with black thin veins and coating on fracture surfaces, low porosity; with lenses of light gray limestone - hard well cemented, weak granular texture and shaley limestone - hard, well cemented, very fine grained, thin bedded, low porosity.	1480'-1490': Penetration rate: 0.3'/min.
	1490					1485': Drill rod discharge milky white.
					1490.0' - 1500.0' Moderate brown (5YR 4/4) to dark yellowish brown (10YR 4/2) DOLOMITE and grayish orange (10YR 7/4) DOLOMITE, and dark gray (N3) to light gray (N7) LIMESTONE; brown dolomite - hard, well cemented, crystalline, fine-medium grained, trace small vugs, with thin black staining and vein filling; minor grayish orange dolomite - weak, very vuggy, scoriaceous, high visible porosity; gray limestone -hard, well cemented, dense, fine-medium grained, tight, trace fossils, low visible porosity.	1490'-1500': Penetration rate: 0.2'/min'. Scattered rig chatters, hard.
	1495					
	1500				1500.0' - 1510.0' Moderate brown (5YR 4/) to dark yellowish brown (10YR 4/2) DOLOMITE, with pale yellowish brown (10YR 8/2) DOLOMITE and light brown (5YR 5/6) LIMESTONE; moderate brown dolomite - hard, well cemented, dense, medium grained, low visible porosity; yellowish brown dolomite - hard, crystalline, very fine grained, very faint thin banding with darker layers; limestone - moderately hard, weakly cemented, granular texture, very vuggy, scoriaceous, high visible porosity.	1500': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis.
	1505					1500'-1520': Penetration rate: 0.2'/min. - hard drilling; moderate to heavy rig chatters.
-1475.1					1504.0' - 1504.3' Black (N1) silty clay, greasy; filling of void.	1504': Rapid rod drop; four inches - drill rod discharge dark gray blck. 1507': Drill rod discharge milky to

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BECHTEL GAITHERSBURG, MD

WELL LOG	PROJECT: INDIANTOWN COGENERATION PLANT	JOB NO. 20524	SHEET NO. 20 OF 22	WELL NO. IPW-1

ELEV.	DEPTH	THICKNESS	SAMPLE	GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC
					1510.0' - 1520.0' Moderate yellowish brown (10YR 5/4), dark yellowish brown (10YR 4/2) and brownish black (5YR 2/1) DOLOMITE; yellowish brown dolomite - hard, well cemented, crystalline to granular, fine-medium grained to massive, lenses of vugs and open granular texture, trace scoriaceous lenses, low to moderate visible porosity.	light tan.
	1515				1515.0' - 1517.0' Brownish black dolomite-hard, crystalline, massive, dense, trace very small vugs.	1512'-1513': Softer. 1516': Drill rod discharge change briefly to dark olive green.
	1520				1520.0' - 1521.0' Moderate brown (5YR 3/4) and black (N1) DOLOMITE, very hard, crystalline, fractured-fractures filled with grayish pink (5R8/2) soft calcareous clay and black staining and mineralization, some secondary crystallization.	1516.5'-1519': Very hard, light to heavy rig chatters. 1517'-1519': Drill rod discharge dark gray to cream color.
	1525				1521.0' - 1530.0' Moderate yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2) DOLOMITE, hard, well cemented, crystalline to sugary texture, fine-medium grained, slightly vuggy, low to moderate porosity; about 15% of interval vuggy.	1520': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. 1520'-1540': Penetration rate: 0.3'/min.
	1530				1530.0' - 1537.0' Moderate yellowish brown (10YR 5/4) to dark yellowish brown (10YR 4/2) DOLOMITE, same as 1521.0' - 1530.0', most of interval sugary texture, increase in vugs, moderate visible porosity.	
	1535					
-1502.1					1537.0' - 1540.0' Very pale orange (10YR 8/2) SANDY LIMESTONE, moderately hard, weakly cemented, granular coquinoid texture, fine-medium grained, chalky, fossiliferous, very small corals, incl. small conical fossils.	1537'-1540': Softer.
	1540				1540.0' - 1550.0' Pale orange (10YR 7/2) SANDY LIMESTONE, same as 1537.0' - 1540.0' except slightly finer grained, sand and shell mixture, chalky, with thin streaks of gray, hard, crystalline limestone and moderate brown (5YR 3/4) dolomite.	1540': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. Total depth for day 1540'; stop drilling to replace kelly winch cable. 6/17/91: Composite water sample 496'-1540' obtained for field and laboratory water quality analysis. Flow in AM about 500 gpm.; replace kelly winch cable before proceeding. Continue drilling from 1540'. No cave in hole. 1540'-1550': Penetration rate: 0.5'/min.; softer.
	1545					
	1550				1550.0' - 1558.0' Pale orange (10YR 7/2) SANDY LIMESTONE, same as 1537.0' - 1540.0', sand and shell mixture, moderately cemented.	1550'-1560': Penetration rate: 0.3'/min. 1555': Slight rig chatters.
	1555					
-1523.1					1558.0' - 1560.0' Moderate brown (5YR 3/4) DOLOMITE, hard, well cemented, dense crystalline to sugary texture, slightly vuggy, trace very pale orange (10YR 8/2) clay, low to moderate visible porosity.	1558.5': Slight rig chatters.
	1560				1560.0' - 1570.0' Dusky yellow (5Y 6/4) to dark yellowish brown (10YR 4/2) and moderate brown (5YR 3/4) DOLOMITE, same as 1521.0' - 1530.0', sugary portion moderately hard, slightly vuggy, low to moderate visible porosity; trace black mineralization - thin bands in veins and small light and dark pieces.	1559.5': Slight rig chatters. 1560': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. 1560'-1580': Penetration rate: 0.2'/min. 1560'-1565': rig chatters - hard; drill rod discharge milky white.
	1565					
	1570				1570.0' - 1577.0' Moderate brown (5YR 3/2) DOLOMITE,same as 1521.0' - 1530.0', except slightly vuggy. 1576.0' - 1577.0' Brown and black slaty lense, soft to hard, very fine grained, very thinly banded, 1/64", greasy feel (wood fragments).	1570': Rig chatters. 1571'-1573': Softer smoother penetration; drill rod discharge dark brown.
	1575					
-1542.1						1576'-1577': Heavy rig chatters - hard.
-1542.6					1577.0' - 1577.5' White (N9) CLAY, soft, plastic.	
	1580				1577.5' - 1581.0' Very pale orange (10YR 8/2) SHELL HASH, fine-coarse grained microfossils and shell fragments, incl. small conical shells, echinoids, coral; few fine grained sand; slightly clayey, chalky.	1577'-1580': Softer - drill rod discharge dark gray to chocolate brown.
-1546.1						
-1547.1					1581.0' - 1582.0' Black (N1) and grayish brown (5YR 3/2) SHALE, soft, silty, highly organic (lignite?), with clay, plastic.	1580': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. Total depth for day 1580'; flow about 500-550 gpm. 6/18/91: Composite water sample 496'-1580' obtained for field and laboratory water quality analysis.
	1585				1582.0' - 1590.0' Very pale orange (10YR 8/2) SANDY LIMESTONE, soft to moderately hard, moderately to well cemented, coquinoid, fossiliferous, incl. small conical fossils, and echinoids, chalky, clayey, low visible porosity; with thin seams of moderate brown (5YR 3/4) dolomite, hard, low porosity.	
-1555.1						

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Process Well No. 1	Update: 8-5-91 Template: GAWATWE2	IPW-1

BECHTEL GAITHERSBURG, MD

WELL LOG	PROJECT: INDIANTOWN COGENERATION PLANT	JOB NO. 20524	SHEET NO. 21 OF 22	WELL NO. IPW-1

ELEV.	DEPTH	THICKNESS	SAMPLE GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC
	1595			1590.0' - 1600.0' Moderate brown (5YR 4/4) to dark yellowish brown (10YR 4/2) DOLOMITE, moderately hard, moderately cemented, granular, sugary, open texture, fine grained, moderate porosity, with thin lenses of sandy limestone, same as 1582.0' - 1590.0' and dark yellowish brown (10YR 4/2) dolomite, hard, dense, crystalline.	Flow in AM 500-550 gpm. Continue drilling from 1580'; 1580'-1600': Penetration rate: 0.4-0.5'/min. - softer.
	1600			1600.0' - 1608.0' Moderate yellowish brown (10YR 5/4) DOLOMITE, hard, well cemented, dense to sugary, open, fine grained, low to moderate porosity; with lenses of black (N1) to grayish brown (5YR 3/2) soft siltstone, very thinly banded (lignite?).	1600': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. 1600'-1610': Penetration rate: 0.5'/min.
	1605				
	1610			1608.0' - 1610.0' Moderate yellowish brown (10YR 5/4) DOLOMITE, hard, well cemented, dense, massive, no vugs, low visible permeability. 1610.0' - 1620.0' Moderate yellowish brown (10YR 5/4) DOLOMITE, moderately hard to hard, well cemented, crystalline to sugary, open texture. fine grained, no vugs, low visible porosity; trace thin black irregular bands.	1607': Rig chatters, drill rod discharge light tan to milky white. 1620'-1620': Penetration rate: 0.2'/min. - hard.
	1615				
	1620			1620.0' - 1630.0' Yellowish brown (10YR 5/2) DOLOMITE, same as 1610.0' - 1620.0', most of interval sugary dolomite, open, moderate visible porosity.	1620': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. 1620'-1630': Penetration rate: 0.3'/min.
	1625				
	1630			1630.0' - 1640.0' Yellowish brown (10YR 5/2) to moderate yellowish brown (10YR 5/4) DOLOMITE, same as 1610.0' - 1620.0', most of interval sugary dolomite, moderate porosity; dense, crystalline portion, trace vugs, low porosity.	1630'-1640': Penetration rate: 0.2'/min.
	1635				1634': Slight rig chatters.
	1640			1640.0' - 1650.0' Yellowish brown (10YR 5/2) to moderate yellowish brown (10YR 5/4) DOLOMITE, same as 1610.0' - 1620.0', most of interval sugary dolomite, moderate porosity.	1640': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. 1640'-1660': Penetration rate: 0.2'/min. - hard and soft layers about six inches thick.
	1645				
	1650			1650.0' - 1660.0' Yellowish brown (10YR 5/2) to moderate yellowish brown (10YR 5/4) DOLOMITE, same as 1610.0' - 1620.0', most of interval hard, dense, crystalline dolomite, very low porosity.	
	1655				
	1660			1658.0' - 1660.0' Dolomite, moderately hard, sugary texture, fine-medium grained, open, vuggy, moderate porosity. 1660.0' - 1670.0' Yellowish brown (10YR 5/2) to moderate yellowish brown (10YR 5/4) DOLOMITE, same as 1610.0' - 1620.0', most of interval hard, dense, crystalline dolomite, low porosity.	1660': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. 1660'-1670': Penetration rate: 0.3'/min.
	1665				

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WELL LOG	PROJECT: INDIANTOWN COGENERATION PLANT	JOB NO. 20524	SHEET NO. 22 OF 22	WELL NO. IPW-1

ELEV.	DEPTH	THICKNESS	SAMPLE	GRAPHICS	DESCRIPTION AND CLASSIFICATION	NOTES ON: WATER LEVELS, WATER RETURN, CHARACTER OF DRILLING, ETC
					1670.0' - 1680.0' Yellowish brown (10YR 5/2) to moderate yellowish brown (10YR 5/4) DOLOMITE, same as 1610.0' - 1620.0', most of interval hard, dense, crystalline dolomite, trace vugs, thin black mineralization in fractures, low porosity.	1670'-1680': Penetration rate: 0.2'/min.
	1675					1677': Rig chatters. 1678': Rig chatters.
	1680				1680.0' - 1689.0' Yellowish brown (10YR 5/2) to moderate yellowish brown (10YR 5/4) DOLOMITE, same as 1610.0' - 1620.0', most of interval hard, dense, crystalline dolomite, few vugs, open, thin black mineralization in fractures, low porosity.	1680': Drill rod discharge chocolate brown. Water sample obtained from drill rod discharge, after clearing, for field water quality analysis. Total depth for day 1680'. 6/19/91: Composite water sample 496'-1680' obtained for field and laboratory water quality analysis. Flow in AM 600-650 gpm. Continue drilling from 1680';
	1685					
	1690				1689.0' - 1693.0' Light moderate brown (5YR 3/6) DOLOMITE, moderately hard to hard, weakly cemented, granular, sugary texture, fine grained, angular to subangular, weak grain to grain contact, open pores, moderate to high porosity. 1693.0' - 1702.0' Yellowish brown (10YR 5/2) to moderate yellowish brown (10YR 5/2) DOLOMITE, same as 1610.0' - 1620.0', about 50% of interval sugary texture, weakly cemented, weak grain to grain contact, moderate to high porosity, massive portion, low porosity.	1680'-1702': Penetration rate: 0.3'/min. Total depth 1702'; Light rig chatters; drill rod discharge milky gray.
	1695					
	1700					
-1667.1					Total depth of hole 1702.0 ft. on 6/19/91. Hole backfilled with eight yards of grout in three stages from 6/26/91 to 7/1/91. Grout mix 5.5 gallons of water and eight ounces W.R. Grace WRDA-79 /sack cement. Grout pumped through rods to bottom of hole. Final depth of well 1340 ft.	1702': Water sample obtained from drill rod discharge, after clearing, for field water quality analysis after flowing for 45 min. Remove 1600' of drill rods from well and set up for development. Well flow 700-750 gpm. Insert compressed air through drill rods to air lift well for two hours; discharge cleared rapidly with very little cuttings. Well flow at end 800-850 gpm. 6/20/91: Composite water sample 496'-1702' obtained for field and laboratory water quality analysis. Flow in AM 800-850 gpm. Start geophysical logging of well. Complete in PM 6/21/91. Logging performed as follows: Spontaneous potential, long and short normal resistivity, temperature, conductivity, gamma, flow meter, caliper, cement bond and accoustic velocity.

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