INDEX TO VOLUME 193

This index covers both the *Initial Reports* and *Scientific Results* portions of Volume 193 of the *Proceedings of the Ocean Drilling Program*. References to page numbers in the *Initial Reports* are preceded by "A" followed by the chapter number with a colon (A1:) and to those in the *Scientific Results* (this volume) by "B" followed by the chapter number with a colon (B1:).

The index was prepared by Earth Systems, under subcontract to the Ocean Drilling Program. The index contains two hierarchies of entries: (1) a main entry, defined as a keyword or concept followed by a reference to the page on which that word or concept appears, and (2) a subentry, defined as an elaboration on the main entry followed by a page reference.

The index covers volume text, figures, and tables but not core-description forms ("barrel sheets"), core photographs, smear slide data, or thin section descriptions. Also excluded from the index are bibliographic references, names of individuals, and routine front matter.

The Subject Index follows a standard format. Geographical, geologic, and other terms are referenced only if they are subjects of discussion. A site chapter in the *Initial Reports* is considered the principal reference for that site and is indicated on the first line of the site's listing in the index. Such a reference to Site 1188, for example, is given as "Site 1188, A3:1–305."

SUBJECT INDEX

1/strontium ratio, vs. strontium isotopes, B7:15

A

acid sulfate alteration. See bleaching aerobic culture, photomicrograph, A4:196 albite, geochemistry, B8:4-5 alkali earths, altered/parent rocks, B6:16 alkalinity, pore water, A4:48 alkalis altered/parent rocks, B6:16 rhyodacite, A6:8 See also sodium oxide + potassium oxide alteration breccia, A4:41-44 classification, B1:18, 62 Formation MicroScanner imagery vs. depth, A4:221 geochemistry, A3:69, 71; A4:47-48; B1:46-49; B8:1-18 hydrothermal fields, A1:7 mass transfer, B1:64 mineralization, B1:27-28 permeability, B13:5-9 photograph, A1:51-52, 75; A3:142-143, 150; A4:69, 132, 172, 185 photomicrograph, A1:81; A3:141, 147, 152; A4:98; B6:15 summary, A6:35; B1:8, 36-38 summary and types, A3:278; A4:24, 233-234, 236-239 volume expansion, B1:59 xenoliths, B6:3 *See also* anhydrite-pyrite-pyrophyllite alteration; bleaching; chlorite-hematite alteration halo; chlorite-pyrite alteration; cristobalite-clay alteration; green silica-clay alteration; hydrother-

mal alteration; illite-chlorite alteration; metasomatism; potassium feldspar-illite alteration; silica-chlorite alteration; silica-clay alteration; silicification; wallrock alteration alteration, silica-clay, photograph, A4:76-77 alteration, silica-sulfate, photograph, A4:174 alteration films, iron oxyhydroxide, A3:37 alteration halos lithologic units, A6:5–6 photograph, A3:110, 121, 145, 159, 167, 201, 208, 211, 219–220; A4:93–94, 133 photomicrograph, A1:54; A3:146, 149, 205–206, 212; A4:122, 125–126, 175–176 veins, A3:62-63; A4:42-45 See also chlorite-hematite alteration halo alteration style, vs. depth, A1:49-50, 66-67; A3:36-37, 137-138; A4:24-25, 114-116; B11:7-9 alteration types, mineralogy, B8:14-16; B12:1-19 altered rocks algorithms for precursor composition, B1:70 geochemistry, B1:18-20, 46-49 volume change, B1:20 aluminum, altered rocks, B1:47 aluminum oxide alteration, A4:47-48 dacite lava, B2:8 vs. depth, A3:223; A4:191, 193 vs. silica, B2:21 xenoliths, B6:2 alunite hydrothermal alteration, B1:16 photomicrograph, A3:169 amphibole, lithologic units, A4:14 amygdules distribution and types, A3:276

VOLUME 193 SUBJECT INDEX amygdules (continued) • boron, pore water

lithologic units, A3:26-33; A4:18 photomicrograph, A1:45; A3:129, 134, 166; A4:123, 151, 163 amygdules, chlorite, photomicrograph, A4:103 amygdules, elongate, photograph, A3:126 amygdules, quartz, photomicrograph, A4:127 amygdules, quartz-pyrite, photomicrograph, A3:162; A4:99, 125-126 amygdules, quartz-sphalerite, photomicrograph, A4:100 anaerobic culture, photomicrograph, A4:197 anatase, hydrothermal alteration, B1:16 andesite, lithology, A1:4 anhydrite alteration, A3:51; B1:21 amygdules, A3:29-30 bleaching alteration, A3:39-41 fresh and altered dacite, B12:3-4 geochemistry, B7:1-23 hydrothermal alteration, B1:15 lithologic units, A4:15–41 photograph, A1:58-60; A3:106, 111, 151; A4:69, 90, 182–183 photomicrograph, A1:45, 57, 68; A3:139, 182, 197; A4:122, 128-129, 161, 164, 171; B1:56; B6:15; B8:10; B9:25 semimassive sulfides, B1:22-23 separates from hydrothermal veins and vug fills, B7:16-23 strontium and sulfur isotopes, B1:30-32 veins, A1:26; A3:59-65 vs. depth, A3:171; A4:117 xenoliths, B6:3 anhydrite, anhedral, photomicrograph, B6:14 anhydrite-pyrite-pyrophyllite alteration, geochemistry, B8:1-18 anhydrite crystals, photomicrograph, A4:198 anhydrite intergrowths, photomicrograph, B6:14 anhydrite matrix, photomicrograph, A4:105 anhydrite overgrowths, photomicrograph, A4:140 anisotropy, magnetic susceptibility, A3:237, 301; A4:209, 259; A6:11, 31, 45 anorthite geochemistry, B8:4-5 plagioclase, B2:25 antimony altered rocks, B1:49 jasperoids, B9:6 pore water, B4:4-5 apatite hydrothermal alteration, B1:16 jasperoids, B9:5 apophysis, photograph, A4:91 arsenic altered rocks, B1:49 galena, B3:3 jasperoids, B9:6 pyrite, B3:3 autobrecciation, photograph, A3:124

B

backarc basins, geology, A1:1-84 bacteria biomineralization, B1:35-36 dacite, A6:26 photomicrograph, A4:196–198 total enumeration, A3:72; A4:49, 250-251; A6:9, 39 bacteria, mineralized, bacterial habitation, A3:226 bacterial counts, data, A3:294 bacterial habitation mineral particles, A3:225-226 photomicrograph, A4:198-199 barite lithologic units, A4:34 massive sulfides, B10:5-7 photomicrograph, A4:140 semimassive sulfides, B1:22–23 strontium and sulfur isotopes, B1:31-32 barium altered rocks, B1:18-20, 36-37, 47-48 chimneys, B1:35 jasperoids, B9:5 massive sulfides, B10:3-7 pore water, B4:4 vs. depth, A3:224; A4:192, 194 basalt geochemistry, B6:3-4, 19 lithology, A1:4 photomicrograph, B6:7-15 xenoliths, B6:1-19 bathymetry, maps, A1:34; B1:51; B2:15 biomass, data, A3:294 biomass activity, bacteria, A3:72; A4:49-50 biomineralization, biosphere, B1:35-38 biosphere, biomineralization, B1:35-38 Bismarck Sea, geology, A1:1-84 bismuth altered rocks, B1:49 jasperoids, B9:6 massive sulfides, B10:4 pore water, B4:4 semimassive sulfides, B1:23 black patches lithologic units, A4:14 photomicrograph, A4:82-85 black smokers, hydrothermal fields, A1:5-7 bleaching alteration, A3:39-41, 51; A4:27-29 geochemistry, B1:27 hydrothermal alteration, B1:16-17 petrology, A5:5-6 photograph, A1:52; A3:108, 110, 144, 150-151, 153, 201; B1:57 borehole images, logging-while-drilling data, A3:90-91 boreholes casing, A3:99 photograph, A3:99-100 bornite, semimassive sulfides, A4:39 boron, pore water, B4:4

VOLUME 193 SUBJECT INDEX breccia • chlorite-pyrite alteration, geochemistry

breccia alteration, A1:27; B1:21 dilation, B1:28-29 green silica-clay alteration, A3:38-39 photograph, A1:75; A4:134, 170, 180 structure, A4:41-44 See also granule breccia; pebble breccia; pseudobreccia breccia, altered, photomicrograph, A4:141 breccia, altered polymict, lithologic units, A4:17-23 breccia, autoclastic, photograph, A4:91 breccia, clast-supported, photograph, A4:181 breccia, flow-banded volcanic, photomicrograph, B8:11-12 breccia, flow-top, volcanism, B1:9-11 breccia, hydrothermal lithologic units, A3:25-26; A4:10-23 photograph, A4:69, 74-75 photomicrograph, A4:82 breccia, jigsaw lithologic units, A3:24, 31 photograph, A4:135, 172, 182 breccia, matrix-supported lithologic units, A4:15-23 photograph, A4:87, 131, 180 breccia, mineralized pumice, photomicrograph, B8:11 breccia, monomict volcaniclastic, lithologic units, A4:21, 31-32 breccia, polymict volcanic, photomicrograph, B8:11, 13 breccia, polymict volcaniclastic lithologic units, A4:13, 21, 32 photograph, A4:96, 138 photomicrograph, A4:109 breccia, volcanic, photomicrograph, B8:8-13 breccia, volcaniclastic alteration and mineralization, A4:13, 21 lithologic units, A3:24-25; A4:16-23 photograph, A4:90, 92 photomicrograph, A4:8; B8:9 breccia cement, jasperoidal silica, photomicrograph, A4:130 breccia flows, volcanism, B1:9-12 brecciation jasperoids, B9:6-7 microfractures, B9:4-7 photograph, A3:124; A4:172 See also autobrecciation brecciation, hydrothermal, photograph, A4:113 brucite hydrothermal alteration, B1:16 photomicrograph, A3:169 Brunhes/Matuyama boundary, oceanic crust, A1:4-5 bulk density logs, vs. depth, A4:217, 226

C

cadmium jasperoids, B9:6 pore water, B4:4–5 calcium jasperoids, B1:48; B9:5–7 massive sulfides, B10:3–7 pore water, B4:4–7

xenoliths. B6:3 See also potassium/calcium ratio calcium oxide alteration, A3:69; A4:47-48 dacite lava. B2:8 massive sulfides, B10:3-7 vs. depth, A3:223; A4:191, 193 vs. europium/europium ratio, B2:24 vs. silica, B2:21 caliper logs, vs. depth, A3:256; A4:217, 226 carbon dioxide, hydrothermal fields, A1:6-7 Category Z, wallrocks, B1:21, 28 cations, sulfate, A3:287 cavities, miarolitic, photomicrograph, B6:7-8, 10 cavity linings, photomicrograph, B9:23 celadonite, lithologic units, A4:14 cement, anhydrite, photograph, A4:170 cement, anhydrite-quartz-pyrite, photograph, A4:131 cement, pyrite, photograph, A4:170 cement, quartz, photograph, A4:170 cerium, pore water, B4:5 cesium, jasperoids, B1:47; B9:5 chalcophile elements altered/parent rocks, B6:17 altered rocks, B1:48-49 chalcopyrite chemical composition, B3:15-17 chloritized zones, B3:3 lithologic units, A4:15-41 massive sulfides, A4:36; B1:6; B10:4-7 petrography, A3:54, 57 photograph, A1:71; A4:144 photomicrograph, A1:55; A3:183, 188; A4:145, 151-154, 166 semimassive sulfides, B1:22-23 vs. depth, A4:117 chalcopyrite disease, photomicrograph, A4:156-157, 164 chalcopyrite fills, photomicrograph, A4:160-161 chemosynthesis, hydrothermal fields, A1:7 chert, hematitic, photomicrograph, A4:154 chimnevs hydrothermal fields, A1:5-7; B1:6 metal sources, B1:33-35 sulfides, A1:23-28; B1:28 chlorite alteration phases, B5:1-10; B11:1-19 breccia, A4:41-44 geochemistry, B8:5 hydrothermal alteration, B1:14-16 hydrothermal event frequency, B1:24-25 lithologic units, A3:26-33; A4:24-41 photograph, B1:57 photomicrograph, A3:166; A4:101; B1:56 silicification alteration, A3:41-47 vs. depth, B5:5-6 xenoliths, B6:3 See also illite-chlorite alteration; silica-chlorite alteration chlorite-hematite alteration halo, photomicrograph, A3:149 chlorite-pyrite alteration, geochemistry, B8:1-18

VOLUME 193 SUBJECT INDEX chlorite intergrowths, photomicrograph • cultivation

chlorite intergrowths, photomicrograph, B6:14 chrome spinel photomicrograph, B6:8 xenoliths, B6:2 chromite chemical composition, B3:27 mineralization, B3:4 chromium, xenoliths, B6:3 chromium oxide, xenoliths, B6:2 clastic zones lithologic units, A3:32 photograph, A4:113 clasts abrasion, A4:138 bleaching alteration, A3:39-41 hydrothermal event frequency, B1:24-25 lithologic units, A3:21–33 movement, A3:25; A4:13 photograph, A3:111-112, 116, 151; A4:87, 92, 113, 131 photomicrograph, A3:135-136, 163 clasts, altered perlitic, photomicrograph, A4:105 clasts, altered volcanic, lithologic units, A4:15-23 clasts, bleached, photograph, A4:96, 138 clasts, chalcopyrite-sphalerite, photomicrograph, A4:139 clasts, glassy, photomicrograph, A4:112 clasts, perlitic photograph, A4:96, 138 photomicrograph, A4:112 clasts, porous, photograph, A4:96, 138 clasts, porphyritic, photomicrograph, A4:112 clasts, spherulitic, photomicrograph, B8:13 clasts, tube pumice, photomicrograph, A4:103 clasts, vitric, photomicrograph, A3:117-118 clasts, volcanic photograph, A4:78-79, 90-92, 118, 134, 138 photomicrograph, A1:68, 72; A4:80-81, 104, 107-109 clay alteration, A3:26; B11:1-19 amygdules, A3:29-30 photomicrograph, A6:17 vs. depth, A3:171; A4:117 xenoliths, B6:3 See also cristobalite-clay alteration; green silica-clay alteration; silica-clay alteration clay intergrowths, photomicrograph, B6:14 clay mineralogy, alteration phases, B5:1-10 clay minerals chimneys, A1:25 hydrothermal alteration, B1:13-16 lithologic units, A6:5 no bacterial habitation, A3:227 photograph, A3:125, 151, 159, 211 photomicrograph, A3:135-136, 212; A4:101, 106, 196-197; B1:56 clinopyroxene mineral chemistry, B2:8-9 photograph, A1:77 xenoliths, B6:2–3 clinopyroxene phenocrysts lithologic units, A4:12, 18; B2:5 petrology, A5:4; A6:4

photograph, A5:7 photomicrograph, A1:78; A4:98; A5:8; B2:18 clinopyroxene phenocrysts, euhedral, photomicrograph, B2:16, 19 cobalt altered rocks, B1:49 jasperoids, B9:6 massive sulfides, B10:4 pore water, B4:5 compressional wave velocity altered volcanic rocks, A3:76; A4:54, 255 rhyodacite, A6:10, 41 rocks, A3:296 vs. depth, A3:230; A4:202 compressional wave velocity logs measurements, A3:94 vs. depth, A3:256; A4:217 conductive minerals Formation MicroScanner imagery vs. depth, A4:220 resistivity-at-the-bit, A4:229 contamination, microorganisms, A3:74 convergence, volcanism, A1:3-5 copper altered rocks, B1:19, 37, 48-49 chimneys, B1:35 jasperoids, B9:6 massive sulfides, B10:3-7 pyrite, B3:3 semimassive sulfides, B1:23 vs. depth, A3:224 vs. depth in altered volcanics and in precursors, B1:69 copper sulfides, semimassive sulfides, A4:39 covellite, semimassive sulfides, A4:39 cracks, perlitic, photomicrograph, A3:117-119, 142; A4:102 cracks, photograph, A1:46 cristobalite alteration, A3:38; B11:1-19 bleaching alteration, A3:40 domain significance, B1:25-26 hydrothermal alteration, B1:14 hydrothermal event frequency, B1:25 lithologic units, A4:24-41 photomicrograph, A3:131-132, 205-206; B1:56 silicification alteration, A3:42-47 veins. A3:59-65 vs. depth, A4:117 cristobalite-clay alteration lithologic units, A6:5-6 photomicrograph, A1:81; A3:164; A6:19 cristobalite-quartz transition, lithologic units, A4:33-34 crust. oceanic. Brunhes/Matuvama boundary. A1:4-5 crystal aggregates, photomicrograph, A3:131–132 CSIRO sample 142421, xenoliths, B6:1-19 cultivation enrichment, A3:295; A4:51-52, 252-254 observations, A4:195

D

dacite alteration, A3:36-51 bacteria, A6:26 bacterial habitation, A3:225 geochemistry, A4:47; B6:19; B8:1-18 hydrothermal fields, A1:7 lithology, A1:4 petrology, B2:4-8 photograph, A1:77; A5:7 volcanism, B1:10–12 dacite, altered geochemistry, B8:1-18 hydrothermal minerals, B8:16 photograph, A3:172 photomicrograph, A1:45; A3:175-176 dacite, altered perlitic, photomicrograph, B8:7 dacite, amygdaloidal, photomicrograph, B8:8-9 dacite, aphyric alteration, A4:26-41 photograph, A3:104 photomicrograph, B8:9 dacite, aphyric glassy, lithologic units, A4:9-23 dacite, bleached, photomicrograph, B8:7 dacite, brecciated, photomicrograph, B8:10 dacite, coherent, photomicrograph, B8:9 dacite, flow-banded, photomicrograph, B8:8, 12 dacite, fresh and altered, interlaboratory analyses, B12:1-9 dacite, porphyritic, alteration films, A3:37 dacite, pseudoclastic veined, photomicrograph, B8:8 dacite, spherulitic, photomicrograph, B8:8 dacite, unaltered, volcanism, B1:11-12 dacite, unaltered feldspar-phyric coherent, photomicrograph, B8:13 dacite, veined coherent, photomicrograph, B8:11 dacite, vesicular petrology, A5:4-5 photomicrograph, B8:7 dacite, vesicular aphyric coherent, photomicrograph, B8:13 dacite/rhyolite boundary, geochemistry, B2:8 dacite lava, petrology and geochemistry, B2:1-31 deep resistivity logs images, A3:253-254 vs. depth, A3:256; A4:217, 226 Deinococcus sp. n. ssp., biomineralization, B1:36 demagnetization, alternating-field, Zijderveld plots, A3:240-241 demagnetization, thermal curves, A3:83-84, 246; A4:58-59, 215; A6:33, 46 rhyodacite, A6:12 demagnetization, Zijderveld plots, A4:212 density, bulk, altered volcanic rocks, A3:76-77 density, grain altered volcanic rocks, A3:76-77; A4:257 rhyodacite, A6:43 rocks, A3:299 vs. depth, A3:232; A4:204

density logs measurements, A3:93-94; A4:61, 64 vs. depth, A3:256 See also bulk density logs devitrification lithologic units. A3:24 photograph, A3:123 photomicrograph, A3:113, 115; A4:107 silicification alteration, A3:44-47 diaspore, hydrothermal alteration, B1:16 diffusion, alteration, A1:26 dilation, hydrothermal systems, B1:28-29 dip histogram in volcanic layering, A3:202 orientation, A3:58-59 primary layering, A6:7, 21 volcanic rocks, A4:41, 43 dip, primary volcanic layering, vs. depth, A4:169, 179; A6:21 dip, vein vs. depth, A3:204; A4:178, 190; A6:23 vs. dip, A3:222 dipping units, Formation MicroScanner imagery vs. depth, A4:222 Djaul transform fault, lithology, A1:4 domains bacterial habitation, A3:225 photograph, A3:127-128 photomicrograph, A3:131-133, 135-136, 164 downhole measurements, A1:17, 21; A3:86-96; A4:59-65 dufreynosite, massive sulfides, B10:4

E

East Sherburne volcanic zone, volcanism, A1:5 electrical conductivity, fluid flow, B1:30 electron probe data, sulfides and oxides, B3:7-8 enrichment cultures, microorganisms, A3:72-73; A4:50; A6:9, 40 Eocene-Oligocene transition, volcanism, A1:3-5 epifluorescence, photomicrograph, A4:196–197 erbium, fresh and altered dacite, B12:4 europium altered rocks, B1:48 dacite lava, B2:8 europium/europium ratio vs. calcium oxide, B2:24 vs. silica, B2:24 vs. strontium, B2:24 vs. strontium isotopes, B7:15 exopolymeric clusters bacterial habitation, A3:226 photomicrograph, A4:199 exsolution laths, photomicrograph, A3:189 extension normal faults, A1:33 veins, A3:63-64

VOLUME 193 SUBJECT INDEX fabric • goethite

F

fabric fluid flow, B1:30 photomicrograph, B9:18 xenoliths, B6:2-3 See also microfabric fault scarps, lithology, A1:4; A4:22 fault zones, Formation MicroScanner imagery vs. depth, A4:223 faults, normal, extension, A1:33; B1:5 faults, rift, lithology, A1:4 faults, transform, volcanism, A1:4-5 feldspar, photomicrograph, A4:109 feldspar microcrysts, petrology, A6:4 feldspar needles, photomicrograph, A3:113 fissure eruptions, lithology, A1:4 fissures, hydrothermal fields, A1:5-7 flaky particles, bacterial habitation, A3:226 flow banding groundmass, B2:7 lithologic units, A3:24, 31; A4:12, 19-20 petrology, A5:5 photograph, A1:48, 70; A3:107, 109, 143, 201; A4:72, 74–75, 89–93, 118, 134–138, 181–183, 185 photomicrograph, A3:148, 205-206; A4:82, 106-108, 119, 171; A5:9; B2:18 flow banding, folded, photograph, A3:200; A4:138 flow banding, laminar, photograph, A3:116 flow banding, relict, photograph, A3:125 flow laminations photograph, A3:154 photomicrograph, A3:155 flow structures, photograph, A3:126 fluid flow alteration, A1:26 geochemistry, B1:26-27 lithologic units, A3:25-26, 32; A4:32 models, B1:32-33 permeability, B13:5-9 sources, B1:29-35 fluid flux, alteration, A3:48-51 fluid inclusions fluid flow, B1:33 massive sulfides, B10:7 photomicrograph, A3:139, 218; B9:24 temperature, B1:24 fluid temperature, hydrothermal fields, A1:6-7 fluid venting, permeability, B13:5-9 fluorine, hydrothermal fields, A1:6-7 folds orientation, A3:58-59 photograph, A1:48; A3:109 folds, isoclinal, lithologic units, A3:24, 31 foliation, vs. lineation, A4:209; A6:31 formation evaluation geochemical logs, A3:95-96 logging, A4:62, 64-65 logging-while-drilling data, A3:89-90 well-log units, A3:95-96

Formation MicroScanner imagery formation evaluation, A3:96 vs. depth, A3:259-261; A4:62, 65, 220-224 vs. resistivity-at-the-bit, A1:76; A4:65, 230 Formation MicroScanner imagery logs, vs. depth, A3:256; A4:217 fractures alteration, B1:21 bleaching alteration, A3:39-41 dilation, B1:28-29 fluid flow, B1:29-30 Formation MicroScanner imagery vs. depth, A3:260-261; A4:65, 221, 223-224 photograph, A1:48; A3:109-110, 153, 159; A4:70 photomicrograph, B9:14 veins, A3:59-65 See also microfractures

G

gadolinium, fresh and altered dacite, B12:4 galena chemical composition, B3:19 groundmass, B3:3 massive sulfides, A4:36; B10:5-7 parageneses, A4:159 photomicrograph, A4:152-153 gamma ray logs measurements, A3:93; A4:60-61, 64 vs. depth, A3:250, 256; A4:217 vs. resistivity-at-the-bit logs, A3:252 gamma rays altered volcanic rocks, A3:75; A4:53-54 rhyodacite, A6:10 vs. depth, A3:229; A4:201; A6:28 Geobacillus sp. n. ssp., biomineralization, B1:36 geochemical logs, formation evaluation, A3:95-96 geochemistry altered dacite, B8:1-18 anhydrite, B7:1-23 dacite lava, B2:1-31 dacite/rhyolite boundary, B2:8 fluid flow, B1:26-27 jasperoids, B9:1-30 massive sulfides, B10:1-22 pore water, B4:1–15 Site 1188, A1:16; A3:65-71 Site 1189, A1:20; A4:46-48 Site 1190, A5:6 Site 1191, A1:23; A6:8 volcanism, B1:9-11 xenoliths, B6:3-4 geochemistry, bulk-rock altered rocks, B1:18-20 dacite lava, B2:26-29, 31 geology, seafloor, basins, A1:37 geothermal gradient, hydrothermal fields, A1:7 germanium, jasperoids, B9:6 glauconite, lithologic units, A4:14 goethite jasperoids, B9:5

VOLUME 193 SUBJECT INDEX goethite (continued) • inclusions

lithologic units, A6:5 gold chemical composition, B3:20-23 mineralization, B3:4 pyrite inclusions, B3:22 sphalerite inclusions, B3:20 void fillings or vesicle linings in quartz, B3:21 See also native gold grabens, Brunhes/Matuyama boundary, A1:4-5 granule breccia, lithologic units, A3:21-33 granules, photomicrograph, A4:123 gray smokers, hydrothermal fields, A1:5-7 green silica-clay alteration petrology, A3:38-39, 49-51; A4:24-27 photograph, A4:118 photomicrograph, A4:119-120 greigite, alteration, A6:6 groundmass microcrysts, A5:5 petrology, A6:4 photomicrograph, B2:16-17 volcanic glass, B2:5-8 groundmass, quartz-clay, photomicrograph, A4:127 groundmass, quartz-illite, photomicrograph, A3:129, 162 groundmass, siliceous, photograph, A3:127 gypsum lithologic units, A4:34 photomicrograph, A1:68; A4:129 gypsum matrix, photomicrograph, A4:105

Η

halloysite lithologic units, A3:30 photomicrograph, A3:161 helium, hydrothermal fields, A1:6-7 hematite alteration, A3:50; A4:37 hydrothermal alteration, B1:15 lithologic units, A6:5 mineralization, B3:4 parageneses, A4:159 petrography, A3:55 photograph, A4:96, 138 photomicrograph, A3:169, 180, 183, 186-187, 191, 193, 205-206; A4:83, 130, 158, 167; B9:12-13, 18 - 21quartz inclusions, B9:4-7 See also chlorite-hematite alteration halo hematite, bladed, photomicrograph, A4:166 hematite flakes, photomicrograph, B9:18, 22 hematite fronds, photomicrograph, B9:22-23 hercynite chemical composition, B3:29 hydrothermal alteration, B1:15-16 mineralization, B3:4 photomicrograph, A3:168 xenoliths, B6:2 holmium, fresh and altered dacite, B12:4 hyaloclastite, semimassive sulfides, B1:22-23 hydrofracture, microfractures, B9:4-7

hydrothermal alteration photomicrograph, A3:119 Site 1188, A1:14; A3:33-51 Site 1189, A1:18-19; A4:23-34 Site 1190, A1:22; A5:5-6, 11 Site 1191, A1:22; A6:4-6 temperature, B1:23-24 See also alteration; metasomatism; silicification hydrothermal alteration, subseafloor, mineralization, B1:12-29 hydrothermal deposits, distribution map, A1:38 hydrothermal fields, geology, A1:5-7 hydrothermal fluids, phase separation, B1:29 hydrothermal systems dilation, B1:28-29 distribution map, B1:53 event frequency, B1:24-25 mineral chemistry, B3:1-31 permeability, B13:1-19 hydrothermal systems, felsic-hosted active systems, B1:1-71 dacite lava, B2:1-31

igneous petrology Site 1188, A3:19-33 Site 1189, A4:8-22 Site 1190, A5:3-5 Site 1191, A6:3-4 igneous phases, remnant, vs. depth, A3:137-138; A4:114-116; B11:7-9 igneous rocks petrography, A1:14, 18, 21-22 vs. depth, A1:49-50, 66-67 illite alteration phases, B5:1-10; B11:1-19 composition (position of AlOH absorption) vs. depth, B5:7-8 geochemistry, B1:26-27 hydrothermal alteration, B1:14-16 hydrothermal event frequency, B1:24-25 lithologic units, A3:30; A4:24-41 paragonitic to potassic composition, B5:3 photomicrograph, A1:53; A3:160-161, 163, 165; B1:56 silicification alteration, A3:41-47 vs. depth, B5:5-6 See also potassium feldspar-illite alteration illite-chlorite alteration, photograph, B1:57 ilmenite chemical composition, B3:28 hydrothermal alteration, B1:15–16 mineralization, B3:4 photomicrograph, A3:189-190, 193; B6:8-9 xenoliths, B6:2 inclusions alteration, A3:50 gold, B3:4 hematite, B9:4-7 magnetite, A4:36

VOLUME 193 SUBJECT INDEX inclusions (continued) • lithologic units

photomicrograph, A1:56; A3:179, 183-188, 193-198, 218; A4:152-153, 156; B9:12-23 pyrrhotite, B3:3 spinel, B3:4 See also melt inclusions inclusions, vermicular, photomicrograph, A3:177-178 index properties altered volcanic rocks, A3:76-77; A4:54-55, 256; A5:15 rhyodacite, A6:10-11, 42 rocks, A3:297-298 volcanic rocks, A5:6 indium, jasperoids, B9:6 Indo-Australian plate, subduction zones, A1:3-5 intergrowths, photomicrograph, A3:190 intrusions, synvolcanic, photograph, A4:91 iron alteration, A3:50, 69 altered rocks, B1:47 jasperoids, B9:5-7 massive sulfides, B10:3-7 pore water, B4:4 vs. manganese, B4:12 See also manganese/iron ratio; silicon/iron ratio iron-manganese-silica deposits, jasperoids, B1:6; B9:7, 27, 29 iron oxide alteration, A3:71; A4:40, 47-48 dacite lava, B2:8 massive sulfides, B10:3-7 photomicrograph, A4:108 silicification alteration, A3:43-47 vs. depth, A3:223; A4:191, 193 vs. silica, B2:21 iron oxyhydroxide altered rhyodacite, A3:37 hydrothermal fields, A1:5-7 iron spinel. See hercynite

J

jasperoids petrography and geochemistry, B9:1–30 photograph, B9:10–11, 17 photomicrograph, B9:12–16, 18–25 Jaulu volcanics, lithology, A1:4

K

kaolinite, hydrothermal alteration, B1:16 kernels geochemistry, B1:26–27, 47 photograph, B1:57

L

lamellae, photomicrograph, A3:180 lanthanum altered rocks, B1:48 pore water, B4:5 lanthanum/samarium ratio, vs. strontium isotopes, B7:15 lava photograph, A4:91 Tsukushi group, B1:12 lava, felsic, alteration, A1:26 lava, glassy, volcanism, B1:10-12 lava, unaltered felsic, volcanism, B1:11-12 lava flows, vesicular, lithology, A4:22 lava groups, distribution, B1:52 layers, orientation, A3:58-59 lead altered rocks, B1:19-20, 49 chimneys, B1:35 galena, B3:3 jasperoids, B9:6 massive sulfides, B10:3-7 pore water, B4:4 vs. depth in altered volcanics and in precursors, B1:69 lead isotopes, massive sulfides, B10:4, 12 Leg 193, coring summary, A1:84 Lelet limestone, lithology, A1:4 Liesegang zoning, xenoliths, B6:3 lineation photomicrograph, A4:85 primary layering, A6:7, 22 vs. foliation, A4:209; A6:31 lithium altered rocks, B1:19 jasperoids, B9:5 pore water, B4:4 lithofacies, volcanism, B1:9-11 lithologic units lithology and alteration, A3:265-268, 270-275 Site 1189, A4:9-11; A6:3-5 Unit 1, A3:21-33; A4:9, 15 Unit 2, A3:21-33; A4:9-10, 15 Unit 3, A3:21-33; A4:10, 15 Unit 4, A3:21-33; A4:10, 15 Unit 5, A3:21-33; A4:10, 15-16 Unit 6, A3:21-33; A4:10, 16 Unit 7, A3:21-33; A4:10, 16 Unit 8, A3:21-33; A4:10, 16 Unit 9, A3:21-33; A4:10, 16 Unit 10, A3:21-33; A4:10, 16 Unit 11, A3:21-33; A4:10, 16 Unit 12, A3:21-33; A4:10, 16 Unit 13, A3:22-33; A4:10, 16 Unit 14, A3:22-33; A4:10, 16 Unit 15, A4:10 Unit 16, A3:22-33; A4:10-11, 16 Unit 17, A3:22-33; A4:11, 16 Unit 18, A3:22-33; A4:16 Unit 19, A3:22-33; A4:11, 16 Unit 20, A3:22-33; A4:11, 16 Unit 21, A3:22-33; A4:11, 16 Unit 22, A3:22-33; A4:11, 16 Unit 23, A3:22-33; A4:11, 16-17 Unit 24, A3:22-33; A4:11, 17 Unit 25, A4:17 Unit 26, A4:17 Unit 27, A3:26-33; A4:17 Unit 28, A3:26-33; A4:17

VOLUME 193 SUBJECT INDEX lithologic units (continued) • magnetite

Unit 29, A3:26-33; A4:17 Unit 30, A3:27-33; A4:17 Unit 31, A3:27-33; A4:17 Unit 32, A3:27-33; A4:17 Unit 33, A3:27-33; A4:17 Unit 34, A3:27-33; A4:17 Unit 35, A3:27-33; A4:17 Unit 36, A3:27-33; A4:18 Unit 37, A3:27–33 Unit 38, A3:27–33 Unit 39, A3:27-33 Unit 40, A3:27-33 Unit 41, A3:27-33 Unit 42, A3:27-33 Unit 43, A3:27-33 Unit 44, A3:27-33 Unit 45, A3:27-33 Unit 46, A3:28–33 Unit 47, A3:28-33 Unit 48, A3:28-33 Unit 49, A3:28-33 Unit 50, A3:28-33 Unit 51, A3:28-33 Unit 52, A3:28-33 Unit 53. A3:28-33 Unit 54, A3:28-33 Unit 55, A3:28-33 Unit 56, A3:28-33 Unit 57, A3:28-33 Unit 58, A3:28-33 Unit 59, A3:28-33 Unit 60, A3:28-33 Unit 61, A3:28-33 Unit 62, A3:28-33 Unit 63, A3:28–33 Unit 64, A3:28-33 Unit 65, A3:28-33 Unit 66, A3:28-33 Unit 67, A3:28-33 Unit 68, A3:29-33 Unit 69, A3:29-33 Unit 70. A3:29-33 Unit 71, A3:29-33 Unit 72, A3:29–33 vs. depth, A1:49-50, 66-67; A3:137-138; A4:114 lithology dacite lava, B2:31 Site 1188, A1:40-42; A3:102, 120 Site 1189, A1:62-63; A4:68, 86 Site 1190, A5:11 summary, A4:233-234, 236-239; A6:35 lithophile elements, altered rocks, B1:47-48 lithophysae, lithologic units, A3:31 logging-while-drilling data borehole images, A3:90-91 formation evaluation, A3:89-90 temperature, A3:87 loss on ignition, jasperoids, B9:5

Μ

macrofauna, hydrothermal fields, A1:7 maghemite, photomicrograph, A3:180 magma lobes, xenoliths, B6:4-5 magnesium alteration, A3:50, 69 altered rocks, B1:19-20, 47 pore water, B4:4-7 vs. depth in altered volcanics and in precursors, B1:67 magnesium ion, geochemistry, B1:27 magnesium oxide alteration, A3:69, 71 dacite lava, B2:8 vs. depth, A3:223; A4:191, 193 vs. silica, B2:21 xenoliths, B6:3-4 magnetic fabric, magnetic susceptibility, A3:237 magnetic foliation, magnetic susceptibility, A3:237 magnetic inclination, vs. depth, A3:239 magnetic inclination, stable, vs. depth, A4:57, 211 magnetic intensity isothermal remanent magnetization, A3:81-83; A4:57–58, 213 natural remanent magnetization, A3:79; A4:56, 210; A6:11-12.32 vs. depth. A6:32 vs. temperature, A3:246 magnetic intensity, backfield isothermal remanent magnetization, vs. applied impulse field, A3:245; A4:214 magnetic intensity, isothermal remanent magnetization, vs. applied impluse field, A3:242-244, 247 magnetic intensity, natural remanent magnetization, vs. depth, A3:238 magnetic intensity, uncorrected remanent magnetization, vs. depth, A3:235; A4:207 magnetic lineation, magnetic susceptibility, A3:237 magnetic properties, minicores, A3:300, 302–304; A4:56-57, 258; A6:11-12, 44, 46 magnetic susceptibility altered volcanic rocks, A3:75; A4:53 anisotropy, A3:301; A4:209, 259; A6:11, 31, 45 archive-half core measurements, A3:78-79; A4:55-56 Flinn-type diagram of anisotropy, A3:237 rhvodacite, A6:10 vs. depth, A3:228, 236; A4:200, 208; A6:27 magnetic susceptibility, volume, vs. depth, A3:234; A4:206; A6:30 magnetite amygdules, A3:29-30 bacteria, A6:26 chemical composition, B3:24-26 hydrothermal alteration, B1:15-16 inclusions, A4:36 mineralization, B3:4 petrography, A3:55, 57 photograph, A3:128, 167; A4:94 photomicrograph, A1:73; A3:156, 166, 169-170, 177-179, 183-190, 193-198; A4:83, 148, 155, 158, 165-167, 184

VOLUME 193 SUBJECT INDEX magnetite (continued) • neutron porosity logs

silicification alteration, A3:41-47 veins, A3:59-65 vs. depth, A3:171; A4:117 magnetite, disseminated, photograph, A3:157 magnetite, lattice-textured, photomicrograph, A3:180 magnetite, microlitic, photomicrograph, A1:81 magnetite inclusions, lithologic units, B2:7 magnetite microphenocrysts lithologic units, B2:5 photomicrograph, B2:16 magnetite phenocrysts petrology, A5:4; A6:4 photograph, A1:77; A5:7 photomicrograph, A1:78; A5:8 major elements alteration, B1:63 altered/parent rocks, B6:16 bulk samples, A3:288-289; A5:14; A6:38 fresh and altered dacite, B12:3-4 mass transfer, B1:64 oxides, A3:284-285, 290-291; A4:243-244 manganese altered rocks, B1:19, 47 pore water, B4:4-5 vs. iron, B4:12 See also iron-manganese-silica deposits manganese/iron ratio, pore water, B4:7 Manus Basin, anhydrite geochemistry, B7:1-23 Manus Basin E, geology, A1:1-84; B1:3-7; B2:3-4 Manus Trench, subduction zones, A1:3-5 Manus volcanic zone E, lithology, A1:4 maps bathymetry, A1:34 tectonics, A1:32 marcasite lithologic units, A6:5 photomicrograph, A1:82; A4:150; A6:20 marcasite, euhedral, lithologic units, A6:6 Marker 14, hydrothermal fields, A1:6-7 mass transfer, alteration, B1:64 matrix, anhydrite, photograph, A4:180 matrix, clay-rich, photograph, A3:122 matrix, pyrite, photograph, A4:180 matrix, quartz, photograph, A4:180 matrix, quartz-breccia, photomicrograph, A4:140 matrix, quartz-pyrite, photomicrograph, A4:145 matrix, quartz-rich, photograph, A4:144 medium resistivity logs, vs. depth, A4:217, 226 melt inclusions chimneys, B1:34 lithologic units, B2:5, 7 photomicrograph, B2:16 metals altered/parent rocks, B6:17 chimneys, B1:33–35 metasomatism, silicification alteration, A3:42-47 methane, hydrothermal fields, A1:6-7 microbes hydrothermal fields, A1:7 mineralization, A1:27

microbiology Site 1188, A1:16; A3:71-74 Site 1189, A1:20; A4:49-52 Site 1191, A1:23; A6:8-9 microcrysts, groundmass, A5:5 microfabric, photomicrograph, B6:15 microfractures fluid flow, B1:30 quartz, B9:4 microlites bacterial habitation, A3:225 hydrothermal alteration, B1:15 lithologic units, A4:15-23 petrology, A5:5 photograph, A3:112 photomicrograph, A3:105, 130, 134, 141, 155, 160; A4:146-147 micromorphology, microorganisms, A3:73-74; A4:52; A6:9 microorganisms enrichment cultures, A3:72-73 micromorphology, A3:73-74 microphenocrysts petrology, A6:4; B2:6 photomicrograph, A3:156 microspherulites lithologic units, A3:24 photograph, A4:89 photomicrograph, A3:114-115 microvesicles groundmass, B2:7 photomicrograph, A1:78; A4:108; A5:8-9 mineral chemistry, dacite lava, B2:8-9, 30-31 mineralization alteration, A1:27; B1:27-28 distribution map, B1:53 gold, B3:4 hydrothermal alteration, B1:12-29 semimassive sulfides, B1:22-23 sulfides, B3:3-4 sulfides and oxides, A3:52-58 minerals hydrothermal alteration, B1:13-16 X-ray diffraction data, A3:279-283; A4:240-242; A5:13; A6:37; B8:18 minor elements, mass transfer, B1:64 models, tectonics, A1:33 Miocene, lithology, A1:4 molvbdenum jasperoids, B9:6 massive sulfides, B10:4 pore water, B4:4-5 mottling, hydrothermal alteration, B1:17

Ν

native gold, massive sulfides, B10:6 neovolcanics, lithology, A1:4 neutron porosity logs measurements, A3:93–94; A4:61 vs. depth, A3:256; A4:217

VOLUME 193 SUBJECT INDEX New Britain, volcanism • plagioclase microlites

New Britain, volcanism, A1:3–5 New Britain Trench, volcanism, A1:3–5 New Hanover, volcanism, A1:3–5 New Ireland, volcanism, A1:3–5 nickel jasperoids, B9:6 pore water, B4:4–5 xenoliths, B6:3 nodules, semimassive sulfides, B1:22–23 nodules, spheroidal, lithologic units, A3:30–31 nonmetals, altered/parent rocks, B6:17

0

olivine, xenoliths, B6:2-3 olivine blades, photomicrograph, B6:7-9, 14 Ontong Java Plateau, volcanism, A1:3-5 opal, hydrothermal event frequency, B1:25 orthopyroxene, mineral chemistry, B2:8-9 orthopyroxene phenocrysts, lithologic units, B2:5 outflow zones, chimneys, A1:23-28 outgrowths, epitaxial, dacite, B6:12 outgrowths, photomicrograph, B9:19 oxides bulk samples, A3:288-289 electron probe data, B3:7-8 major elements, A3:284-285, 290-291; A4:243-244 mineral chemistry, B3:1-31 parageneses, A4:159, 168 petrography, A1:14-15, 19; A3:51-58; A4:33-41; A6:6 oxygen isotopes, temperature, B1:23

Ρ

Pacific Ocean, geology, A1:1-84 Pacific plate, subduction zones, A1:3-5 PACMANUS hydrothermal field alteration phases, B5:1-10; B11:1-19 altered dacitic rock geochemistry, B8:1-18 anhydrite geochemistry, B7:1–23 basalt xenoliths, B6:1-19 core-scale permeability, B13:1-19 fresh and altered dacites, B12:1-9 geologic map, B2:13-14 geology, A1:5-7; B1:3-7; B2:3-4 permeability, resistivity, and X-ray computed tomography, B14:1-14 pore water geochemistry, B4:1-15 sulfide and oxide mineral chemistry, B3:1-31 paleoseafloors, volcanism, B1:9-11 Papua New Guinea active felsic-hosted hydrothermal system, B1:1-71 geology, A1:1-84 parageneses secondary minerals, A3:199; A4:36-37, 40, 159, 168 sulfides and oxides, A3:52-58; A4:159, 168 veins, A3:53-58, 61-65 paragonite geochemistry, B8:5 hydrothermal event frequency, B1:25 See also pyrophyllite + paragonite

pebble breccia lithologic units, A3:21-33 photograph, A3:111 perflurocarbon tracers, contamination, A3:74 perlite lithologic units, A3:23; A4:18-19 photomicrograph, B8:7; B9:20 volcanism, B1:9-11 permeability fluid flow, B1:29-30, 37 resistivity and X-ray computed tomography, B14:1-14 vs. confining pressure, B13:12-13 vs. depth, B13:14, 16 vs. porosity, B13:15, 17; B14:12 vs. pressure, B14:12 permeability, core-scale, hydrothermal systems, B13:1-19 petrography igneous rocks, A1:14, 18, 21-22 jasperoids, B9:1-30 sulfides and oxides, A1:14-15, 19 xenoliths, B6:2-3 petrology dacite lava, B2:1–31 hydrothermal alteration, B1:16-18 pН geochemistry, B1:27 pore water, A4:48 phenocrysts lithologic units, A3:23, 30; A4:12, 18; B2:5-6 petrology, A5:4; A6:4; B2:7-8 photomicrograph, A1:78; A5:8 See also microphenocrysts phosphorus, jasperoids, B9:5 photoelectric factor logs, vs. depth, A3:256; A4:217, 226 physical properties Site 1188, A1:16; A3:74-77; B13:19 Site 1189, A1:20; A4:52-55; B13:19 Site 1190, A5:6 Site 1191, A1:23; A6:10-11 plagioclase alteration phases, B11:1-19 geochemistry, B1:47; B8:4-5 mineral chemistry, B2:8-9 no bacterial habitation, A3:227 photograph, A1:77 silicification alteration, A3:46-47 vs. depth, A3:171; A4:117 See also anorthite plagioclase, calcic, hydrothermal alteration, B1:15 plagioclase, microlitic bacterial habitation, A3:225 photomicrograph, A1:81; A3:160; A4:121; A6:19 plagioclase, skeletal, photomicrograph, A4:110 plagioclase, variolitic, photomicrograph, A4:85, 111 plagioclase laths photomicrograph, B6:8-12, 15 xenoliths, B6:2–3 plagioclase microcrysts, photomicrograph, A3:165; A5:9 plagioclase microlites groundmass, B2:5-8 lithologic units, A3:30-31

VOLUME 193 SUBJECT INDEX plagioclase microlites (continued) • pyrophyllite

photograph, A4:71 photomicrograph, A4:97, 123; B2:16-17; B9:15 plagioclase needles, photomicrograph, A3:131-132; A6:16 plagioclase phenocrysts distribution and types, A3:277 lithologic units, A3:23-33; A4:12, 18; B2:5 petrology, A5:4; A6:4; B2:7-8 photograph, A3:112, 124; A5:7 photomicrograph, A1:44, 53, 64, 78; A3:130, 135-136, 155, 161; A4:84, 97–98; A5:8; B2:18; B9:20 plagioclase phenocrysts, euhedral, photomicrograph, B2:16, 19 plagioclase phenocrysts, resorbed, photomicrograph, B2:17 Pleistocene. See Pliocene/Pleistocene boundary Pliocene, lithology, A1:4 Pliocene/Pleistocene boundary, lithology, A1:4 plunge, vs. depth of vesicles, A4:179 pore water, geochemistry, A3:70-71, 293; A4:48, 249; B4:1-15 porosity alteration, A1:25; B1:37 altered volcanic rocks, A3:76-77; B1:20 dacite, B1:11-12 fluid flow, B1:29-30 hydrothermal systems, B13:5-9 resistivity, B14:5–6 vs. depth, A3:233; A4:205; B13:16 vs. permeability, B13:15, 17; B14:12 potassium alteration, A3:69; B1:36-37, 47 altered rocks, B1:19-20 pore water, B4:4 vs. depth in altered volcanics and in precursors, B1:68 potassium/calcium ratio, altered rocks, B1:19, 28 potassium/sodium ratio, hydrothermal alteration, B1:13 potassium feldspar hydrothermal alteration, B1:15 vs. pyrophyllite + paragonite, B6:3 potassium feldspar-illite alteration, geochemistry, B8:1-18; B11:3 potassium ions, geochemistry, B1:27 potassium logs formation evaluation, A3:95-96 vs. depth, A3:256, 193; A4:217, 226 potassium oxide alteration, A3:69, 71 dacite lava, B2:8 vs. depth, A3:223; A4:191 See also sodium oxide + potassium oxide pressure vs. permeability, B14:12 vs. resistivity, B14:12 vs. time, A4:227 pressure, confining tomography, B14:9–12 vs. permeability, B13:12–13 pressure, effective, permeability, B13:5-9 pressure cooker model, conceptual cross section, B1:61 pseudobreccia, photograph, A4:93, 137, 185

pseudomorphism photomicrograph, A4:158 silicification alteration, A3:44-47 pseudomorphs lithologic units, A3:30; A4:14 photomicrograph, B6:14 Pual Ridge dacite lava petrology and geochemistry, B2:1-31 geology, A1:1-84; B1:4-7 longitudinal section, B1:55 sulfide and oxide mineral chemistry, B3:1-31 three-dimensional shaded-relief image, B2:15 volcanic architecture, B1:9-12 pumice, photomicrograph, B8:11 pyrite alteration, A1:26; A3:51 amygdules, A3:29-30 chemical composition, B3:9-14 fresh and altered dacite, B12:3-4 hydrothermal alteration, B1:15 lithologic units, A3:28-33; A4:15-41; A6:5 massive sulfides, B10:5-7 mineralization, B3:3 no bacterial habitation, A3:227 petrography, A3:56-57 photograph, A1:58-60, 71; A3:172; A4:69, 88, 144 photomicrograph, A1:45, 55, 57, 68, 73; A3:166, 170, 179, 183, 185-188, 195-196, 198; A4:83, 128-129, 142, 145, 148–156, 158, 165–167, 175–176, 182-184; B1:56; B6:8; B9:24-25 semimassive sulfides, B1:22-23 sulfur isotopes, B1:32 veins, A3:54, 59-65 vs. depth, A3:171; A4:117 See also anhydrite-pyrite-pyrophyllite alteration; chlorite-pyrite alteration pyrite, anhedral, semimassive sulfides, A4:38-39 pyrite, disseminated parageneses, A3:52; A4:35-36 photograph, A4:131 photomicrograph, A4:127, 146 pyrite, disseminated euhedral, photomicrograph, A4:147 pyrite, disseminated Type 1, photomicrograph, A4:146 pyrite, euhedral lithologic units, A6:6 photomicrograph, A3:18; B6:14 pyrite, framboidal parageneses, A4:159 photomicrograph, A1:82; A4:162; A6:20 pyrite, subhedral, photomicrograph, A3:177 pyrite cubes, photomicrograph, A3:156 pyrite intergrowths, photomicrograph, B6:14 pyrite rims, photomicrograph, A4:160-161 pyrophanite chemical composition, B3:31 spinel, B3:5 pyrophyllite alteration phases, B1:37; B5:1-10; B11:1-19 geochemistry, B8:5 hydrothermal alteration, B1:13-16 photomicrograph, A3:160

VOLUME 193 SUBJECT INDEX pyrophyllite (continued) • rubidium

selvage, B1:17 temperature, B1:23–24 vs. depth, B5:5 *See also* anhydrite-pyrite-pyrophyllite alteration pyrophyllite + paragonite, vs. potassium feldspar, B6:3 pyroxene composition, B2:25 xenoliths, B6:2–3 *See also* clinopyroxene; orthopyroxene pyroxene plates, photomicrograph, B6:8–11, 14 pyrrhotite petrography, A3:55, 57 photomicrograph, A1:56; A3:184–185 pyrite inclusions, B3:3

Q

quartz alteration, B11:1–19 amygdules, A3:29-30 domain significance, B1:25-26 fluid inclusions, B1:24 hydrothermal alteration, B1:14-15 hydrothermal event frequency, B1:24-25 inclusions, B9:4-7 lithologic units, A3:26-33; A4:15-41 photograph, A1:74-75; A3:211; A4:88, 90, 96, 138 photomicrograph, A1:45; A3:152, 155, 158, 163, 165-166, 168-169, 177-178, 182-183, 190-192, 212; A4:101-102, 106, 128, 130, 150-151, 156, 162-163, 166, 182-184; B1:56 silicification alteration, A3:41-47 veins, A3:59-65 vs. depth, A3:171; A4:117 See also cristobalite-quartz transition quartz, euhedral, photomicrograph, A3:197-198; B9:24 quartz, jasperoidal, photomicrograph, A1:69, 104, 130 quartz, micropoikilitic, photomicrograph, A4:109 quartz, poikiloblastic, photomicrograph, A4:125-126, 175-176 quartz, polycrystalline, photomicrograph, B9:23 quartz, secondary, photomicrograph, A3:197–198 quartz, Type 2a, photomicrograph, A4:149 quartz aggregates, photomicrograph, A3:133 quartz crystals, photograph, B9:11 quartz needles, photomicrograph, A3:113 quartz overgrowths, photomicrograph, A4:125-126 quartz phenocrysts, photomicrograph, A4:125-126 quartz-rich patches, lithologic units, A3:31

R

rare earths altered rocks, B1:48 anhydrite, B7:7, 13–14 dacite lava, B2:8, 23; B9:26 fresh and altered dacite, B12:4 iron-manganese-silica deposits, B9:26 jasperoids, B9:5–7, 26 pore water, B4:4–7, 11 profiles, B6:18

semimassive sulfides, B10:11 xenoliths, B6:4 Rataman Formation, lithology, A1:4 rate of penetration logs, vs. depth, A3:250 reaction zones, chimneys, B1:35 remanent magnetization, isothermal intensity vs. applied impulse field, A3:247 magnetic intensity, A3:81-83 remanent magnetization, natural discrete measurements, A3:80-81 rhyodacite, A6:11-12 resistive units Formation MicroScanner imagery vs. depth, A4:221, 223resistivity-at-the-bit, A4:228 resistivity dacite, B1:11-12 vs. pressure, B14:12 X-ray computed tomography and permeability, B14:1-14 resistivity-at-the-bit conductive minerals, A4:229 resistive units, A4:228 vs. Formation MicroScanner imagery, A1:76; A4:65, 230 resistivity-at-the-bit logs vs. depth, A3:250-251 vs. gamma ray logs, A3:252 resistivity logs measurements, A3:93; A4:60, 63 vs. depth, A3:250 See also deep resistivity logs; medium resistivity logs; shallow resistivity logs rhyodacite alteration, A3:36-51 geochemistry, A3:69, 71 lithology, A1:4 photomicrograph, A6:16 See also dacite rhyodacite, altered photograph, A1:80; A6:15 photomicrograph, A4:146; A6:17-18 rhyodacite, altered vesicular aphyric, petrology, A6:3-4 rhyodacite, aphyric, photograph, A1:79; A6:14 rhyodacite, porphyritic, alteration films, A3:37 rhyodacite, unaltered, volcanism, B1:11-12 rhyodacite, vesicular, photograph, A1:43; A3:103 rhyodacite, vesicular microlite-bearing glassy, lithologic units, A3:21-33 rhyolite. See dacite/rhyolite boundary rift zones, lithology, B1:5 rock magnetism Site 1188, A1:16-17; A3:77-86 Site 1189, A1:20-21; A4:55-59 Site 1191, A1:23; A6:11-12 **Roman Ruins** hydrothermal fields, A1:5-7; B1:7; B2:3-4, 6 iron-manganese-silica deposits, B9:7 location, A1:61 rubidium altered rocks, B1:19

VOLUME 193 SUBJECT INDEX rubidium (continued) • Site 1189

pore water, B4:4 rutile hydrothermal alteration, B1:16 photomicrograph, A3:205–206

S

salinity alteration, A3:71 pore water, A4:48 samarium. See lanthanum/samarium ratio sandstone, alteration, A1:27 sandstone, graded volcaniclastic lithologic units, A4:17-23, 32 photomicrograph, A4:112 Satanic Mills, hydrothermal fields, A1:5-7; B1:6; B2:3-4, 7 - 8scandium, altered rocks, B1:48 seafloor spreading, volcanism, A1:3-5 secondary minerals parageneses, A3:199 vs. depth, A1:49-50, 66-67; A3:35, 137-138; A4:114-116: B11:7-9 seismic profiles, Manus Basin, A1:35-36 seismicity, volcanism, A1:5 selenium galena, B3:3 massive sulfides, B10:4 selvage hydrothermal event frequency, B1:25 photograph, B1:57; B9:11 photomicrograph, B1:56; B9:15-16 pyrophyllite, B1:17, 47 quartz, B9:4–7 selvage, illitic, geochemistry, B1:26-27 shallow resistivity logs, vs. depth, A3:256 shear wave velocity logs, vs. depth, A3:256; A4:217 silica alteration, A3:69; A4:47-48 altered rocks, B1:19 dacite lava, B2:8 hydrothermal alteration, B1:14-15 photograph, A4:69 photomicrograph, A6:17 rhyodacite, A6:8 veins, A3:59-65 vs. aluminum oxide, B2:21 vs. calcium oxide, B2:21 vs. depth, A3:223; A4:191, 193 vs. europium/europium ratio, B2:24 vs. iron oxide, B2:21 vs. magnesium oxide, B2:21 vs. sodium oxide + potassium oxide, A6:24; B2:20 vs. titanium/zirconium ratio, B2:22 vs. zirconium/titanium oxide ratio, B1:65 See also green silica-clay alteration; iron-manganesesilica deposits; silica-chlorite alteration; silicaclay alteration silica, green, alteration, A3:38-39 silica, microcrystalline, lithologic units, A6:5 silica, opaline, alteration, A3:38

silica-chlorite alteration, lithologic units, A4:10-23 silica-clay alteration photograph, A4:137, 185 photomicrograph, A4:123 silicification alteration, A3:41-51; A4:28-41 hydrothermal alteration, B1:16-18 lithologic units, A4:11-23 photograph, A3:110, 151, 157, 208; A4:76-77 photomicrograph, A3:129, 147-148, 158, 165, 196, 205-206 silicification, poikiloblastic lithologic units, A4:24-25, 28-29 photomicrograph, A4:125-126 silicon altered rocks. B1:47 jasperoids, B9:5–7 vs. depth in altered volcanics and in precursors, B1:66 silicon/iron ratio, jasperoids, B9:7 silver, galena, B3:3 Site 1188, A3:1-305 alteration phases, B5:1-10; B11:1-19 anhydrite geochemistry, B7:1-23 basalt xenoliths, B6:1-19 core-scale permeability, B13:1-19 coring summary, A3:262–264 downhole measurements, A1:17; A3:86-96 fresh and altered dacites, B12:1-9 geochemistry, A1:16; A3:65-71 hydrothermal alteration, A1:14; A3:33–51 igneous petrology, A1:14; A3:19-33; B2:5-6 lithology, A1:40-42 location, A1:61 microbiology, A1:16; A3:71-74 operations summary, A3:6–18 physical properties, A1:16; A3:74-77 pore water geochemistry, B4:1-15 principal results, A3:1-6 rock magnetism, A1:16-17; A3:77-86 site description, A3:1-305 site objectives, A1:13; A3:6 site survey, A3:18-19 structural geology, A1:15; A3:58-65 sulfide and oxide mineral chemistry, B3:1-31 sulfide and oxide petrography, A1:14-15; A3:51-58 summary, A1:13-17 television surveys, A1:39 Site 1189, A4:1-259 alteration phases, B5:1-10; B11:1-19 alteration summary, A4:233-234, 236-239 anhydrite geochemistry, B7:1-23 basalt xenoliths, B6:1-19 core-scale permeability, B13:1-19 coring summary, A4:231–232 downhole measurements, A1:21; A4:59-65 geochemistry, A1:20; A4:46-48 hydrothermal alteration, A1:18-19; A4:23-34 igneous petrology, A1:18; A4:8-23; B2:6 jasperoids, B9:1-30 lithology, A1:62-63; A4:233-234, 236-239 location, A1:61; A4:67

VOLUME 193 SUBJECT INDEX Site 1189 (continued) • structure, cockade, photomicrograph

massive sulfide geochemistry, B10:1-22 microbiology, A1:20; A4:49-52 operations summary, A4:5-7 physical properties, A1:20; A4:52-55 pore water geochemistry, B4:1-15 principal results, A4:1-5 rock magnetism, A1:20-21; A4:55-59 site description, A4:1-259 site objectives, A1:17; A4:5 site survey, A4:7-8 structural geology, A1:19-20; A4:41-46 sulfide and oxide mineral chemistry, B3:1-31 sulfide and oxide petrography, A1:19; A4:33-41 summary, A1:17–21 Site 1190, A5:1-15 coring summary, A5:10 geochemistry, A5:6 hydrothermal alteration, A1:22; A5:5-6 igneous petrology, A1:21; A5:3-5; B2:6-7 location, A4:67 operations summary, A5:2-3 physical properties, A5:6 principal results, A5:1 site description, A5:1-15 site objectives, A1:21; A5:1-2 site survey, A5:3 summary, A1:21-22 Site 1191, A6:1-46 coring summary, A6:34 fresh and altered dacites, B12:1-9 geochemistry, A1:23; A6:8 hydrothermal alteration, A1:22; A6:4-6 igneous petrology, A1:22; A6:3-4; B2:7-8 lithology and alteration, A6:35 microbiology, A1:23; A6:8-9 operations summary, A6:2-3 physical properties, A1:23; A6:10-11 principal results, A6:1-2 rock magnetism, A1:23; A6:11-12 site description, A6:1–46 site objectives, A1:22; A6:2 site survey, A6:3 structural geology, A1:22-23; A6:7-8 sulfide and oxide petrology, A6:6 summary, A1:22-23 smectite breccia, A4:41-44 geochemistry, B8:5 Snowcap conceptual cross section, B1:61 hydrothermal fields, A1:6-7; B1:6; B2:3-6 sodium alteration, A3:69 altered rocks, B1:19 pore water, B4:4 See also potassium/sodium ratio sodium oxide alteration, A3:69, 71; A4:47-48 dacite lava, B2:8 vs. depth, A3:223; A4:191, 193 sodium oxide + potassium oxide, vs. silica, A6:24; B2:20

Solomon microplate, volcanism, A1:3-5 sonic velocity logs, measurements, A3:94; A4:61 South Bismarck microplate, volcanism, A1:3-5 sphalerite chemical composition, B1:6; B3:18 lithologic units, A4:15-41 massive sulfides, A4:36, 39-40; B10:5-7 petrography, A3:57 photomicrograph, A1:73; A4:152-153, 155-157, 163 semimassive sulfides, B1:22-23 veins and vesicle linings, B3:3 vs. depth, A4:117 sphalerite, subhedral iron-rich, photomicrograph, A3:181 sphalerite, zoned, photomicrograph, A4:164 sphalerite disease, photomicrograph, A4:157 spheroids bacterial habitation, A3:225 photomicrograph, A3:131-132 spherulites lithologic units, A3:23-24; A4:20 photograph, A4:136 photomicrograph, A3:113, 147, 164; A4:106-107, 109; B8:13 See also microspherulites spinel alteration, A3:50; A6:6 mineralization, B3:4 petrography, A3:55 photomicrograph, A3:168, 190, 192-193 spreading centers, volcanism, A1:4-5 stockwork zone alteration, B1:21 chimneys, A1:25; B1:7 massive sulfides, B1:28; B10:5-7 photograph, A1:52; A3:106; A4:69 photomicrograph, A4:104-105; B8:10 Stoneley wave velocity logs, vs. depth, A3:256 strontium anhydrite, B7:7 jasperoids, B1:48; B9:5 massive sulfides, B10:4 pore water, B4:4-5 vs. depth, A3:224; A4:192, 194; B7:12 vs. europium/europium ratio, B2:24 strontium isotopes anhydrite, B1:30-32; B7:1-23 chimneys, B1:34, 37 pore water, B4:4-6 vs. 1/strontium ratio, B7:15 vs. depth, B1:60; B7:11 vs. europium/europium ratio, B7:15 vs. lanthanum/samarium ratio, B7:15 structural geology Site 1188, A3:58-65 Site 1189, A1:19-20; A4:41-46 Site 1191, A1:22-23; A6:7-8 structure anhydrite veins, A3:215 veins, A1:15 structure, cockade, photomicrograph, A4:143

VOLUME 193 SUBJECT INDEX structure, frond-like, photomicrograph • textures, volcaniclastic, lithologic units

structure, frond-like, photomicrograph, B9:21 structure, ovoid, photomicrograph, A4:160-161 structure, plumose, photomicrograph, B6:13 subduction zones, geology, A1:3-5 subduction zones, intraoceanic, backarc basins, A1:3-5 sulfate cations, A3:287 lithologic units, A4:14 sulfides chimneys, A1:23-28 electron probe data, B3:7-8 mineral chemistry, B3:1-31 mineralization, B3:3-4 parageneses, A4:159, 168 petrography, A1:14-15, 19; A3:51-58; A4:34-41; A6:6 photograph, A4:96, 138, 182-183 sulfides, massive bulk composition, B10:22 geochemistry, B10:1-22 photograph, A1:71; A4:78-79 sulfides, semimassive bulk composition, B10:22 geochemistry, B10:1–22 lithologic units, A4:11-23, 29-30; B1:7 mineralization, B1:22-23, 37 photograph, A4:144 ternary diagram, B10:10 sulfur galena, B3:3 geochemistry, A3:69-70 jasperoids, B9:5-7 pore water, B4:4 xenoliths, B6:3 sulfur, total altered rocks, B1:48 volcanic rocks, A3:286, 292 vs. depth, A3:224; A4:192, 194, 245-246 sulfur isotopes anhydrite, B1:30-32; B7:1-23

hydrothermal fields, A1:7 massive sulfides, B10:5, 13 pyrite, B1:32 vs. depth, B7:11

Т

talc, hydrothermal alteration, B1:16 tectonics maps, A1:32; B1:50 models, A1:33 television surveys, vibration-isolated, bathymetric contours, A1:39; A3:101 tellurium altered rocks, B1:48 jasperoids, B9:6 massive sulfides, B10:4 semimassive sulfides, B1:23 xenoliths, B6:4 temperature fluid flow, B1:33 hydrothermal alteration, B1:23–24

logging-while-drilling data, A3:87 measurements, A4:61-62, 64 vs. depth, A3:86-87, 257; A4:218 vs. magnetic intensity, A3:246 vs. time, A3:248-249, 258; A4:219, 227 temperature logs, measurements, A3:94–95 tennantite massive sulfides, B10:4-7 semimassive sulfides, A4:39 textures lithologic units, A3:22-26, 29-32 photomicrograph, A3:205-206 textures, breccia alteration, A1:25 photomicrograph, A3:119 textures, clastic lithologic units, A3:25; A4:20-21 photograph, A3:122, 125 photomicrograph, A3:135-136, 163 textures, clastic/mottled, lithologic units, A3:32 textures, fibrous laminar, photomicrograph, A1:72; A4:80 textures, fragmental, photograph, A3:127 textures, glomerophyric, photomicrograph, A1:78; A5:8 textures, granular, photomicrograph, A4:97 textures, hieroglyphic, photograph, A4:95, 132 textures, intergranular, photomicrograph, A4:110 textures, jackstraw, photomicrograph, B2:17 textures, jigsaw-fit photograph, A4:76-77 photomicrograph, A3:117-119 textures, laminar, photograph, A4:74-75, 92 textures, palimpsest quench, dacite, B6:1-19 textures, perlitic lithologic units, A3:23; A4:12, 18-19 photograph, A1:46, 52; A3:104, 106, 140, 142, 144; A4:70 photomicrograph, A1:47; A3:105; A4:101, 104-105 textures, pilotaxitic, photograph, A4:71 textures, poikiloblastic, photomicrograph, B9:19 textures, primary, silicification alteration, A3:41-47 textures, pseudoclastic lithologic units, A3:25-26, 32; A4:13, 21-22 photograph, A1:46; A3:140, 142 textures, spheroidal photograph, A3:123 photomicrograph, A3:131-132 textures, spherulitic lithologic units, A3:23-24 photomicrograph, A3:113 textures, spinifex basalt, B6:1-19 photomicrograph, B6:7-15 textures, vesicular alteration, A1:25 lithologic units, A3:30–33 textures, vitriclastic, photomicrograph, A3:117-118 textures, volcanic, lithologic units, A3:22-24, 29-32; A4:11-15, 18-23 textures, volcaniclastic, lithologic units, A3:24-26; A4:12-13, 21

VOLUME 193 SUBJECT INDEX thermal conductivity • veins, quartz-anhydrite

thermal conductivity altered volcanic rocks, A3:76; A4:54 rhyodacite, A6:10 volcanic rocks, A5:6 vs. depth, A3:231; A4:203; A6:29 thorium altered rocks, B1:48 pore water, B4:5 thorium logs formation evaluation, A3:95-96 vs. depth, A3:256; A4:217, 226 titanium oxide alteration, A4:48 dacite lava, B2:8 rhyodacite, A3:71 vs. depth, A3:223; A4:191, 193 vs. zirconium. B2:22 xenoliths. B6:2 See also zirconium/titanium oxide ratio titanomagnetite chemical composition, B3:30 mineralization, B3:4 photomicrograph, A3:189 tomography, X-ray computed, permeability, B14:1-14 trace elements bulk samples, A3:288-289; A4:243-244; A5:14; A6:38 fresh and altered dacite, B12:3-4 jasperoids, B9:5-7 mass transfer, B1:64 volcanic rocks, A3:284-285, 290-291; A4:247-248 trace elements, magmatophile, hydrothermal fields, A1:7 trachytic alignment, photomicrograph, A3:165 translucent clusters, photomicrograph, A4:198–199 Tsukushi, hydrothermal fields, A1:6-7 Tsukushi group, lava, B1:12 tube pumice, lithologic units, A4:13 tube worms, hydrothermal fields, A1:7

U

uranium altered rocks, B1:19–20, 36–37, 48 jasperoids, B9:5 massive sulfides, B10:4 uranium logs formation evaluation, A3:95–96 vs. depth, A3:256; A4:217, 226

V

vanadium, xenoliths, B6:3 vein linings, sphalerite, B3:3 vein systems, multiple opening photograph and sketch, A3:216–217 veinlets petrology, A5:5–6 photomicrograph, B9:16 quartz, B9:4–7 silicification alteration, A3:42–47 veinlets, anhydrite-pyrite photograph, A3:124, 145, 159 photomicrograph, A3:205-206 veinlets, cristobalite-pyrite, photomicrograph, A3:205-206 veinlets, opaline silica, photograph, A3:140 veinlets, quartz-pyrite-magnetite, photomicrograph, A3:149 veins alteration, A4:10-41; A6:6; B1:21 anhvdrite, A1:26 bleaching alteration, A3:39-41 dilation, B1:28-29 dip vs. depth, A3:204; A4:178, 190 dip vs. overall dip, A3:222 distribution in different intervals of dip, A4:177, 189 geometry, A3:61, 64; A4:43, 45; A6:7-8 green silica-clay alteration, A3:38-39 jasperoids, B9:6-7 lithologic units, A3:30-33 mineralogy, A3:62; A4:42-45, 186; A6:7-8 mineralogy vs. lithologic units, A3:203, 209-210; A4:173, 187 parageneses, A3:61-65; A4:42-45 photograph and sketch, A3:213-214; A4:182-183 photomicrograph, A1:82; A3:205-206; A6:20; B9:20 structure, A1:15, 59-65 thickness, A3:203, 221; A4:177, 189 veins, anastomosing quartz, photomicrograph, A4:142 veins, anhydrite alteration schematic diagram, photograph, B1:58 bleaching alteration, A3:41; B1:58 petrology, B1:17 photograph, A3:215; A4:92, 133, 181, 184 photomicrograph, A3:174 separates from hydrothermal veins and vug fills, B7:16-23 strontium and sulfur isotopes, B1:30-32 veins, anhydrite-pyrite lithologic units, A4:15-23 photograph, A1:58-60; A3:121, 207 photomicrograph, A1:54, 57; A3:175-176, 205-206, 212 structure, A3:60 veins, anhydrite-pyrite-silica-magnetite, structure, A3:59-60 veins, anhydrite-quartz-cristobalite, photomicrograph, A3:174 veins, anhydrite-quartz-pyrite lithologic units, A4:10-23 photograph, A3:173; A4:76-77, 88 photomicrograph, A4:120, 128, 141, 143 veins, anhydrite-silica-clay, photograph, A3:207–208 veins, anhydrite-silica-clay-pyrite, structure, A3:61 veins, cristobalite-anhydrite-pyrite, photomicrograph, B6:13 veins, quartz hydrothermal fields, B1:28 photomicrograph, A3:119, 205-206; A4:119, 157 veins, quartz-anhydrite photograph, A4:188

VOLUME 193 SUBJECT INDEX

veins, quartz-anhydrite (continued) • volcanic rocks, silicified flow-banded, lithologic units 18

photomicrograph, A4:82, 175-176 veins, quartz-clay, photograph, A3:219-220 veins, quartz-pyrite lithologic units, A4:15–23 photograph, A1:74; A3:211; A4:73, 172, 174 photomicrograph, A3:146, 148, 218; A4:122, 124, 171, 175–176 veins, quartz-pyrite-magnetite, photograph, A4:94, 133 veins, quartz-sphalerite-pyrite, photograph, A4:135 veins, quartz-sulfate, lithologic units, A4:10-23 veins, silica, photograph, A4:92-93, 137, 181, 185 veins, silica-anhydrite-magnetite-pyrite, parageneses, A3:53 veins, silica-pyrite dip vs. depth, A6:23 lithologic units, A4:10-23 photograph, A3:201 photomicrograph, A3:205-206 veins, silica-pyrite-anhydrite parageneses, A3:52-53 photograph, A1:48; A3:142-144, 153, 167, 200 photomicrograph, A3:205-206 veins, stockwork photograph, A1:52; A3:106, 144, 153 photomicrograph, A4:105 veins, stockwork ladder, photomicrograph, A3:148 veins, sulfide, lithologic units, A6:5 velocity logs measurements, A4:61 See also compressional wave velocity logs; shear wave velocity logs; sonic velocity logs; Stoneley wave velocity logs vents, hydrothermal fields, A1:5-7 vesicle linings, sphalerite, B3:3 vesicles groundmass, B2:7-8 lithologic units, A3:22-23; A4:11-12, 18; B2:6 petrology, A5:4 photograph, A1:80; A4:71, 88; A6:4, 15 photomicrograph, A1:54; A3:145, 166, 182; A4:145, 149; B6:11 plunge vs. depth, A4:179 silicification alteration, A3:41-47 See also microvesicles vesicles, tube, photomicrograph, A3:117-118 VIT. See television surveys void ratio, altered volcanic rocks, A3:76-77 volatiles, chimneys, B1:33-35 volcanic edifices, lithology, A1:4 volcanic facies fluid flow, B1:32-33 volcanism, B1:9-12 volcanic fragments photograph, A1:75; A4:69-70, 75, 180 photomicrograph, A4:82, 129 volcanic glass bacteria, A6:26 bacterial habitation, A3:225-226 composition, B2:30 groundmass, B2:5-8 lithologic units, A3:23

no bacterial habitation, A3:227 petrology, A5:5; A6:4 photomicrograph, A1:78, 81; A5:8; A6:16; B2:17 silicification alteration, A3:44-47 xenoliths, B6:3 volcanic glass, perlitic hydrothermal alteration, B1:16-18 photomicrograph, B6:13 volcanic glass, vesicular dacite, photomicrograph, B6:7-15 volcanic rocks chemical classification, A6:24 point counts on thin sections, A3:269; A4:235; A5:12; A6:36 quartz-potassium-feldspar-plagioclase phases, A6:25 trace elements, A3:284-285, 290-291 volcanic rocks, altered photograph, A4:170, 181-182, 188 photomicrograph, A4:99-100, 171 volcanic rocks, altered aphyric lithologic units, A3:21-33; A4:15-23 photomicrograph, A4:101 volcanic rocks, altered felsic, X-ray diffraction data, B11:1-19 volcanic rocks, altered fractured, lithologic units, A3:21-33 volcanic rocks, altered vesicular, lithologic units, A3:21-33 volcanic rocks, aphyric, lithologic units, A4:16-23 volcanic rocks, aphyric silicified, lithologic units, A3:27-33 volcanic rocks, bleached lithologic units, A3:21-33; A4:10-23 photomicrograph, A4:122 volcanic rocks, bleached fractured, photograph, A3:153 volcanic rocks, bleached silicified, lithologic units, A3:22-33 volcanic rocks, bleached vesicular, photomicrograph, A4:121 volcanic rocks, brecciated, lithologic units, A3:27-33 volcanic rocks, flow-laminated, photograph, A3:112, 200-201 volcanic rocks, layered, orientation, A4:41, 43; A6:7 volcanic rocks, magnetite-rich, lithologic units, A3:28-33 volcanic rocks, perlitic flow-banded, lithologic units, A3:21-33 volcanic rocks, plagioclase-phyric lithologic units, A3:28–33 photograph, A3:124; A4:94 volcanic rocks, plagioclase-rich poikiloblastic, photomicrograph, A4:124 volcanic rocks, silicified lithologic units, A4:16-23 photograph, A4:184 photomicrograph, A4:123 volcanic rocks, silicified amygdaloidal aphyric, photograph, A4:88, 128 volcanic rocks, silicified flow-banded, lithologic units, A3:22-33

VOLUME 193 SUBJECT INDEX

volcanic rocks, silicified poikiloblastic, photograph • zonation, bleaching alteration

volcanic rocks, silicified poikiloblastic, photograph, A4:73 volcanic rocks, silicified porphyritic, lithologic units, A3:27-33 volcanic rocks, veined vesicular phyric, photograph, A4:133 volcanic rocks, vesicular lithologic units, A4:11–23 photograph, A1:51; A3:108, 110, 150 volcanic rocks, vesicular aphyric lithologic units, A4:16-23 photograph, A1:65; A3:108; A4:95, 132; A5:7 volcaniclastics bleaching alteration, A3:39-41 hydrothermal event frequency, B1:24-25 lithologic units, A3:21-33 lithology, A1:4 photograph, A3:111, 151 photomicrograph, A3:152 volcaniclastics, gravelly-sandy, volcanism, B1:9-11 volcanism architecture, B1:9–12 Eocene–Oligocene transition, A1:3–5 volume, altered rocks, B1:20 volume expansion, vs. depth, B1:59 vug fills, photograph, A4:87, 134-136

W

Wadati-Benioff Zone, volcanism, A1:3-5 wallrock alteration Category Z, B1:21 photomicrograph, B9:15-25 silica, B1:25-26 water content altered volcanic rocks, A3:76-77 volcanic rocks, A3:286, 292 vs. depth, A3:224; A4:192, 194, 245-246 weathering, lithologic units, A6:5 Weitin transform fault, lithology, A1:4 well-log Unit 1, formation evaluation, A3:95-96; A4:62, 64 well-log Unit 2, formation evaluation, A3:96; A4:62, 64 well-log Unit 3, formation evaluation, A3:96; A4:62, 64 well-log Unit 4, formation evaluation, A3:96; A4:62, 64 well-log Unit 5, formation evaluation, A3:96; A4:62, 65 well-log Unit 6, formation evaluation, A4:62, 65 well-log Unit 7, formation evaluation, A3:96; A4:62, 65 well-log Unit 8, formation evaluation, A3:96; A4:62, 65 well-log Unit 9, formation evaluation, A3:96; A4:65 well-log Unit 10, formation evaluation, A4:65 well-log units, formation evaluation, A3:95-96; A4:62, 64 Willaumez extensional transform fault, volcanism, A1:5 wireline logs heave, A3:255; A4:216, 225 vs. depth, A3:256

X

X-ray diffraction data altered felsic volcanic rocks, B11:1–19 minerals, A3:279–283; A4:240–242; A5:13; A6:37; B8:18; B11:10–19 xenoliths basalt, B6:1–19 fabric, B6:2–3 geochemistry, B6:3–4, 19 lithologic units, A3:31–32; A4:20 photomicrograph, A3:134; A4:110–111; A6:18; B6:7– 15

Y

ytterbium altered rocks, B1:48 fresh and altered dacite, B12:4 yttrium altered rocks, B1:48 pore water, B4:4 vs. depth, A3:224; A4:192, 194

Z

zeolites lithologic units, A6:5 photograph, A1:80; A4:71; A6:15 Zijderveld plots demagnetization, A4:212 intensity-decay curves, A3:240-241 zinc altered rocks, B1:19-20, 49 chimneys, B1:35 jasperoids, B9:6 massive sulfides, B10:3-7 pore water, B4:4-5 pyrite, B3:3 semimassive sulfides, B1:23 vs. depth, A3:224 vs. depth in altered volcanics and in precursors, B1:69 zircon, hydrothermal alteration, B1:16 zirconium dacite lava, B2:8 rhyodacite, A3:71 vs. depth, A3:224; A4:192, 194 vs. titanium oxide, B2:22 zirconium/titanium ratio vs. silica, B2:22 xenoliths, B6:3 zirconium/titanium oxide ratio alteration, A4:48 rhyodacite, A3:71 vs. depth, A3:224; A4:192, 194; B1:54 vs. silica, B1:65 zonation, bleaching alteration, A3:39-41