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Sheep Mountain, Yavapai Co.
T8N, R1W, Sec 15

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12-20-2006
Daniel E. Noble Library AS4

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SM-19
S-4

P. 1/2

4-1-1

PHELPS DODGE CORPORATION

GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT

GEOLOGIC LOG

HOLE NO. SM 19 SHEET NO. 1
COORDINATES 18782 N 23010 E
TYPE DRILL _____ BIT SIZE NX & BX
DATE STARTED _____

Project SHEEP MOUNTAIN, ARIZONA

COLLAR ELEVATION 2599
TOTAL FOOTAGE _____
LOGGED BY RSP
DATE COMPLETED 12-2

FROM	TO	CORE RECOVERY	ROCK TYPE	ROCK DESCRIPTION	ALTERATION	METALLIZATION
1883.5	1886.6	100%	Pc granite	Highly siliceous, well fractured. Core ground-up at (883.5-89). Numerous vugs. Many qtz veinlets with pink-K feldspars. Scattered stringers of younger albite-bio. porphyry. Basal breccia	silicification: strong; qtz veins seal fractures argillization: strong, of plagioclase. mod-strong oxidation	Total sulf: tr FeOx: 5% Py native Cu: <.01 %Cu: tr Orig sulf: <1%
1886.6	1892	30% core lost (88.6-89)	Fault Zone	Fault breccia. Fragments of granite & younger porphyry. Poorly metallized.	Ea	Native copper: tr %Cu = tr 2-3% FeOx
1892	1910	95%	Younger Albite-bio porphyry.	Well silicified. Local breccias, about 1 every 2 ft. Flooded by sec(?) K feldspars. Poorly oxidized, especially open breccias	silicification: strong qtz veins seal fractures. argillization: strong alt of plagia phenocrysts.	Total sulf: nil Py Native copper disseminated on joints native Cu: tr %Cu: tr FeOx: <1%
1910	1925.5	100%	do.	Well silicified, laced with qtz veinlets sealing fractures. Numerous xenoliths of meta-diabase and other biotite-rich rock. Flooded by sec(?) pink feldspar. Numerous leached cavities. Major jointing at 60° to core. Minor FeOx.	silicification: strong. argillization: strong. total alt. of plagio.	Tot sulf: tr Py, cc, MoS_2. Cuprite (?) repl cc. native Cu: tr %Cu: tr. Orig sulf: 1% Moly with sec
1925.5	1995	90%	Fault Zone	Siliceous rock consisting of grey quartz + pink sec(?) K feldspars. Porous rock - numerous med-large vugs. Fault breccia at 1929 sealed by siliceous FeOx. Core looks well leached	silicification: strong	Total sulf: tr Py, cc Native Cu <0.1% %Cu: <0.1% FeOx: ½% Orig sulf. est. 2%

SM-19
S-4

P Z/2

4-1-1

PHELPS DODGE CORPORATION

GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT

GEOLOGIC LOG

SHEET NO. 4
23010 E
BIT SIZE NX & BX

Project SHEEP MOUNTAIN, ARIZONA

COLLAR ELEVATION 2519'
TOTAL FOOTAGE 2409
LOGGED BY RSP
DATE COMPLETED 12-21-69

ROCK TYPE	ROCK DESCRIPTION	ALTERATION	METALLIZATION	GRAPHIC LOG
RP granite	Highly siliceous, well fractured. Core ground-up at (883.5-89). Numerous vugs. Many qtz veinlets with pink-k feldspars. Scattered stringers of younger albite-bio-porphyry. Basal breccia	silicification: strong, qtz veins seal fractures argillization: strong, of plagioclase. mod-strong oxidation	Total sulf: tr FeOx: 5% Py native Cu: <.01 %Cu: tr Orig sulf: <1%	
Fault Zone	Fault breccia. Fragments of granite & younger porphyry. Poorly metallized.	do	Native copper: tr %Cu = tr 2-3% FeOx	
Younger albite-bio-porphyry.	Well silicified. Local breccias, about 1 every 2 ft. Flooded by sec(?) k feldspars. Poorly oxidized, especially open breccias	silicification: strong qtz veins seal fractures. argillization: strong alt of plagia phenocrysts.	Total sulf: nil Py Native copper disseminated on joints native Cu: tr %Cu: tr FeOx: <1%	
do.	Well silicified, laced with qtz veinlets sealing fractures. Numerous xenoliths of meta-diabase and other biotite-rich rock. Flooded by sec(?) pink feldspar. Numerous leached cavities. Major jointing at 60° to core. Minor FeOx.	silicification: strong. argillization: strong. total. alt. of plagio.	Tot sulf: tr Py, cc, MoS_2. Cuprite (?) repl cc. native Cu: tr %Cu: tr. Orig sulf: 1% Moly with sec qtz veins.	
Fault Zone	Siliceous rock consisting of grey quartz + pink sec(?) k feldspars. Porous rock - numerous med-large vugs. Fault Breccia at 1929 sealed by siliceous FeOx. Core looks well leached	silicification: strong	Total sulf: tr Py, cc Native Cu <0.1% %Cu: <0.1% FeOx: ½% Orig sulf. est. 2%	

SM-19 P 1/2 4-1-2

5-5

PHELPS DODGE CORPORATION

GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT

GEOLOGIC LOG

HOLE NO. SM 19 SHEET NO. 5
COORDINATES 18782 N 23510E
TYPE DRILL _____ BIT SIZE NX SX
DATE STARTED _____

Project SHEEP MOUNTAIN, ARIZ

COLLAR ELEVATION 2599'
TOTAL FOOTAGE 29
LOGGED BY RSP
DATE COMPLETED 12-21

FROM	TO	CORE RECOVERY	ROCK TYPE	ROCK DESCRIPTION	ALTERATION	METALLIZATION
1915	1952	85% 4/1	Quartz	Massive pale-grey to pink quartz. Moderate to poorly fractured.	silicification: extreme chlorite, sericite: tr	Total sulfides: tr Py, MoS_2 minor FeOx on joints
1952	1965	80% 12/13	do.	As above; but with numerous vugs. Core is locally pulverized. Siliceous FeOx heals breccia at 1958.	silicification: extreme sericitization: minor	Total sulfides: tr Py, cc, MoS_2 % Cu: <0.1%
1965	1980	17% 2.5/15	Fault Zone	Crushed core. Fragments of mainly younger albite-biotite-porphyry with minor basic-rocks.	is pre-fault. silicification: moderate argillization: strong - of plagioclase phenocrysts	Total sulfides: tr Py, cc(?) Tr FeOx on joints
1980	1996	100%	Younger bo-albite-granite porphyry	Well altered; locally brecciated at top. Flooded by fracture-sealing quartz veinlets. Moderate-heavy FeOx on joints; often vuggy.	argillization: strong - of plagioclase. silicification: strong. chloritization: moderate - of plagioclase. sec. K-feldspar: minor	Total sulfides: 0.1% Py, cc, MoS_2(?) % Cu: tr FeOx: 1%
1996	2025	100%	do	Well altered; flooded by sec. qtz veins + sec. K-feldspars. Moderate fracturing. Scattered vugs. Biotite-plagioclase rock (diorite xenolith?) at (2023-29)	silicification: strong argillization: strong - of plagioclase chloritization: moderate - of plagioclase. sericite: tr sec. K-feldspar: moderate	Total sulfides: 0.3% Py MoS_2 (tr)

SM-19 P 2/2 4-12

S-5

PHELPS DODGE CORPORATION

GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT

GEOLOGIC LOG

SHEET NO. 5

2310E

BIT SIZE NX SX

COLLAR ELEVATION 2549'

TOTAL FOOTAGE 2409

LOGGED BY RSP

DATE COMPLETED 12-21-64

Project SHEEP MOUNTAIN, ARIZ

ROCK TY.	ROCK DESCRIPTION	ALTERATION	METALLIZATION	GRAPHIC LOG
Quartz	Massive pale-grey to pink quartz. Moderate to poorly fractured	silicification: extreme chlorite, sericite: tr	Total sulfides: tr Py, MoS_2 minor FeO_x on joints	
do.	As above; but with numerous vugs. Core is locally pulverized. Siliceous FeO_x heals breccia at 1958.	silicification: extreme sericitization: minor	Total sulfides: tr Py, cc, MoS_2 % Cu: <0.1%	
Fault zone	Crushed core. Fragments of mainly younger albite-biotite-porphyry with minor basic-rocks.	is pre-fault. silicification: moderate argillization: strong - of plagioclase phenocrysts	Total sulfides: tr Py, cc(?) Tr FeO_x on joints	
-albite-rte orphyry	Well altered; locally brecciated at top. Flooded by fracture-sealing quartz veinlets. Moderate-heavy FeO_x on joints; often vuggy.	argillization: strong - of plagioclase. silicification: strong. chloritization: moderate - of plagioclase. sec. K-feldspar: minor	Total sulfides: 0.1% Py, cc, MoS_2(?) % Cu: tr FeO_x: 1%	
do	Well altered; flooded by sec. qtz veins + sec. K-feldspars. Moderate fracturing. Scattered vugs. Biotite-plagioclase rock (diorite xenolith?) at (2023-29)	silicification: strong argillization: strong - of plagioclase chloritization: moderate - of plagioclase. sericite: tr sec. K-feldspar: moderate	Total sulfides: 0.3% Py MoS_2 (tr)	

SM-19
5-6

P 1/2

4-1-3

PHELPS DODGE CORPORATION

GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT

GEOLOGIC LOG

HOLE NO. SM 19 SHEET NO. 6
COORDINATES 15982 N 23010 E
TYPE DRILL ____ BIT SIZE BX WL
DATE STARTED ____

Project SHEEP MOUNTAIN, ARIZONA

COLLAR ELEVATION 2514'
TOTAL FOOTAGE 21[illegible]
LOGGED BY RSP
DATE COMPLETED 12-2[illegible]

FROM	TO	CORE RECOVERY	ROCK TYPE	ROCK DESCRIPTION	ALTERATION	METALLIZATION
2025	2087	100%	Younger bio-albite-granite porphyry.	As above, but more siliceous and less sec. k-feldspar. Xenoliths of biotite schist, plagioclase-biotite (diorite?) rock. Breccia at 2063.	as above	Total sulfides: 0.1% py, MoS_2 Increase in overall MoS_2 content
2087	2090	90%	Basic Rock	Fine-gr. biotite-plagioclase rock. (Diorite). Numerous qtz veins. Breccia zone. May be xenolith..	silicification: moderate argillization: extreme - of plagioclase.	Total sulfides: 0.1% py, MoS_2 - mostly on joint surfaces
2090	2112.5	100%	Younger bio-albite-granite porphyry	Well altered; qtz veins flood rock. Xenoliths of above basic rock + pC schists. Well fractured, FeOx on joints. A few vugs. Brecciated at: 2097, 2099, 2101.	silicification: strong argillization: strong sec. k-feldspars: mod	Total sulfides: 0.3% py, MoS_2 Orig. sulfide est: <1%
2112.5	2131	100%	do.	Extremely siliceous; flooded by sec. grey qtz Numerous xenoliths of pC metamorphics, + basic rocks. Small breccia at (2112-15). Moderate fracturing, scattered vugs.	silicification: extreme argillization: strong - of plagioclase. sec. k-feldspar: wk-mod.	Total sulfides: 0.2% py, ccpy, MoS_2 % Cu: tr
2131	2143	100%	do.	Well altered; less siliceous, but more flooding by large amounts k-feldspar. Scattered xenoliths.	silicification: mod-strong argillization: strong - of plagioclase. sec. k-feldspar: very strong. chloritization: weak.	Total sulfides: 0.5% py, MoS_2, cov, ccpy, boc(?) % Cu: tr.
2143	2166.5	85%	Breccia Zone	Younger biotite-albite-granite porphyry. As above. Core is pulverized & splintered. Minor amounts FeOx on joints	as above.	as above

SM-19
S-6

P.2/2

4-1-3

PHELPS DODGE CORPORATION

GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT

GEOLOGIC LOG

NO. 6
23010 E
SIZE BX WA

Project SHEEP MOUNTAIN, ARIZONA

COLLAR ELEVATION 2514'
TOTAL FOOTAGE 2109
LOGGED BY RSP
DATE COMPLETED 12-21-64

ROCK DESCRIPTION	ALTERATION	METALLIZATION	GRAPHIC LOG
As above, but more siliceous and less sec. k-feldspar. Xenoliths of biotite schist, plagioclase-biotite (diorite?) rock. Breccia at 2063.	as above	Total sulfides: 0.1% py, MoS_2 increase in overall MoS_2 content	
Fine-gr. biotite-plagioclase rock. (Diorite). Numerous qtz veins. Breccia zone. May be xenolith..	silicification: moderate argillization: extreme - of plagioclase.	Total sulfides: 0.1% py, MoS_2 - mostly on joint surfaces	
Well altered; qtz veins flood rock. Xenoliths of above basic rock + pC schists. Well fractured, FeOx on joints. A few vugs. Brecciated at: 2097, 2099, 2101.	silicification: strong argillization: strong sec. k-feldspars: mod	Total sulfides: 0.3% py, MoS_2 Orig. sulfide est: <1%	
Extremely siliceous; flooded by sec. grey qtz Numerous xenoliths of pC metamorphics, + basic rocks. Small breccia at (2112-15). Moderate fracturing, scattered vugs.	silicification: extreme argillization: strong - of plagioclase. sec. k-feldspars: wk-mod	Total sulfides: 0.2% py, ccpy, MoS_2 % Cu: tr	
Well altered; less siliceous, but more flooding by large amounts k-feldspar. Scattered xenoliths.	silicification: mod-strong argillization: strong - of plagioclase. sec. k-feldspars: very strong. chloritization: weak.	Total sulfides: 0.5% py, MoS_2, cov, ccpy, boc(?) % Cu: tr.	
Younger biotite-albite-granite porphyry. As above. Core is pulverized & splintered. Minor amounts FeOx on joints	as above.	as above	

SM-19
S-7.

P 1/2

4-1-4

PHELPS DODGE CORPORATION

GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT

GEOLOGIC LOG

HOLE NO. SM 19 SHEET NO. 7
COORDINATES 18982 N 23010 E
TYPE DRILL _____ BIT SIZE BXWL
DATE STARTED _____

Project SHEEP MOUNTAIN, ARIZONA

COLLAR ELEVATION 2594
TOTAL FOOTAGE 2[illegible]
LOGGED BY R.S.P.
DATE COMPLETED 12-2

FROM	TO	CORE RECOVERY	ROCK TYPE	ROCK DESCRIPTION	ALTERATION	METALLIZATION
2166.5	2185	100%	Younger biotite-albite-granite porphyry	Well altered. Moderate fracturing, FeO_x on joints. General flooding of silica, pink feldspars.	silicification: qtz veining very strong argillization: strong - of plagioclase. sec. K-feldspars: moderate	Total sulfides: 1/2% Py, MoS_2, ccpy(?)
2185	2211	90% to 0	Fault Zone.	Pulverized core. Younger biotite-albite-granite porphyry. Porphyry as above. Minor FeO_x on joints.	as above	as above
2211	2259.7	90%	Younger biotite-albite-granite porphyry	Well altered. Well fractured. Tr FeO_x. General flooding of silica + pink feldspars	silicification: very strong qtz veining argillization: strong - of plagioclase. sec. K-feldsp: moderate.	Total sulfides: trace Py, MoS_2
2259.7	2270	100%	Fault Zone.	Broken & shattered core. Younger biotite-albite-granite porphyry fragments. Ferruginous silica cement at 2262	as above	as above
2270	2335	100%	Younger biotite-albite-granite porphyry	Well altered: flooding by quartz veins, sec. K feldspars. Moderate fracturing. Tr FeO_x on joints	silicification: very strong. qtz veining argillization: strong - of plagioclase phenos. sericitization: weak sec K-feldspars: moderate	Total sulfides: <1% Py, MoS_2, ccpy (tr)
2335	2394 2579	95%	do.	as above, but shows evidence of leaching. Moderate FeO_x on joints, Leaching cavaties from sulphides or ferromagnesians. Local shattering of core.	as above, but with heavier sericitization.	Total sulfides: <1% Py, MoS_2

SM-19 P2/2 4-14
5-7

PHELPS DODGE CORPORATION

GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT

GEOLOGIC LOG

7
23010E
BXWL

COLLAR ELEVATION 2514 ft
TOTAL FOOTAGE 2109
LOGGED BY RSP
DATE COMPLETED 12-21-69

Project SHEEP MOUNTAIN, ARIZONA

ROCK DESCRIPTION	ALTERATION	METALLIZATION	GRAPHIC LOG
Well altered. Moderate fracturing, FeOx on joints. General flooding of silica, pink feldspars.	silicification: qtz veining very strong argillization: strong - of plagioclase. sec. k - feldspars: moderate	Total sulfides: ½% Py, MoS_2, ccpy(?)	
Pulverized core. Younger biotite-albite-granite porphyry. Porphyry as above. Minor FeOx on joints.	as above	as above	
Well altered. Well fractured. Tr FeOx. General flooding of silica + pink feldspars.	silicification: very strong qtz veining argillization: strong - of plagioclase. sec. k - feldsp: moderate.	Total sulfides: trace Py, MoS_2	
Broken & shattered core. Younger biotite-albite-granite porphyry fragments. Ferruginous silica cement at 2262	as above	as above	
Well altered: flooding by quartz veins, sec. k feldspars. Moderate fracturing. Tr FeOx on joints	silicification: very strong. qtz veining argillization: strong - of. plagioclase phenos. sericitization: weak sec k - feldspars: moderate	Total sulfides: <1% Py, MoS_2, ccpy (tr)	
as above, but shows evidence of leaching. Moderate FeOx on joints, Leaching cavities from sulphides or ferromagnesians. Local shattering of core.	as above, but with heavier sericitization.	Total sulfides: <1% Py, MoS_2	

SM-19
S-8

P1/2

4-1-5

PHELPS DODGE CORPORATION

GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT

GEOLOGIC LOG

HOLE NO. SM 19 SHEET NO. 8
COORDINATES 18992 N 23010 E
TYPE DRILL _____ BIT SIZE RX WL
DATE STARTED _____

Project SHEEP MOUNTAIN, ARIZONA

COLLAR ELEVATION 2599
TOTAL FOOTAGE 2909
LOGGED BY RSP
DATE COMPLETED 12-21-64

FROM	TO	CORE RECOVERY	ROCK TYPE	ROCK DESCRIPTION	ALTERATION	METALLIZATION
2349	2351	100%	Younger biotite-albite granite porphyry.	Moderate fracturing. Well altered. FeO_x stains after ferromagnesians.	silicification: very strong - gtz flooding + veining chloritization: strong - of altered plagioclase see K-feldspars.	Total sulfides: < ½% py, MoS_2
2351	2358	100%	do.	Well fractured; minor fault zone. Minor FeO_x on joints. Scattered leach(?) cavaties. Well altered.	as above.	Total sulfides: <1% py, cupy, MoS_2, cc Cu: tr.
2358	2906.5	100%	do.	Moderate to locally strong fracturing. Traces of FeO_x on joints. Minor oxidation of py along joints. Well altered.	as above	Total sulfides: < ½% py, MoS_2
2906.5	2909	15%	Fault Zone.	Core extremely pulverized. Fragments of younger biotite-db albite-granite porphyry		

SM-19
S-8

2/2

4-1-S

PHELPS DODGE CORPORATION

GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT

GEOLOGIC LOG

Project SHEEP MOUNTAIN, ARIZONA

8
23010 E
RXWL

COLLAR ELEVATION 2544
TOTAL FOOTAGE 2409
LOGGED BY RSP
DATE COMPLETED 12-21-64

ROCK DESCRIPTION	ALTERATION	METALLIZATION	GRAPHIC LOG
Moderate fracturing. Well altered. FeOx stains after ferromagnesians.	silicification: very strong - qtz flooding + veining chloritization: strong - of altered plagioclase see K-feldspars.	Total sulfides: < 1/2% py, MoS_2	
Well fractured; minor fault zone. Minor FeOx on joints. Scattered leach(?) cavaties. Well altered.	as above.	Total sulfides: < 1% py, ccpy, MoS_2, cc Cu: tr.	
Moderate to locally strong fracturing. Traces of FeOx on joints. Minor oxidation of py [illegible] joints. Well altered.	as above	Total sulfides: < 1/2% py, MoS_2	
Core extremely pulverized. Fragments of younger biotite-alb albite-granite porphyry			

SM-20
S-1

1/2

4-1-6

PHELPS DODGE CORPORATION

GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT

GEOLOGIC LOG

HOLE NO. SM-20 SHEET NO. 1
COORDINATES
TYPE DRILL Diamond Core BIT SIZE NXWL
DATE STARTED

Project SWEET MOUNTAIN, ARIZONA

COLLAR ELEVATION
TOTAL FOOTAGE 2
LOGGED BY RSP
DATE COMPLETED 3-2-6

FROM	TO	CORE RECOVERY	ROCK TYPE	ROCK DESCRIPTION	ALTERATION	METALLIZATION
0	1630	Rotary Drill	Volcanics	Tuffs, agglomerates, andesites, surface flows		
1630	1661	100%	Younger porphyry [bi-bio-gr porph]	Xenoliths of schist. Well fractured. Well altered: qtz veining, flooding. Strongly oxidized: abundant FeO_x, MnO_x, leached cavaties w/ indigenous limonite	oxidized Silicification: strong argillization: moderate-of feldspars Sericite: moderate.	Original sulfides: 2-3% Native Cu, green Cu minerals (?) Cu: tr
1661	1673	100%	Granite	Well altered: silica flooding. Well fractured. Well oxidized: abundant FeO_x, MnO_x, especially on fractures, leached cavities w/ indigenous limonite Xenoliths of schists.	oxidation Silicification: silica flooding strong Sericite: moderate - on fractures.	Original sulfides: 2-3% Native Cu, cc Cu: <0.1%
1673	1697	100%	Albite-biotite-granite porphyry	Younger porphyry with xenoliths of schists, Basic dikes at 1685, 1693. Well fractured with fault zone at (1689.9 - 93.7). Well altered: silica flooding. Strongly oxidized: Abundant FeO_x, MnO_x on fractures, leached cavities with indigenous limonite.	oxidation Silicification: strong - flooding argillization: strong - of plagioclase. Sericite: moderate - on joints	Original sulfides: 3% Native Cu, cc Cu: <0.1%
1697	1733.6	95%	Granite (?)	Xenoliths of schists. Small basic dike at 1705 Moderate fracturing, locally brecciated. Strongly altered: strong silica flooding. Moderate to strong oxidation: Abundant FeO_x, MnO_x; leach cavities with indigenous limonite	oxidation Silicification: strong - flooding argillization: strong - of feldspars Sericitization: mod - weak.	Original sulfides: 1-5% local conc. of cc. Native Cu, cc, green Cu minerals. Cu: 0.1%
1733.6	1747.3	98%	Albite-bio-granite porphyry (?)	Well altered Porphyry: groundmass altered to dk red, no feldgs. Well fractured. Minor oxidation: tr FeO_x, MnO_x. Scattered leached cavities. Locally brecciated	Silicification: mod - strong qtz veining argillization: strong - of plagioclase. all. of groundmass	Original sulfides: <1% Total sulfides: 0.6% cc, py, native Cu %Cu: 0.5% cc repl py; native Cu repl. cc

SM-20
S-1

2/2

4-1-6

PHELPS DODGE CORPORATION

GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT

GEOLOGIC LOG

ET NO. 1

T SIZE NXWL

Project SUGAR MOUNTAIN, ARIZONA

COLLAR ELEVATION 2513

TOTAL FOOTAGE 2825

LOGGED BY RSP

DATE COMPLETED 3-2-65

ROCK DESCRIPTION	ALTERATION	METALLIZATION	GRAPHIC LOG
ffs, agglomerates, andesites, surface flows			
Xenoliths of schist. Well fractured. Well altered: qtz veining, flooding. Strongly oxidized: abundant FeO_x, MnO_x, leached cavaties w/ indigenous limonite	oxidized Silicification: strong argillization: moderate-of feldspars Sericite: moderate.	Original sulfides: 2-3% Native Cu, green Cu minerals (?) Cu: tr	
Well altered: silica flooding. Well fractured. Well oxidized: abundant FeO_x, MnO_x, especially on fractures, leached cavities w/ indigenous limonite Xenoliths of schists.	oxidation Silicification: silica flooding strong sericite: moderate - on fractures.	Original sulfides: 2-3% Native Cu, cc Cu: <0.1%	
Younger porphyry with xenoliths of schists, Basic dikes at 1685, 1693. Well fractured with fault zone at (1688.7 - 93.7). Well altered: silica flooding. Strongly oxidized: Abundant FeO_x, MnO_x on fractures, leached cavities with indigenous limonite.	oxidation Silicification: strong - flooding argillization: strong - of plagioclase. Sericite: moderate - on joints	Original sulfides: 3% Native Cu, cc Cu: <0.1%	
Xenoliths of schists. Small basic dike at 1705 Moderate fracturing, locally brecciated. Strongly altered: strong silica flooding. Moderate to strong oxidation: Abundant FeO_x, MnO_x; leach cavities with indigenous limonite	oxidation silicification: strong - flooding argillization: strong - of feldspars Sericitization: mod - weak.	Original sulfides: 1-5% local conc. of cc. Native Cu, cc, green Cu minerals. Cu: 0.1%	
Well altered porphyry: groundmass altered to dk red, no FeMgs. Well fractured. Minor oxidation: tr FeO_x, MnO_x. Scattered leached cavities.	silicification: mod - strong qtz veining argillization: strong - of plagioclase. alt. of groundmass	Original sulfides: <1% Total sulfides: 0.6% cc, py; native Cu %Cu: 0.5% cc > py; native Cu repl. cc	

Locally brecciated

SM-20
S-2

1/2

4-1-7

PHELPS DODGE CORPORATION

GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT

GEOLOGIC LOG

HOLE NO. SM 20 SHEET NO. 2
COORDINATES
TYPE DRILL Diamond Core BIT SIZE NXIWL
DATE STARTED

COLLAR ELEVATION
TOTAL FOOTAGE
LOGGED BY B.S.P
DATE COMPLETED

Project SUPERSTITION MOUNTAIN, ARIZONA

FROM	TO	CORE RECOVERY	ROCK TYPE	ROCK DESCRIPTION	ALTERATION	METALLIZATION
1747.3	1754.5	100%	Fault Zone	Fragments of younger biotite-albite-granite porphyry. Minor FeO_x, MnO_x on joints. Abundant dendritic native Cu on joints.	Minor oxidation	Total sulfides: 0.1% cc, py, MoS_2(?) Native Cu: 1% Cu: 1.2%
1754.5	1767.5	54%	Fault Zone	As above. Locally abundant sulphides, but with overall decrease in metallization	As above.	Total sulfides: 0.1% cc, py, green Cu minerals, nat Cu: tr
1767.5	1771	100%	Biotite-albite-granite porphyry	Well fractured. Strong alteration: silicification Weak oxidation: minor FeO_x, MnO_x	silicification: strong silica flooding argillization: moderate - of plagioclase phenocrysts. sericitization: wk-mod.	Total sulfides: 1% cc, py, native Cu Cu: 0.5%.
1771	1782	100%	do.	as above, but more oxidized: scattered leached cavities with indigenous limonite. Inclusions of schist gneisses	as above. strong flooding of sec. k-feldspars.	Original sulfides: 1% Total sulfides: tr Native Cu, py, cc, green Cu sil Cu: tr
1782	1790.5	100%	do.	Zone of strong alteration: silica + sec. k feldspar flooding. Well fractured. Moderate oxidation: FeO_x, MnO_x on joints, leached cavities.	silicification: strong qtz veining, silica flooding sec. k-feldspar - strong flooding argillization: strong sericitization: wk-moderate	Original sulfides: <1% Tot sulf: tr Cu: tr
1790.5	1811	100%	do.	Well altered - silica flooding. Moderate - locally strong oxidation: minor transported FeO_x, MnO_x; scattered leached cavities of indigenous FeO_x. Locally brecciated	as above, but without sec. k-feldspar.	Original sulfides: 1½% Tot sulf: tr Native Cu, py, cc, green Cu minc Cu: trace

SM-20
S-2

2/2

4-1-7

PHELPS DODGE CORPORATION

GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT

GEOLOGIC LOG

Project SHEEP MOUNTAIN, ARIZONA

D. 2

E NXWL

COLLAR ELEVATION

TOTAL FOOTAGE

LOGGED BY BSP

DATE COMPLETED

ROCK DESCRIPTION	ALTERATION	METALLIZATION	GRAPHIC LOG
Fragments of younger biotite-albite-granite porphyry. Minor FeOx, MnOx on joints. Abundant dendritic native Cu on joints.	Minor oxidation	Total sulfides: 0.1% cc, py, MoS_2(?) Native Cu: 1% Cu: 1.2%	
As above. Locally abundant sulphides, but with overall decrease in metallization	As above.	Total sulfides: 0.1% cc, py, green Cu minerals, native Cu Cu: tr	
Well fractured. Strong alteration: silicification weak oxidation: minor FeOx, MnOx	silicification: strong silica flooding argillization: moderate - of plagioclase phenocrysts. sericitization: wk-mod.	Total sulfides: 1% cc, py, native Cu Cu: 0.5%.	
as above, but more oxidized: scattered leached cavities with indigenous limonite. Inclusions of schist gneisses	as above. strong flooding of sec. k-feldspars.	Original sulfides: 1% Total sulfides: tr Native Cu, py, cc, green Cu stains. Cu: tr	
one of strong alteration: silica + sec. k feldspar flooding. Well fractured. Moderate oxidation: FeOx, MnOx on joints, leached cavities.	silicification: strong qtz veining, silica flooding sec. k-feldspar - strong flooding argillization: strong sericitization: wk-moderate	Original sulfides: <1% Tot sulf: tr Cu: tr	
Well altered - silica flooding. Moderate - locally strong oxidation: minor transported FeOx, MnOx; scattered leached cavities w/ indigenous FeOx. Locally brecciated	as above, but without sec. k-feldspar.	Original sulfides: 1½% Tot sulf: tr Native Cu, py, cc, green Cu minerals Cu: trace	

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4-1-8

PHELPS DODGE CORPORATION

GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT

GEOLOGIC LOG

HOLE NO. SM-20 SHEET NO. 3
COORDINATES
TYPE DRILL Diamond Core BIT SIZE 7 7/8 WL
DATE STARTED

Project SWEEP MOUNTAIN, ARIZONA

COLLAR ELEVATION
TOTAL FOOTAGE
LOGGED BY RSP
DATE COMPLETED

FROM	TO	CORE RECOVERY	ROCK TYPE	ROCK DESCRIPTION	ALTERATION	METALLIZATION
1811	1820.5	100%	Younger biotite-albite-gran porphyry	Well fractured. Well altered: extensive silica veining. Minor oxidation. Locally abundant cc, native copper.	Silicification: strong veining & flooding. argillization: strong - of plagioclase phenos. Sericitization: weak	Total sulfides 1-2% cc, py, native Cu Cu: 1%
1820.5	1826	100%	do.	Well fractured. Well altered: strong silica flooding. Xenoliths(?) of diorite. Moderately oxidized: FeO_x, MnO_x, indigenous FeO_x boxwork in leached cavities.	as above	Original sulfides: 1-2% Total sulfides: tr py, cc Cu: tr
1825	1843	30%	Fault Zone	Well pulverized biotite-albite-granite porphyry Minor oxidation GENERAL BASE OF OXIDATION		Total sulfides: <1% (?) Native Cu: tr
1843	1846	100%	Younger bio-albite-granite porphyry	Moderate fracturing. Well altered: silica veining, locally, alteration of groundmass. Locally oxidized: leach cavities, FeO_x, MnO_x. Well mineralized: disseminated + veinlets of py, supergene cc Xenoliths(?) of diorite	as above.	Total sulfides: 3-4% cc, py Cu: 2%
1846	1892	100%	do.	Granite porphyry - metadiorite complex. Moderate - poorly fractured. Generally well altered: silica + secondary K-feldspar flooding. Local oxidation: Abundant sulfides: veinlets, disseminated.	silicification: strong qtz veining, silica flooding argillization: total - of plagioclase secondary K-feldspar: strong " flooding Sericitization: moderate Chloritization: of feldspars	Total sulfides: 5% cc, py, cov, MoS_2 native Cu, malachite. Cu: 1.5-2.0%

SM-20
S-3

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PHELPS DODGE CORPORATION

GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT

GEOLOGIC LOG

NO. 3

SIZE XX WE

COLLAR ELEVATION

TOTAL FOOTAGE

LOGGED BY RSP

DATE COMPLETED

Project SHEEP MOUNTAIN, ARIZONA

ROCK DESCRIPTION	ALTERATION	METALLIZATION	GRAPHIC LOG
Well fractured. Well altered: extensive silica veining. Minor oxidation. Locally abundant cc, native copper.	silicification: strong veining & flooding. argillization: strong - of plagioclase phenos. sericitization: weak	Total sulfides: 1-2% cc, py, native Cu Cu: 1%	
Well fractured. Well altered: strong silica flooding. Xenoliths(?) of diorite. Moderately oxidized: FeO_x, MnO_x, indigenous FeO_x boxwork in leached cavities.	as above	Original sulfides: 1-2% Total sulfides: tr py, cc Cu: tr	
Well pulverized biotite-albite-granite porphyry Minor oxidation GENERAL BASE OF OXIDATION		Total sulfides: <1% (?) Native Cu: tr	
Moderate fracturing. Well altered: silica veining, locally, alteration of groundmass. Locally oxidized: leach cavities, FeO_x, MnO_x. Well mineralized: disseminated + veinlets of py, supergene cc Xenoliths(?) of diorite	as above.	Total sulfides: 3-4% cc, py Cu: 2%	
Granite porphyry-metadiorite complex. Moderate-poorly fractured. Generally well altered: silica + secondary k-feldspar flooding. Local oxidation: Abundant sulfides: veinlets, disseminated.	silicification: strong qtz veining, silica flooding argillization: total - of plagioclase secondary k-feldspar: strong flooding sericitization: moderate chloritization: of feldspars	Total sulfides: 5% cc, py, cov, MoS_2 native Cu, malachite. Cu: 1.5-2.0%	

SM-20
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4-1-9

PHELPS DODGE CORPORATION

GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT

GEOLOGIC LOG

HOLE NO. SM 20 SHEET NO. 4
COORDINATES
TYPE DRILL Diamond Core BIT SIZE NX to BAS BX: 1915 –
DATE STARTED

Project SHEEP MOUNTAIN, ARIZONA

COLLAR ELEVATION
TOTAL FOOTAGE
LOGGED BY RSP
DATE COMPLETED

FROM	TO	CORE RECOVERY	ROCK TYPE	ROCK DESCRIPTION	ALTERATION	METALLIZATION
1892	1928.5	100%	Younger bio-clb-granite porphyry	Porphyry with diorite xenoliths. Moderate fract., locally bx. Generally well altered: silica, sec. k-feldspar flooding, sericitization. Minor oxidation: FeOx rims Py, native Cu	Silicification: qtz veining, silica flooding strong argillization: strong: of plagioclase sec. k-feldspar: strong flooding sericitization: moderate	Total sulfides: 4-6% Py, cc, MoS_2, native Cu Cu: 1.5%
1928.5	1932.5	90%	Fault Zone.	As above, but well broken. Basic dike at 1929.5 Post-mineral	as above	as above.
1932.5	1947	100%	Younger bio-clb-granite porphyry	As interval (1892 – 1928.5)	as above	Total sulfides: 4% cc, Py, MoS_2 Cu: 2%
1947	1954.5	80%	da	Generally as above, but with with less sulphides.	as above.	Total sulfides: 1.5% Py, cc, native Cu Cu: 0.9%
1954.5	1969.2	60%	Fault Zone	Frags of younger porphyry & diorite. Minor oxidation. Post mineral.	as above.	Total sulfides: ~~0.5%~~ 5% Py, cc, native Cu. Cu: 1.0%
1969.2	2040	95%	Meta-diorite.	Hornfelsic + gneissic fabric. Moderate fracturing, locally brecciated. Well ~~altd~~ altered: horizons of qtz veining	locally strong silica veining. sec. k-feldspar flooding complete argillization of plagioclase.	Total sulfides: 4% Py, cc, MoS_2, ccpy Cu: 0.2 – 0.7%
2040	2048	32%	Fault Zone	As above, but highly fragmented	as above	as above.

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PHELPS DODGE CORPORATION

GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT

NO. 4

SIZE NX to 945 BX: 1915–

GEOLOGIC LOG

Project SHEEP MOUNTAIN, ARIZONA

COLLAR ELEVATION

TOTAL FOOTAGE

LOGGED BY RSP

DATE COMPLETED

ROCK DESCRIPTION	ALTERATION	METALLIZATION	GRAPHIC LOG
Porphyry with diorite xenoliths. Moderate fract., locally bx. Generally well altered: silica, sec. K-feldspar flooding, sericitization. Minor oxidation: FeOx rims Py, native Cu	Silicification: qtz veining, silica flooding strong argillization: strong of plagioclase sec K-feldspar: strong flooding sericitization: moderate	Total sulfides: 4-6% Py, cc, MoS_2, native Cu Cu: 1.5% ±	
As above, but well broken. Basic dike at 1929.5 Post-mineral	as above	as above.	
As interval (1892 – 1928.5)	as above	Total sulfides: 4% cc, Py, MoS_2 Cu: 2%	
Generally as above, but with with less sulphides.	as above.	Total sulfides: 1.5% Py, cc, native Cu Cu: 0.7%	
Frags of younger porphyry or diorite. Minor oxidation. Post mineral.	as above.	Total sulfides: ~~3%~~ 5% Py, cc, native Cu. Cu: 1.0%	
Hornfelsic + gneissic fabric. Moderate fracturing, locally brecciated. Well ~~alte~~ altered: horizons of qtz veining	locally strong silica veining. sec. K-feldspar flooding complete argillization of plagioclase.	Total sulfides: 4% Py, cc, MoS_2, copy Cu: 0.2 – 0.7%	
As above, but highly fragmented	as above	as above.	

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4-1-10

PHELPS DODGE CORPORATION

GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT

GEOLOGIC LOG

HOLE NO. SM 20 SHEET NO. 5
COORDINATES
TYPE DRILL BIT SIZE BXWL
DATE STARTED

Project SHEEP MOUNTAIN

COLLAR ELEVATION
TOTAL FOOTAGE
LOGGED BY RSP
DATE COMPLETED

FROM	TO	CORE RECOVERY	ROCK TYPE	ROCK DESCRIPTION	ALTERATION	METALLIZATION
2073	2079	100%	Meta-diorite.	Poorly fractured, locally bx. Basic dike @ 2057.5 Diorite is med-gr with hornfelsic + gneissic tex. Generally well altered. Minor oxidation.	strong qtz veining destruction of ferro-mags. sec. K-feldspar flooding argillization of plagioclase.	Total sulfides: 2.5% py, ccpy, MoS_2, born, cel? Cu: ~~0.4–0.5%~~ 0.2–0.4
2079	2091	90%	Fault Zone	Highly fragmented metadiorite. Postmineral	do.	Cu: 0.4–0.5%
2091	2146	100%	Meta-diorite	Moderate to well fractured. Bx zone at (2097–98.2) Premineral bx at 2108. Well altered. Minor oxidation	strong quartz veining argillization of plagioclase sec. K-feldspar floods qtz veins.	Total sulfides: 3% py, ccpy, MoS_2 Cu: 0.3–0.4%
2146	2151.8	83%	Fault zone	Highly fragmented metadiorite Post-mineral	as above	as above
2151.8	2191.5	100%	Meta-diorite	Moderate fracturing, locally bx. Bx (premineral?) with ferruginous silica cement at (2159–60) Well altered.	strong quartz veining argillization of plagioclase chloritization of altered plagioclase	Total sulfides: 1% py, ccpy, MoS_2 Cu: 0.3–0.6% ccpy replaces py
2191.5	2193.5	100%	Fault Zone	Highly fragmented metadiorite. Post-mineral	do.	do.
2193.5	2200	90%	Meta-diorite	Moderate fracturing, locally brecciated. Well altered.	do.	Total sulfides: 2% py, ccpy Cu: 0.4%
2200	2205.5	100%	Fault Zone	Fragmented metadiorite, fault gouge.		

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PHELPS DODGE CORPORATION

GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT

ET NO. 5

T SIZE BXWL

GEOLOGIC LOG

Project SHEEP MOUNTAIN

COLLAR ELEVATION

TOTAL FOOTAGE

LOGGED BY RSP

DATE COMPLETED

ROCK DESCRIPTION	ALTERATION	METALLIZATION	GRAPHIC LOG
Poorly fractured, locally bx. Basic dike @ 2057.5 Diorite is med-gr with hornfelsic + gneissic tex. Generally well altered. Minor oxidation.	strong qtz veining destruction of ferro-mags. sec. k-feldspar flooding argillization of plagioclase.	Total sulfides: 2.5% py, ccpy, MoS_2, born, cc(?) Cu: ~~0.4—0.5%~~ 0.2—0.4	
Highly fragmented metadiorite. Postmineral	do.	Cu: 0.4-0.5%	
Moderate to well fractured. Bx zone at (2097-98.2) Premineral bx at 2108. Well altered. Minor oxidation	strong quartz veining argillization of plagioclase sec. k-feldspar floods qtz veins.	Total sulfides: 3% py, ccpy, MoS_2 Cu: 0.3-0.4%	
Highly fragmented metadiorite Post-mineral	as above	as above	
Moderate fracturing, locally bx. Bx (premineral?) with ferruginous silica cement at (2159-60) Well altered.	strong quartz veining argillization of plagioclase Chloritization of altered plagioclase	Total sulfides: 4% py, ccpy, MoS_2 Cu: 0.3-0.6% ccpy replaces py	
Highly fragmented metadiorite. Post-mineral	do.	do.	
Moderate fracturing, locally brecciated. Well altered.	do.	Total sulfides: 2% py, ccpy Cu: 0.4%	
Fragmented metadiorite, fault gouge.			

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4-1-11

PHELPS DODGE CORPORATION

GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT

GEOLOGIC LOG

HOLE NO. SM 20 SHEET NO. 6
COORDINATES
TYPE DRILL BIT SIZE BXWL
DATE STARTED

Project SWEEP MOUNTAIN, ARIZONA

COLLAR ELEVATION
TOTAL FOOTAGE
LOGGED BY RSP
DATE COMPLETED

FROM	TO	CORE RECOVERY	ROCK TYPE	ROCK DESCRIPTION	ALTERATION	METALLIZATION
2305.5	2226	60%	Meta-diorite	Contains fragments of basic dikes. Poorly fractured. Strong alteration. 3/4 core recovery (2205-16)	Strong quartz veining chloritization & argillization of plagioclase	Total sulfides: 4% py, ccpy, MoS_2 Cu: 0.3% Mo: tr
2226	2254	100%	Meta-diorite	As above but with more copper metallization Locally bx.	do.	Total sulfides: 4% py, ccpy, MoS_2 Cu: 0.6-0.8% Mo: tr+
2254	2309	100%	Meta-diorite	Basic dikes at 2297, 2306. Moderate-poor fracturing. FeOx abundant in bx at 2271. Moderate oxidation around same. Well altered.	strongly silicified sec. K-feldspars in qtz veins. argillization & chloritization of plagioclase	Total sulfides: 3% py, ccpy, MoS_2 Cu: 0.4%
2309	2313	70%	Fault Zone	Fragments of metadiorite		
2313	2334.5	100%	Meta-diorite	Basic dike at [2315.6-16] Moderate fracturing. Well altered. FeOx fault gouge at 2322, 2326.	strong quartz veining argillization & chloritization of plagioclase $CaCO_3$ vein	Total sulfides: 2½% py, ccpy Cu: 0.3%
2334.5	2345	60%	Fault Zone	Minor oxidation		
2345	2411	100%	Meta-diorite	Poorly fractured. FeOx on joints. Moderate to strong alteration	strong quartz veining weak chloritization of plagioclase. sec. K-feldspars in qtz veins	Total sulfides: 5% py, ccpy, MoS_2, cc Cu: 0.4%

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PHELPS DODGE CORPORATION

GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT

NO. 6

SIZE BXWL

GEOLOGIC LOG

Project SHEEP MOUNTAIN, ARIZONA

COLLAR ELEVATION

TOTAL FOOTAGE

LOGGED BY RSP

DATE COMPLETED

ROCK DESCRIPTION	ALTERATION	METALLIZATION	GRAPHIC LOG
Contains fragments of basic dikes. Poorly fractured. Strong alteration. 3/4 core recovery (2205-16)	Strong quartz veining chloritization & argillization of plagioclase	Total sulfides: 1% py, ccpy, MoS_2 Cu: 0.3% Mo: tr	
As above but with more copper metallization Locally bx.	do.	Total sulfides: 4% py, ccpy, MoS_2 Cu: 0.6-0.8% Mo: tr+	
Basic dikes at 2297, 2306. Moderate-poor fracturing. FeOx abundant in bx at 2271. Moderate oxidation around same. Well altered.	strongly silicified sec. K-feldspars in qtz veins. argillization & chloritization of plagioclase	Total sulfides: 3% py, ccpy, MoS_2 Cu: 0.4%	
Fragments of metadiorite			
Basic dike at [2315.6-16] Moderate fracturing. Well altered. FeOx fault gouge at 2322, 2326.	strong quartz veining argillization & chloritization of plagioclase $CaCO_3$ vein	Total sulfides: 2½% py, ccpy Cu: 0.3%	
Minor oxidation			
Poorly fractured. FeOx on joints. Moderate to strong alteration	strong quartz veining weak chloritization of plagioclase. sec. K-feldspars in qtz veins	Total sulfides: 5% py, ccpy, MoS_2, CC Cu: 0.4%	

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PHELPS DODGE CORPORATION

GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT

NO. A-7

SIZE BXWL

GEOLOGIC LOG

Project SHEEP MOUNTAIN

COLLAR ELEVATION

TOTAL FOOTAGE

LOGGED BY RSP

DATE COMPLETED

ROCK DESCRIPTION	ALTERATION	METALLIZATION	GRAPHIC LOG
Contains angular fragments of basic dikes. Poorly fractured. FeOx on joints. Well altered.	intense quartz veining with sec. K-feldspars. argillization & chloritization of plagioclase.	Total sulfides: 5-7% py, ccpy, MoS_2, cc Cu: 0.3%	
Generally as above, but contains numerous fragments of basic dikes. Locally bx	do.	do.	
fragments of above metadiorite			
Contains fragments of basic dikes. Poorly fractured. Well altered. Tr. FeOx on joints	strong quartz veining with sec. K-feldspars moderate-weak sericitization. wk chloritization of argillized plagioclase	Total sulfides: 2-3% py, ccpy, MoS_2, cc(?) Cu: 0.2%	
Well fractured. Abundant qtz-sulfide veinlets seal fissures. Weak alteration.	quartz veining weak chloritization	Total sulfides: 2% py, ccpy, MoS_2 Cu: tr	
Fragmented andesite & metadiorite			
Contains fragments of basic dike. Moderate fracturing. Well altered.	strong silica veining & shading	Locally abundant MoS_2. Total sulfides: 2% py, ccpy, MoS_2 Cu: tr MoS_2: tr	

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4-1-12

PHELPS DODGE CORPORATION

GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT

GEOLOGIC LOG

HOLE NO. SM 20 SHEET NO. 1-7
COORDINATES
TYPE DRILL BIT SIZE BXWL
DATE STARTED

Project SHEEP MOUNTAIN

COLLAR ELEVATION
TOTAL FOOTAGE
LOGGED BY RSP
DATE COMPLETED

FROM	TO	CORE RECOVERY	ROCK TYPE	ROCK DESCRIPTION	ALTERATION	METALLIZATION
2411	2441.5	100%	Meta diorite	Contains angular fragments of basic dikes. Poorly fractured. FeOx on joints. Well altered.	intense quartz veining with sec. K-feldspars. argillization & chloritization of plagioclase.	Total sulfides: 5-7% py, ccpy, MoS_2, cc Cu: 0.3%
2441.5	2467	100%	Meta-diorite.	Generally as above, but contains numerous fragments of basic dikes. Locally bx	do.	do.
2467	2479	90%	Fault Zone	Fragments of above metadiorite		
2479	2492	100%	Meta-diorite	Contains fragments of basic dikes. Poorly fractured. Well altered. Tr. FeOx on joints	strong quartz veining with sec. K-feldspars moderate-weak sericitization. wk chloritization of argillized plagioclase	Total sulfides: 2-3% py, ccpy, MoS_2, cc(?) Cu: 0.2%
2492	2495.8	100%	Andesite dike	Well fractured. Abundant qtz-sulfide veinlets seal fissures. Weak alteration.	quartz veining weak chloritization	Total sulfides: 2% py, ccpy, MoS_2 Cu: tr
2495.8	2502	90%	Fault Zones	Fragmented andesite & metadiorite		
2502	2508.5	100%	Meta-diorite	Contains fragments of basic dike. Moderate fracturing. Well altered.	strong silica veining & flooding	Locally abundant MoS_2 Total sulfides: 2% py, ccpy, MoS_2 Cu: tr MoS_2: tr

SM-20

8

4-2-1

PHELPS DODGE CORPORATION

GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT

GEOLOGIC LOG

HOLE NO. SM20 SHEET NO. 8

COORDINATES

TYPE DRILL BIT SIZE BXWL

DATE STARTED

COLLAR ELEVATION

TOTAL FOOTAGE

LOGGED BY RSP

DATE COMPLETED

Project SILVER MOUNTAIN, ARIZONA

FROM	TO	CORE RECOVERY	ROCK TYPE	ROCK DESCRIPTION	ALTERATION	METALLIZATION	GRAPHIC LOG
2508.5 2511	2512	100%	Andesite Dike	Well fractured. Similar to aforementioned andesite dike.	Strong quartz veining weak chloritization	Total sulfides: 1% Py	
2512	2527	100%	Meta-diorite	Well fractured. Strong alteration. FeOx on joints.	strong qtz veining + flooding. sec k-feldspar flooding along qtz veins destruction of ferro-mags.	Total sulfides: 4% py, ccpy, MoS_2 Cu: 0.2% MoS_2: tr+	
2527	2632	100%	Meta-diorite	Moderate-poorly fractured. Strong alteration. Noteable decline in copper metallization.	intense silica flooding & quartz veining sec-k feldspar flooding destruction or sericitization of most biotite.	Total sulfides: 5% py, MoS_2, ccpy. Cu: tr-0.1%	
2632	2660	100%	Meta-diorite	As above, but more siliceous. Porphyry dike (albite-bio-porphyry?) at (2633.8-35). Marked decrease in total-sulfide values.	as above, but more intensly silicified.	Total sulfides: 1% py, ccpy, MoS_2 Cu: < 0.1%	
2660	2706.6	100%	Granite.	Poorly fractured. Moderately altered. Transported FeOx on joints.	silica veining & flooding with sec k-feldspars. chloritization near ad-andesite.	Total sulfides: 1% py, ccpy, MoS_2 Cu: tr	
2706.6	2707.3	100%	Andesite Dike	Well fractured. Moderate alteration.	quartz veining	Total sulfides: 1-2%	
2707.6	2225	100%	Granite	as above interval but moderate to well fractured.	as above interval	Total sulfides: 1% py, ccpy Cu: tr	

SM-21

4-2-2

PHELPS DODGE CORPORATION

GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT

GEOLOGIC LOG

HOLE NO. SM-21 SHEET NO. 1
COORDINATES 10257 N 25779 E
TYPE DRILL Diamond Core BIT SIZE BXWL
DATE STARTED November 27, 1963 - 1964

Project SHEEP MOUNTAIN

COLLAR ELEVATION 2561
TOTAL FOOTAGE 2192
LOGGED BY RSP
DATE COMPLETED Feb 1, 1965

FROM	TO	CORE RECOVERY	ROCK TYPE	ROCK DESCRIPTION	ALTERATION	METALLIZATION	GRAPHIC LOG
1963.5	2006	75%	Biotite-granite gneiss	Med-fine gr pink-grey gneiss. Well-fractured, locally bxd (1992.5-98). FeOx, MnOx on joints, oxidation of sulphide veins	very weak qtz veining	Est. of orig sulf: 0.5% Tot. sulf: tr cc(?)	
2006	2025	90%	Biotite-Monzonite gneiss	Medium grained yellow grey gneiss. Poorly fractured, but locally bx. Oxidation of sulphide veins: FeOx in sulphide casts.	weak qtz veining weak argillization of plagioclase.	Est. of orig. sulfides: 0.5% Total sulf: tr cc Cu: tr	
2025	2044	90%	Gneiss	Gneiss of monzonitic to granodioritic composition Moderate fracturing. Minor oxidation of sulfide veins. Weakly altered. 10% core recovery @(2035-44) could be fo gouge.	minor qtz veining argillization of plagioclase.	Est of orig sulfides: 0.5% Total sulfides: tr Py, cc(?). Cu: tr	
2044	2052	95%	Granite	Cse-gr pink granite w/ biotite schist. Poorly fractured. Minor oxidation. Moderate alteration	moderate silica flooding chloritization of biotite argillization of feldspar	Original sulfides: <1% Total sulfides: 0.5% Py.	
2052	2071.6	95%	do.	as above, but locally brecciated; well oxidized	strong silica flooding moderate argillization of plagioclase.	Original sulfides: 1.5%	
2071.6	2079.2	90%	Garnet-qtz-diorite gneiss	Moderate fracturing. Sulfides in qtz bands.	qtz veining; moderate strong argillization of plagioclase.	Original sulfides: tr	
2079.2	2082.5	90%	Gneiss	FAULT ZONE			

SM-24

4-2-6

PHELPS DODGE CORPORATION

GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT

GEOLOGIC LOG

HOLE NO. SM-24 SHEET NO. 1
COORDINATES 23925N 23905E
TYPE DRILL _____ BIT SIZE BXLWL
DATE STARTED 1-21-65

Project SHEEP MOUNTAIN

COLLAR ELEVATION 2616
TOTAL FOOTAGE 2606
LOGGED BY RSP
DATE COMPLETED 5-12-65

FROM	TO	CORE RECOVERY	ROCK TYPE	ROCK DESCRIPTION	ALTERATION	METALLIZATION	GRAPHIC LOG
0	2134	Rotary		Tuffs, andesitic lavas, agglomerates, conglomerates.			
2134	2159	100%	Biotite-garnet-gneiss	Contains granite dikes. Moderately fractured. Moderately fractured altered.	chloritization of biotite & plagioclase. sec. biotite (?)	Total sulfides: 1% Py. ccpy. Cu: 0.1%	
2159	2164	100%	Granite & pegmatite.	Moderately fractured. Weakly altered.	quartz veins.	Total sulfides: tr Py.	
2164	2173	100%	Garnet-biotite-gneiss	Moderately fractured. Moderately altered.	quartz veining chloritization of ferro-mags and garnet.	Total sulfides: 1% Py.	
2173	2177.5	100%	Granite	Moderately fractured, weakly altered	quartz veining	Total sulfides: 4% Py	
2177.5	2184	100%	Rhyolite Porphyry	Grey fine-grained porphyry. Well fractured with bx at top. Moderately altered.	quartz veins.	Total sulfides: 5% Py, ccpy Cu: 0.1%	
2184	2224	100%	Garnet-biotite-gneiss	Contains small granite dikes. Moderately fractured, Well altered.	chloritization of ferro-mags. quartz veining	Total sulfides: 3-5% Py, ccpy, bornite, MoS_2 Cu: tr-0.1%	
2224	2235	90%	Fault Zone				

SM-24

2

4-2-7

PHELPS DODGE CORPORATION

GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT

GEOLOGIC LOG

HOLE NO. SM 24 SHEET NO. 2
COORDINATES
TYPE DRILL BIT SIZE BXWL
DATE STARTED

Project SHEEP MOUNTAIN

COLLAR ELEVATION
TOTAL FOOTAGE
LOGGED BY RSP
DATE COMPLETED

FROM	TO	CORE RECOVERY	ROCK TYPE	ROCK DESCRIPTION	ALTERATION	METALLIZATION	GRAPHIC LOG
2235	2242	100%	Gneiss & Granite	Well-moderately fractured. Well altered.	quartz veining Chloritization of ferromags	Total sulfides: 1% py, ccpy, MoS_2 Cu: tr	
2242	2263.7	100%	Andesite Dike	Poorly fractured, weakly altered.	quartz & veins.	Total sulfides: 5-10% Py.	
2263.7	2283	100%	Garnet-biotite-gneiss	Well to moderately fractured. Weakly altered.	quartz veins	Total sulfides: 1% Py.	
2283	2289	100%	Granite	Contains pegmatites, garnet gneiss. Moderately fractured, locally brecciated. Well altered.	quartz veining Sec. K-feldspar flooding Chloritization.	Total sulfides: 1% py, ccpy Cu: tr-0.3%	
2289	2373	100%	Garnet-biotite-gneiss	With granite dikes. Poorly fractured, locally bx, moderately altered.	Chloritization of ferro-mags. quartz veining	Total sulfides: 1% py, ccpy. Cu: tr-0.3%	
2373	2405	100%	Diabase	Well to poorly fractured, local breccia with silicified gouge. Well altered.	quartz veining Calcite veining Chloritization of ferromags	Total sulfides: 5% py, ccpy, MoS_2 Cu: tr-0.2%	
2405	2417	70%	Fault zone.	Fragmented & gouge material		Cu: tr	
2417	2422	100%	Garnet-biotite-gneiss.	Well fractured. Moderate to strong alteration	quartz veining	Total sulfides: tr Py.	

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PHELPS DODGE CORPORATION
GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT

GEOLOGIC LOG

HOLE NO. SM24 SHEET NO. 3
COORDINATES
TYPE DRILL BIT SIZE BXWL to 2453
DATE STARTED NXWL from 2453-2606

Project SHEEP MOUNTAIN

COLLAR ELEVATION
TOTAL FOOTAGE
LOGGED BY RSP
DATE COMPLETED

FROM	TO	CORE RECOVERY	ROCK TYPE	ROCK DESCRIPTION	ALTERATION	METALLIZATION	GRAPHIC LOG
2422	2426	90%	Andesite Dike	Well fractured, locally bx. Moderately altered.	quartz veins calcite veins	Total sulfides: 1% Py	
2426	2435	100%	Garnet-biotite-gneiss	similar to previous intervals of same		Cu: 0.2%	
2435	2449	90%	Andesite Dike	In a fault zone. Also with diabasic fragments. Well altered.	quartz veins calcite veins chloritization	Total sulfides: 2% Py, ccpy, bornite Cu: 0.1-0.3%	
2449	2451	100%	Diabase	Poorly fractured, Well altered.	quartz veins calcite veins chloritization	Total sulfides: tr py, ccpy Cu: 0.1%	
2451	2506	30%	Fault Zone	Diabasic fragments and gouge.	da	Cu: 0.1-0.2%	
2506	2568	30-50%		Diabasic and granitic fragments.		Cu: tr	
2568	2606	80%	Granite	With pegmatites, gneiss. Well to moderately fractured. Poorly altered.	quartz veins	Total sulfides: tr Py, ccpy	
				End of the hole.			

SM-26

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PHELPS DODGE CORPORATION

GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT

GEOLOGIC LOG

Project SHEEP MOUNTAIN

HOLE NO. SM-26 SHEET NO. 1
COORDINATES
TYPE DRILL BIT SIZE EXNL
DATE STARTED 25-Feb 1965

COLLAR ELEVATION 6113
TOTAL FOOTAGE 2193
LOGGED BY RSP
DATE COMPLETED 9-April, 1965

FROM	TO	CORE RECOVERY	ROCK TYPE	ROCK DESCRIPTION	ALTERATION	METALLIZATION	GRAPHIC LOG
0	2170	Rotary Drilled		Conglomerates, tuffs, agglomerates, basalt, andesite flows.			
2170	2212	100%	Granite.	Top of pC at 2160. No core from (2188-98) Moderately fractured. Well oxidized: FeO_x and Mn_xO_x on joints, in sulfide casts, pitting of feldspars. Well altered.	quartz veining destruction of ferro-mags argillization of feldspars.	Original sulfides: 2-3% Total sulfides: <1% cc Cu: tr	
2212	2221	100%		Well fractured. Minor oxidation. Moderately altered.	quartz veins, silica flooding	Total sulfides: 0.5% Py, cov, bornite. Cu: tr	
2221	2273	100%		as above, but with pegmatites. Well altered. Locally oxidized.	quartz veins sec K-feldspar flooding argillization of primary feldspars. sericitization	Total sulfides: <1% py, ccpy, MoS_2, green Cu	
2273	2314.5	100%	Granite (?) Porphyry	feldspar phenocrysts in a blue-grey groundmass. some ferromag phenocrysts. Moderate to poor fracturing. Well altered.	abundant quartz veining zones of silica flooding chloritization sec. K-feldspar flooding	Total sulfides: 5% py, ccpy, cc Cu: tr	
2314.5	2457	100%	Granite	Poorly fractured. Well altered.	silica flooding argillization of feldspar destruction of biotite chloritization of feldspar	Total sulfides: 5% py, ccpy, MoS_2, cc, cov. Cu: tr.	
2157	2162	100%	Andesite Dike	Well fractured. Moderately altered.	quartz veining chloritization	Total sulfides: 0.5-1% Py	

SM-26
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4-2-10

PHELPS DODGE CORPORATION
GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT
GEOLOGIC LOG

HOLE NO. SM-26 SHEET NO. 2
COORDINATES
TYPE DRILL BIT SIZE
DATE STARTED

Project SHEEP MOUNTAIN

COLLAR ELEVATION
TOTAL FOOTAGE
LOGGED BY RSP
DATE COMPLETED

FROM	TO	CORE RECOVERY	ROCK TYPE	ROCK DESCRIPTION	ALTERATION	METALLIZATION	GRAPHIC LOG
2452	2491	100%	Granite	Well to moderately fractured. Well altered. Oxidized at base: FeOx stains.	quartz veining sec K-feldspar flooding	Total sulfides: 1% py, ccpy, MoS_2	
2491	2493	100%	Andesite Dike.	Well fractured. Moderate alteration.	quartz veining	Total sulfides: 3% py	
				END OF THE HOLE.			

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SM-27

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PHELPS DODGE CORPORATION

GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT

GEOLOGIC LOG

Project SIERRO MOUNTAIN, ARIZONA

HOLE NO. SM-27 SHEET NO. 1
COORDINATES [illegible] 2020N A251 5.24 1332E
TYPE DRILL ——— BIT SIZE 2 5/8 IVL
DATE STARTED March 15, 1965

COLLAR ELEVATION 2538 2521
TOTAL FOOTAGE 2277 ft
LOGGED BY RSP
DATE COMPLETED April 20, 1965

FROM	TO	CORE RECOVERY	ROCK TYPE	ROCK DESCRIPTION	ALTERATION	METALLIZATION	GRAPHIC LOG
0	1380	Rotary Drilling		Post-mineral tuffs, agglomerates and basic volcanics.			
1380	1498	100%	Granite Porphyry	Younger albite-biotite-granite porphyry. Moderately fractured. Well oxidized: FeOx & MnOx on joints and in leached cavities, pitted plagioclase. Well altered.	argillization of plagioclase quartz veining secondary k-feldspar flooding	Original sulfides: <1%	
1498	1506	100%	Breccia	Breccia of younger granite porphyry. Oxidized. calcareous FeOx cement.	moderate to weak quartz veining	native copper Cu: tr	
1506	1562	100%	Granite porphyry	Moderately fractured. Well oxidized: FeOx on joints, in sulfide casts. Well altered. Base of widespread oxidation	argillization of plagioclase quartz veins calcite veins sericite	Original sulfides: 1-2% Total sulfides: tr cc, native Cu Cu: tr	
1562	1727	100%	↓	Moderately fractured. Oxidation mostly local. Appearence of native copper-sulfide assemblage. Native Cu often rims sulfides.	argillization of plagioclase quartz veining sec. k-feldspar flooding sericite.	Original sulfides: 1% Total sulfides: ½% cc, py, native Cu Cu: 0.1-0.3%	
1727	1758	100%		Well fractured. Locally oxidized. Predominantly sulfide assemblage. Well altered	argillization of plagioclase quartz veining sec. k-feldspar flooding	Original sulfides <1% Total sulfides: ½% cc, Py Cu: 0.1-0.3%	
1758	1759	100%	Breccia	Breccated younger granite porphyry. FeOx cement			

SM-27

2

4-2-12

PHELPS DODGE CORPORATION

GEOPHYSICAL RESEARCH AND EXPLORATION DEPARTMENT

GEOLOGIC LOG

HOLE NO. SM-27 SHEET NO. 2
COORDINATES
TYPE DRILL BIT SIZE HXWL
DATE STARTED

Project Sheep Mountain, Ariz.

COLLAR ELEVATION
TOTAL FOOTAGE
LOGGED BY RSP
DATE COMPLETED

FROM	TO	CORE RECOVERY	ROCK TYPE	ROCK DESCRIPTION	ALTERATION	METALLIZATION	GRAPHIC LOG
1757	1783	100%	Granite Porphyry	as above interval of same.	as above	as above.	
1783	1796	100%		Well fractured. Well oxidized: FeOx on joints and sulfide casts. Well altered.	quartz flooding sec K-feldspars.	Original sulfides: <1% native Cu: tr	
1796	1820	100%		Well fractured. Moderately to strongly oxidized. Well altered.	quartz flooding sec K-feldspars argillization of plagioclase.	Original sulfides: 1-2% Total sulfides: ½% py, cc Cu: tr	
1820	1887	100%		Well fractured. Locally strong oxidation. Well altered. FeOx on joints.	flooding by quartz veins and sec. K-feldspars. argillization of plagioclase.	Original sulfides: tr-2% Total sulfides: tr. cc, py Cu: tr	
1887	1894	90%	Fault Zone.				
1894	1914	100%	Granite Porphyry	Well fractured. FeOx on joints. Well altered.	argillization of plagioclase quartz veins Secondary K-feldspar flooding	Total sulfides: trace py, MoS_2	
1914	1928	95%	Fault Zone.				
1928	2074	100%	Granite Porphyry	Well to moderately fractured. Locally oxidized. Breccia at 2042.5-2045. Well altered	argillization of plagioclase quartz veining sec K-feldspar flooding	Total sulfides: <1% py, cc, MoS_2, native Cu.	