United States District Court,
N.D. Ohio, Eastern Division.

SKW AMERICAS, et al,
Plaintiffs.
v.
EUCLID CHEMICAL COMPANY,
Defendant.

Oct. 8, 2002.

In construing patent claims covering the invention of a liquid admixture for hydraulic cement, the District Court, O'Malley, J., held that: (1) phrase "sequential adding," meant " adding one after the other, but in no particular order;" (2) phrase "comprising incorporating an admixture comprising mixtures of," meant "and also an admixture including, but not limited to;" and (3) functional clause "accelerate the rate of hardening," meant that the additive would decrease the amount of time it would take for an hydraulic cement mix to reach final set, relative to a plain mix.

Claims construed.

3,782,991, 4,373,956. Cited As Prior Art.

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MEMORANDUM & ORDER

O'MALLEY**, District Judge.**

Plaintiffs SKW Americas, Inc. and MBT Holding Co. AG (collectively, "MBT") bring this action against defendant Euclid Chemical Company ("Euclid"), asserting that Euclid has infringed a patent owned by MBT covering the invention of a liquid admixture for hydraulic cement. Specifically, MBT alleges that: (1) it owns reissue patent RE-35194 ("the '194 patent"), which is directed at a certain additive compound that accelerates the hardening of hydraulic cement and increases its compressive strength; and (2) Euclid sells a product that violates MBT's '194 patent rights. Based on these allegations, MBT claims Euclid has contributed to or induced the infringement of claims 1, 20, and 38 contained in the '194 patent.

In response, Euclid has asserted counterclaims against MBT, seeking to invalidate MBT's patent rights. Specifically, Euclid claims that: (1) the '194 patent should be declared invalid, void, and unenforceable, due to obviousness, anticipation, and/or prosecution history estoppel; and (2) the Court should declare it has not infringed the '194 patent, nor induced or contributed to infringement.

Pursuant to Markman v. Westview Instruments, 517 U.S. 370, 116 S.Ct. 1384, 134 L.Ed.2d 577 (1996), the Court held a hearing on January 14, 2002, to determine the meaning or construction of the patents' claims, as a matter of law. In advance of this hearing, the parties submitted: (1) a joint claims construction chart, identifying areas of agreement and areas of dispute; and (2) separate briefs urging a certain construction for each disputed claim term. For the most part, MBT asserts that the disputed terms need no special construction, while Euclid asserts the disputed terms do need further, and generally limiting, construction.

The Court's analysis and construction of the disputed claims is set out below. The following charts summarize the Court's conclusions.

CLAIM 1		
DISPUTED TERM	**CONSTRUCTION**	lines
"an admixture comprising"	"an admixture including, but not limited to"	
"alkali, ammonium and alkaline earth salts of thiocyanic acid"	[none]	
"water soluble thiosulfates"	[none]	
"alkanolamino acids"	[none]	
"alkali and alkaline earth salts of nitric acid"	[none]	
"said additive being present in an amount sufficient to accelerate the rate of hardening of said hydraulic cement mix and to increase its compressive strength after hardening"	"said admixture being present in an amount sufficient to: (1) decrease the amount of time it will take for an hydraulic cement mix to reach final set, relative to a plain mix; and (2) increase the compressive strength of the hydraulic cement mix, relative to a plain mix, when measured at a like time interval after hardening"	
CLAIM 20		
DISPUTED TERM	**CONSTRUCTION**	lines
"a process for accelerating the hardening of hydraulic cement mixes"	"a process for accelerating the hardening of hydraulic cement mixes relative to plain cement mixes"	
"sequentially adding"	"adding one after the other, but in no particular order"	
"comprising incorporating an admixture comprising mixtures of"	"and an admixture including, but not limited to"	
"ammonium, alkali, and alkaline earth salts of thiocyanic acid, and mixtures thereof"	[none]	
"water soluble thiosulfates that may be substituted in whole or in part for the thiocyanates"	[none]	
"an alkanolamine; and water soluble alkanolamino acids that may be substituted in whole or in part for the thiocyanates"	[none]	
"ammonium, alkali, and alkaline earth salts of nitric acid, and mixtures thereof"	[none]	
"said additive being present in an amount sufficient to accelerate the rate of hardening of said hydraulic cement mix and to increase its compressive strength after hardening"	"said admixture being present in an amount sufficient to: (1) decrease the amount of time it will take for an hydraulic cement mix to reach final set, relative to a plain mix; and (2) increase the compressive strength of the hydraulic cement mix, relative to a plain mix, when measured at a like time interval after hardening"	
CLAIM 38		
DISPUTED TERM	**CONSTRUCTION**	lines
"an admixture comprising"	"an admixture including, but not limited to"	
"alkali, ammonium and alkaline earth salts of thiocyanic	[none]	

acid"	
"water soluble thiosulfates"	[none]
"alkanolamino acids"	[none]
"alkali and alkaline earth salts of nitric acid"	[none]
"said admixture being present in an amount sufficient to accelerate the rate of hardening of said hydraulic cement mix and to increase its compressive strength after hardening"	"said admixture being present in an amount sufficient to: (1) decrease the amount of time it will take for an hydraulic cement mix to reach final set, relative to a plain mix; and (2) increase the compressive strength of the hydraulic cement mix, relative to a plain mix, when measured at a like time interval after hardening"

I. Legal Standards.

The construction of the patent and the terms contained therein is an issue to be determined by the Court, as a matter of law. Markman v. Westview Instruments, Inc., 52 F.3d 967, 976 (Fed.Cir.1995), *affirmed,* 517 U.S. 370, 372, 116 S.Ct. 1384, 134 L.Ed.2d 577 (1996). In construing a claim, the Court determines "the meaning and scope of the patent claims asserted to be infringed." *Id*.

Claims are construed from the vantage point of a person of ordinary skill in the art at the time of the invention. Id. at 986. To ascertain the meaning of the claims, a court primarily should consider three things: the language of the patent claims, the patent specification, and the prosecution history. Insituform Tech., Inc. v. Cat Contracting, Inc., 99 F.3d 1098, 1105 (Fed.Cir.1996); Markman, 52 F.3d at 979. The claim language itself defines the scope of the claim, and "a construing court does not accord the specification, prosecution history, and other relevant evidence the same weight as the claims themselves, but consults these sources to give the necessary context to the claim language." Eastman Kodak Co. v. Goodyear Tire & Rubber Co., 114 F.3d 1547, 1552 (Fed.Cir.1997).

"Claim language is given its ordinary and accustomed meaning except where a different meaning is clearly set forth in the specification or where the accustomed meaning would deprive the claim of clarity." Northern Telecom Ltd. v. Samsung Electronics, 215 F.3d 1281, 1287 (Fed.Cir.2000). While a patentee can "act as his own lexicographer to specifically define terms of a claim contrary to their ordinary meaning, the written description in such a case must clearly redefine a claim term so as to put a reasonable competitor or one reasonably skilled in the art on notice that the patentee intended to so redefine that claim term." Elekta Instrument S.A. v. O.U.R. Scientific Intern., Inc., 214 F.3d 1302 (Fed.Cir.2000) (quoting Process Control Corp. v. HydReclaim Corp., 190 F.3d 1350, 1357 (Fed.Cir.1999)) (internal quotation marks omitted). For purposes of construing the claim, the written description contained in the specification may "act as a sort of dictionary, which explains the invention and may define the terms used in the claims." Markman 52 F.3d at 979.

Although claims should be read in view of their specification, Vitronics Corp. v. Conceptronic, Inc., 90 F.3d 1576, 1582 (Fed.Cir.1996), the Federal Circuit has repeatedly cautioned against limiting the scope of a claim to the preferred embodiment or specific examples disclosed in the specification. *See* Ekchian v. Home Depot, Inc., 104 F.3d 1299, 1303 (Fed.Cir.1997) ("[w]hile examples disclosed in the preferred embodiment may aid in the proper interpretation of a claim term, the scope of a claim is not necessarily limited by such examples"); Intervet America, Inc. v. Kee-Vet Laboratories, Inc., 887 F.2d 1050, 1053 (Fed.Cir.1989) ("limitations appearing in the specification will not be read into claims, and ... interpreting what is meant by a word in a claim 'is not to be confused with adding an extraneous limitation appearing in the specification, which is improper' ") (citation omitted).

In construing the claims, the Court may look to the patent's prosecution history if it is a part of the record in the case. Markman, 52 F.3d at 980. "This 'undisputed public record' of proceedings in the Patent and

Trademark Office ["PTO"] is of primarysignificance in understanding the claims." *Id*. Although the prosecution history "can and should be used" when construing the claims, it "cannot 'enlarge, or diminish or vary' the limitations in the claims." *Id*. (citation omitted). Prosecution history is relevant to the construction of a claim written in means-plus-function form. Indeed, "just as prosecution history estoppel may act to estop an equivalence argument under the doctrine of equivalents, positions taken before the PTO may bar an inconsistent position on claim construction" under s. 112, para. 6. Clear assertions made in support of patentability thus may affect the range of equivalents under s. 112, para. 6. Cybor Corp. v. FAS Technologies, Inc., 138 F.3d 1448, 1457 (Fed.Cir.1998) (citations and internal quotation marks omitted). The Court does not, however, apply the doctrine of prosecution history estoppel at this stage of the analysis. "There is a clear line of distinction between using the contents of the prosecution history to reach an understanding about disputed claim language and the doctrine of prosecution history estoppel, which 'estops' or limits later expansion of the protection accorded by the claim to the patent owner under the doctrine of equivalents when the claims have been purposefully amended or distinguished over relevant prior art to give up scope." Biodex Corp. v. Loredan Biomedical, Inc., 946 F.2d 850, 862 (Fed.Cir.1991) (citations omitted).

Extrinsic evidence such as expert testimony may be considered, if needed to assist the Court in understanding the technology at issue or in determining the meaning or scope of technical terms in a claim. Aqua-Aerobic Systems, Inc. v. Aerators, Inc., 211 F.3d 1241, 1244-45 (Fed.Cir.2000); Hoechst Celanese Corp. v. BP Chemicals Ltd., 78 F.3d 1575, 1579 (Fed.Cir.1996), *cert. denied,* 519 U.S. 911, 117 S.Ct. 275, 136 L.Ed.2d 198 (1996). Expert testimony may not be relied upon, however, to "correct errors or erase limitations or otherwise diverge from the description of the invention as contained in the patent documents." *Id*. at 1254 (citing Markman, 52 F.3d at 981). Reliance on any extrinsic evidence is also discouraged where the public record-that is, the claims themselves, the specification, and the file history-unambiguously defines the scope of the claims. Vitronics, 90 F.3d at 1583. Courts are not prohibited, though, from examining extrinsic evidence, even when the patent document is itself clear. Pitney Bowes, Inc. v. Hewlett-Packard Co., 182 F.3d 1298, 1308 (Fed.Cir.1999).

[1] [2] [3] [4] [5] There is presumed to be "a difference in meaning and scope when different words or phrases are used in separate claims." United States v. Telectronics, Inc., 857 F.2d 778, 783 (Fed.Cir.1988). There is a presumption against construing claims as being so similar as to "make a claim superfluous." *Id*. That claims are presumed to differ in scope, however, "does not mean that every limitation must be distinguished from its counterpart in another claim, but only that at least one limitation must differ." Kraft Foods, Inc. v. International Trading Co., 203 F.3d 1362, 1369 (Fed.Cir.2000); Mantech Envtl. Corp v. Hudson Envtl. Servs., 152 F.3d 1368, 1376 (Fed.Cir.1998). The doctrine of claim differentiation, moreover, "only creates a presumption that each claim in a patent has a different scope; it is 'not a hard and fast rule of construction.' " Kraft Foods, Inc., 203 F.3d at 1369 (citing Comark Communications, Inc. v. Harris Corp., 156 F.3d 1182, 1186 (Fed.Cir.1998)). "Claim differentiation can not broaden claims beyond their correct scope." Multiform Desiccants, Inc. v. Medzam, Ltd., 133 F.3d 1473, 1480 (Fed.Cir.1998). FN1 With these principles in mind, the Court turns to the parties' dispute over the claim language employed in the '194 patent.

FN1. When construing claims, the Court must be mindful of the word "means." *See* 35 U.S.C. s. 112 para. 6 ("An element in a claim for a combination may be expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof"). That is, when claim terms are in the form commonly referred to as "means plus function," the language must be construed as limited to the specific structure described in the specification "and equivalents thereof." Signtech USA, Ltd. v. Vutek, Inc., 174 F.3d 1352, 1358 (Fed.Cir.1999). The '194 patent does not use the term "means," so the Court does not undertake a means plus function analysis.

II. Construction Analysis.

A. Overview of the Invention.

The Court begins its analysis with an overview of the terminology and science of concrete. Generally, the building material known as concrete is made up of water, cement and aggregate. Cement is a fine powder which, when mixed with water, creates an adhesive "cement paste;" the paste will eventually harden and gains strength to form a rock-like mass. "Portland cement," which is the most common type of cement, is composed of a certain ratio of calcium, silicon, aluminum, and iron (all of which are normally found in a given combination of limestone and clay). Portland cement is also an "hydraulic cement," which means that it can set, harden, and remain stable under water.

To create concrete, an "aggregate"-usually, sand, crushed stone, and/or gravel-is added to the cement paste. Aggregates are referred to as fine (e.g., sand) or coarse (e.g., gravel). A typical concrete mix is made up of roughly 10% cement powder, 25% fine aggregate, 40% coarse aggregate, 20% water, and 5% air. FN2 Because concrete is malleable when newly mixed, yet strong and durable when hardened, it is an excellent building material. Nonetheless, engineers often modify concrete to make it even more useful. To increase the tensile strength of concrete slabs, for example, the concrete can be poured over steel bars ("rebar") or wire. To increase the resistance of concrete to cracking in freezing temperatures, the ratio of air in the concrete mix can be increased through "air-entrainment" methods. And, in addition to controlling the precise cement/water/aggregate/air ratios, engineers can also modify and control the properties of concrete by adding additional materials, or "admixtures," to the concrete mix. The '194 patent at issue in this case covers the invention of such an admixture.

FN2. Cement mixed with fine aggregate alone is also known as "mortar." Put differently, "cement" is a powder; adding water creates "cement paste;" adding fine aggregate creates "mortar;" and adding coarse aggregate creates "concrete."

In particular, the '194 patent covers a liquid admixture composition that, when added to an hydraulic cement mix, "provide[s] economy, compressive strength at all ages, and a desirable degree of acceleration of rate of hardening and setting." '194 patent, col. 1, lines 14-16. The patent's summary of invention explains that inclusion of the correct amount of the admixture "into cementitious systems ha[s] been found to yield beneficial effects on rate of hardening of cementitious mixes and on early and ultimate compressive strength after hardening, surprising in degree and due to interactive effects not predictable to one skilled in the art." Id. at col. 2, lines 58-63. The summary also notes that the invention works by adding the admixture "before, after, or during addition of water." Id. at col. 2, line 67.

The admixture is essentially comprised of three chemical components: (1) "an alkalior alkaline earth or ammonium salt of thiocyanic acid," also referred to as a "thiocyanate;" (2) "an alkanolamine;" and (3) "an alkali, alkaline earth or ammonium salt of nitric acid," also referred to as a "nitrate." Id. at col. 3., lines 11-13. Each of these three components describes a certain family of chemical compounds. Further, certain related components may be substituted for the thiocyanate and/or the alkanolamine-the patent explains that the invention includes "corresponding mixtures" in which: (1) "alkali or alkaline earth thiosulfates and chlorides below the level where corrosion is promoted are substituted for some or all of the thiocyanate;" and (2) "certain alkanolamino acids and their water soluble salts are substituted for the alkanolamine." Id. at col. 3, lines 13-18. While prior art suggested use of some of these substances as cement admixtures, it is the particular combination claimed in the '194 patent that its inventors contend "yield[s] beneficial effects" to an extent "surprising in degree" and "due to interactive effects not predictable by one skilled in the art." Id. at col. 2, lines 59-63. The patent notes that, regardless of how the three various components are mixed to create the final admixture, the admixture should be added to the cement mix in an amount "up to about

3.0% by weight based on the weight of the cement," with the thiocyanate making up 0.01% to 0.50%, the alkanolamine making up 0.005% to 0.08%, and the nitrate making up 0.05% to 2.0%. Id. at col. 3, lines 25-32. This amounts to several quarts of admixture added to the entire contents of a normal cement truck.

Central to the claims at issue is the promise that use of the admixture disclosed in the '194 patent "accelerates the rate of hardening" of hydraulic cement mix, and also increases the "compressive strength" of cement after hardening. As the parties explained through their respective technical experts, these variables are commonly measured by those skilled in the art using certain accepted testing procedures. One procedure for testing the hardness of cement is known as the "slump test." The slump test is a relatively simple, "low-tech" procedure to determine the degree to which a wet concrete mix is "workable," also known as its "stiffness." The slump test calls for a standard-sized steel cone FN3 to be filled with the concrete mix. In the same way a bucket is used on the beach to build a sand castle, the cement-filled cone is then turned over, and the cone removed. The concrete mix then "slumps" a measurable amount, depending on how wet the mix is (or how long the mix has been allowed to harden). A very wet mix has a "high slump," while an almost-hardened mix will have a "low slump." FN4 Frequently, building specifications direct the contractor to pour the concrete only when it has a specific slump; or put another way, to pour only when the concrete has progressed a certain degree toward attaining hardness. The slump may be changed by adding more water, adding more cement, adding an admixture, or simply waiting an additional period of time.

FN3. The structure is actually a frustum, not a cone, but concrete contractors apparently did not seize upon the term "frustum."

FN4. The standard frustum used to conduct a slump test is 12 inches high. Thus, a fresh, wet concrete mix might have a slump of 7 inches (leaving a 5-inch high pile), while the same mix might have a slump of only 3 inches after it has had a chance to harden for some time.

Another common procedure for determining the hardness or stiffness, of cement is use of a penetrometer, also called the "needle test." With the needle test, a standard-sized container is filled with the concrete mix and a standard-weighted, 50-millimeters-long needle is rested on top. The needle then sinks into the mix a certaindistance, depending on how stiff the concrete has become. Concrete contractors will conduct the needle test periodically, to determine the point in time when the needle sinks into the mix a distance of 25 millimeters. It is at this point-normally 3 to 6 hours after initial mixing of "plain" concrete-that the concrete has reached its "initial set," also called "early set." Contractors know that, after initial set, the concrete should no longer be worked, at the risk of decreasing its ultimate strength. Contractors will then continue to conduct the needle test; eventually, after the concrete has had additional time to harden, the needle will not sink into the concrete mix at all. It is at this point-normally 6 to 10 hours after initial mixing-that the concrete has reached its "final set." After final set, the forms into which the concrete was poured can be removed, with confidence that the concrete will retain the desired shape. FN5

FN5. The Court heard testimony about various testing standards and specifications promulgated by the American Society for Testing Materials ("ASTM"). The needle test described here is a simplified version of the Vicat Needle test (ASTM C 191). Other penetration-type tests measure: (1) the amount of pressure needed to sink a standard needle 25 mm into mortar sieved from concrete, where 500 psi indicates initial set and 4000 psi indicates final set, (ASTM C 403/C); and (2) the point in time when the cement mix can bear a standard-sized needle bearing a 1/4-pound weight without any penetration (signifying initial set), and a 1-pound weight without any penetration (signifying final set) (the "Gillmore Needle" test, ASTM C 266). The "slump test" described above is ASTM C 143.

Finally, testing apparatus is available to test both the compressive strength and tensile strength of concrete. To test compressive strength, a standard-sized cube of hardened concrete is placed between two metal plates, which are then squeezed together. The machine measures the amount of pressure the concrete cube can withstand before it fractures. The compressive strength of concrete is commonly measured at the end of 16 hours, and then at the end of 1, 3, 7, 28, 60, and 365 days; generally, the compressive strength of concrete increases with time over the first 28 days, and then levels off. To test tensile strength, a standard-sized cylinder of hardened concrete is placed in a machine which "flexes" the cylinder, in the same way a person uses his thumbs to break a pencil. Again, the machine measures the amount of pressure the concrete sample can withstand before it fractures. The patent makes no claims regarding the effect of the admixture on the tensile strength of concrete.

B. Analysis.

The parties dispute certain language contained in claims 1, 20, and 38 of the '194 patent. To clarify the areas of dispute, the Court first sets out below the entire language of these three claims. Each claim is broken into a number of clauses, to ease understanding. The disputed terms, according to the parties' joint claims construction chart, are presented in bold typeface. (As noted below, however, the terms in dispute according to the claims construction chart are more numerous than the terms in dispute according to the parties during oral argument at the January 14, 2002 *Markman* hearing.) Finally, the Court has grouped the clauses of each claim into three essential categories: (1) "preamble" clauses, (2) "admixture composition" clauses, and (3) "functional" clauses.

	CLAIM 1
Preamble Clauses	A hydraulic cement mix comprising hydraulic cement, aggregate,
	sufficient water to effect hydraulic setting of the cement, and
Admixture Clauses	**an admixture comprising** a composition or a mixture of compositions selected from the group consisting of **alkali, ammonium and alkaline earth salts of thiocyanic acid, and water soluble thiosulfates**; a composition or a mixture of compositions selected from the group consisting of alkanolamine; and **alkanolamino acids**; and
	a composition or a mixture of compositions selected from the group consisting of **alkali and alkaline earth salts of nitric acid;**
Functional Clauses	**said additive being present in an amount sufficient to accelerate the rate of hardening of said hydraulic cement mix and to increase its compressive strength after hardening.**
	CLAIM 20
Preamble Clauses	**A process for accelerating the hardening of hydraulic cement mixes which includes sequentially adding** hydraulic cement, aggregate in an amount up to 80% by weight based on total weight of said cement mix, and
	sufficient water to effect hydraulic setting of the cement,
Admixture Clauses	**comprising incorporating an admixture comprising mixtures of** (a) a composition selected from the group consisting of **ammonium, alkali, and alkaline earth salts of thiocyanic acid, and mixtures thereof**; and **water soluble thiosulfates that may be substituted in whole or in part for**

	the thiocyanates; and
	(b) **an alkanolamine;**
	and water soluble alkanolamino acids, substituted in whole or in part for the alkanolamine; and
	(c) a composition selected from the group consisting of **ammonium, alkali and alkaline earth salts of nitric acid, and mixtures thereof**;
Functional Clauses	**said additive being present in an amount sufficient to accelerate the rate of hardening of said hydraulic cement mix and to increase its compressive strength after hardening.**
	CLAIM 38
Preamble	A hydraulic cement mix comprising
Clauses	hydraulic cement,
	aggregate,
	sufficient water to effect hydraulic setting of the cement, and
Admixture	**an admixture comprising:**
Clauses	(a) [a] composition or a mixture of compositions selected from the group consisting of **alkali, ammonium and alkaline earth salts of thiocyanic acid, and water soluble thiosulfates,**
	wherein said salts of thiocyanic acid are sodium, potassium, ammonium and calcium thiocyanate; and said soluble thiosulfates are sodium, potassium, ammonium, calcium and magnesium thiosulfates;
	(b) a composition or a mixture of compositions selected from the group consisting of alkanolamine and **alkanolamino acids,**
	wherein said alkanolamines are diethanolamine, triethanolamine or tetra(hydroxyethyl)ethylenediamine; and said alkanolamino acids are bicine and N,N-di(hydroxyethyl)-B-aminopropionic acid; and
	(c) a composition or a mixture of compositions selected from the group consisting of **alkali, ammonium, and alkaline earth salts of nitric acid,**
	wherein, said salts of nitric acid are sodium, potassium, calcium, magnesium and ammonium nitrates;
Functional Clauses	**said admixture being present in an amount sufficient to accelerate the rate of hardening of said hydraulic cement mix and to increase its compressive strength after hardening.**

Before turning to its claim construction analysis, the Court notes that the parties agreed, at the *Markman* hearing, that a number of the terms listed as disputed in their joint claims chart were not, in fact, in dispute. Specifically, the parties agreed that the chemical terms contained in the "admixture clauses" of all three claims were not in dispute, because: (1) they now agreed that the chemical formulae describing the compositions of the "nitrate" admixture component does not include the "ammonium radical;" and (2) certain of the chemical terminology claims construction issues are essentially hypothetical, given that the proposed constructions of the disputed terms will not have any relevance to a subsequent infringement analysis. *See* hearing tr. at 63-67 (counsels' description of the remaining areas of dispute). Accordingly, the Court concludes the following terms, which were originally identified as disputed, are no longer disputed, and need no special legal construction by the Court:

Claim Terms No Longer in Dispute		
Claim 1	- >	alkali, ammonium and alkaline earth salts of thiocyanic acid, and water soluble thiosulfates
	- >	alkanolamino acids

	->	alkali and alkaline earth salts of nitric acid
Claim 20	- >	ammonium, alkali, and alkaline earth salts of thiocyanic acid, and mixtures thereof
	- >	water soluble thiosulfates that may be substituted in whole or in part for the thiocyanates
	- >	an alkanolamine; and water soluble alkanolamino acids, substituted in whole or in part for the alkanolamine
	->	ammonium, alkali and alkaline earth salts of nitric acid, and mixtures thereof
Claim 38	- >	alkali, ammonium and alkaline earth salts of thiocyanic acid, and water soluble thiosulfates
	- >	alkanolamino acids
	->	alkali, ammonium, and alkaline earth salts of nitric acid

This leaves only the disputed terms enumerated below, which the Court now construes as a matter of law.

1. "***An Admixture Comprising.***"

[6] All three claims contain an "admixture clause" which begins with the phrase "an admixture comprising." MBT asserts that the phrase "an admixture comprising" should take its ordinary meaning, and needs no special construction by the Court. Euclid asserts the Court should construe this phrase to mean "an admixture requiring the presence of the following compositions but not excluding unrecited compositions." In other words, Euclid wants it made clear that, while the admixture *must* contain the certain components listed, it can *also* contain other, unlisted components.

In Vehicular Technologies Corp. v. Titan Wheel Intern., Inc., 212 F.3d 1377, (Fed.Cir.2000), the Federal Circuit Court of Appeals addressed the meaning of the term "comprising:"

The phrase "consisting of" is a term of art in patent law signifying restriction and exclusion, while, in contrast, the term "comprising" indicates an open-ended construction. In simple terms, a drafter uses the phrase "consisting of" to mean "I claim what follows and nothing else." A drafter uses the term "comprising" to mean "I claim at least what follows and potentially more."

Id. at 1382-83 (citations omitted). Or, as put by plaintiff's counsel in this case at the *Markman* hearing, the term "comprising" is a term of art which, in "patentese," means "including but not limited to," while the term "consisting of" means "it must come from whatever is listed here." Hearing tr. at 5.

Notably, the '194 patent contains both phrases.FN6 Claim 1, for example, describes an "hydraulic cement mix *comprising* " hydraulic cement, aggregate, water, and an admixture, while the third component of the admixture is "a composition or a mixture of compositions selected from the group *consisting of* alkali, ammonium, and alkaline earth salts of nitric acid. " '194 patent, col. 14, lines 37-53. Because the hydraulic cement mix is "comprised of" the four elements listed (cement, aggregate, water, and an admixture), it may include other elements as well. On the other hand, because the third component of the admixture "consists of" one or more of a certain group of related chemicals, the third component may not include any other substance.

FN6. Indeed, during the reissue process, the '194 patent was amended specifically to change two uses of the term "comprising," in claim 1, to the term "consisting of." '194 patent, col. 14, lines 37-53.

MBT agrees with Euclid that "comprising" is a term of art in patent law, and MBT also agrees with Euclid on the meaning of that term. Nonetheless, MBT believes the Court need not provide any special construction for the term, and should simply direct the jury to accord this term its "ordinary meaning." The Court concludes, however, that Euclid's position is correct-it is appropriate to construe the claim language so that the jury will comprehend accurately this term of art. As noted, Euclid proposes the phrase be construed to mean "an admixture requiring the presence of the following compositions but not excluding unrecited compositions." FN7 The Court finds that this construction is needlessly prolix. Instead, the Court construes the phrase "an admixture comprising" to mean "an admixture including, but not limited to." This construction more simply and precisely defines the phrase at issue, as explained by the Federal Circuit Court of Appeals.

FN7. Euclid alternatively suggests the word "elements" instead of "compositions."

2. "*Sequentially Adding.*"

[7] The "preamble clauses" of claim 20 make clear that the claimed process for accelerating the hardening of hydraulic cementmixes involves, first, the "sequential adding" of cement, aggregate, and water. The "admixture clause" of claim 20 then recites "incorporating" an admixture into the cement mix, without reciting *when* in the overall mixing process the admixture should be added. MBT asserts that the phrase "sequentially adding" should take its ordinary meaning, and needs no special construction by the Court. Euclid asserts this phrase should be construed to mean adding the ingredients in a specific order: "hydraulic cement, followed by aggregate, followed by sufficient water to effect hydraulic setting of the cement." MBT responds that, while the ingredients must be added one after the other, the claim language does not insist on a particular order.

The Court concludes that MBT is correct. Neither the claim language itself nor the specification modify or define the term "sequentially adding," or indicate the term is used in a special manner. The Court, therefore, concludes that the term must be used in its ordinary and customary manner. Importantly, the claim language itself states that the patented process involves sequential adding of cement, aggregate, and water, and "incorporating" into this process an admixture. The claim language is silent as to when in the process the incorporation of the admixture must occur-it could be, for example, before *or* after addition of the water. Given that there is no necessary order in the claimed process for incorporation of the admixture, an ordinary and straightforward reading of the term "sequentially adding" indicates there is no necessary order for combining the other ingredients, either. That is, the ordinary and customary meaning of the term "sequentially adding," as used in the context of the claim language, is that the ingredients be added one at a time; "sequentially adding" does not mean, as Euclid urges, "in the following sequence." The patent specification also supports this construction. While the specification does not provide any explicit discussion of the term "sequentially adding," it does state that the admixture may be added "before, after, or during addition of water." '194 patent at col. 2, line 67 ("summary of the invention"). That is, the admixture may be added either preceding or following another ingredient, but it is still being added sequentially. The patent does not claim any specific ordering of the ingredients in the process.

The Court's reading of the claim language is also supported by extrinsic evidence. It is true, as Euclid notes, that the dictionary definition of the word "sequence" means "a following of one thing after another." But this definition is ultimately unhelpful, because the claim language does not state the sequence must be a particular one, as opposed to "any sequence." And the experts who testified at the *Markman* hearing, as well as the treatises to which they point, made it very clear that a person of ordinary skill in the art would *not* understand that the concrete ingredients listed in the preamble clause of claim 20 must follow one another into the mixer *only* in the order listed. Rather, the ordinary and accustomed meaning of the claim language is merely that the ingredients are not added simultaneously. Further, this same extrinsic evidence makes

clear that one of ordinary skill in the art would understand that "sequentially adding" hydraulic cement, aggregate, and water simply means these ingredients are not all added into the mixer at the same time.FN8 Simultaneous adding of concrete ingredients into a mixer is rarely practiced "in the field," because doing so does not lead to accurate mixes or efficient mixing. Rather, cement, aggregate, and water are added one at a time. The order of adding is *usually* cement, then aggregate, then water, but this order is not "set in stone."

FN8. Similarly, prior art cited in the '194 patent makes clear that a person skilled in the art would understand that cement admixtures can be incorporated in any number of ways: "The admixture ... can be incorporated into the cementitious mixture as desired, e.g. during the grinding of the cement clinker at the cement plant, separately during mixing with aggregate, ... together with one of the main ingredients of the wet cementitious mixture, ... added to [the fine aggregate], ... or mixed with a small part of the cement to produce a pre-packaged concentrated mixture ...." Patent 3,536,507 at col. 4, lines 34-50.

Put simply, Euclid's proposed construction of the term "sequentially adding" is different from that term's ordinary and accustomed meaning, which works perfectly well in the context of the claim language. This conclusion does not end the inquiry, however, because MBT's suggestion-that is, that the phrase "sequentially adding" needs no special construction-is likely to leave a jury confused. The meaning of "sequentially adding" ingredients may be clear to one skilled in the art, but, "[i]n the end, claim construction must result in a phraseology that can be taught to a jury of lay people. It is not enough simply to construe the claims so that one skilled in the art will have a definitive meaning." Control Resources, Inc. v. Delta Electronics, Inc., 133 F.Supp.2d 121, 127 (D.Mass.2001); *see* MacNeill Engineering Co., Inc. v. Trisport, Ltd., 126 F.Supp.2d 51, 56 (D.Mass.2001), *dismissed on appeal;* 15 Fed.Appx. 835 (Fed.Cir.2001) ("The Court's "claim construction obligation ... involves not only properly construing the claim language so that the litigants (for the most part skilled in the particular art) will understand it, but also teaching the chosen construction to the jury in language that will inform the jury in plain English the legal framework it must apply in order to do justice." ").

The Court concludes that the term "sequentially adding" must be construed to remove any risk of ambiguity to the jury at the time of trial. Accordingly, the Court construes this term to mean " adding one after the other, but in no particular order." This construction ensures that the jury will not mistakenly believe that the ingredients recited in the claim language must be mixed together in a particular order.

3. "*Comprising Incorporating an Admixture Comprising Mixtures of* "

[8] The "admixture clauses" of claim 20 explain that, during or after the sequential addition into the mixer of cement, aggregate, and water, the process for accelerating the hardening of the cement mix "compris[es] incorporating an admixture comprising mixtures of" certain substances. Euclid asserts that this phrase is so indefinite and ambiguous that it is incapable of construction, especially because it confuses the particular order suggested by the prior "sequentially adding" clause-that is, Euclid complains there is no claim or explanation of when, in the mixing sequence, the admixture is added. Put differently, Euclid asserts this language is "indefinite in that it is unclear as to when the admixture is incorporated into the cement mix." MBT responds that "one of ordinary skill in the art would immediately understand that the admixture could be incorporated into the cement mix at any time before hardening of the cement mix in which it is included." Thus, MBT asserts the phrase "comprising incorporating an admixture comprising mixtures of" should take its ordinary meaning, and needs no special construction by the Court.

As discussed above in the "sequentially adding" discussion, one skilled in the art would easily understand the language in question to mean that: (1) the claimed process is essentially comprised of mixing cement, aggregate, water, and an admixture; (2) the admixture, in turn, is comprised of certain components; and (3) the mixing order of the four ingredients (cement,aggregate, water, and admixture) is sequential, as the Court

has already construed that term.

Euclid again argues that: (1) the claimed mixing order of the concrete ingredients is definite; (2) this otherwise-definite order of mixing is made indefinite because the claim language does not state when the admixture must be added; and (3) thus, the phrase at issue is incapable of definition. But, as noted in section B.2 above, the claimed mixing order is *not* definite, other than non-simultaneous. In sum, the language of claim 20 is not indefinite for failure to recite when, in the mixing sequence, the admixture must be added to the cement mix. On the other hand, Euclid is correct that the phrase in question is very unwieldy. It is fair to say that the phrase in question "must be translated into plain English so that a jury will understand." Control Resources, 133 F.Supp.2d at 127. Here, the essence of the claim is that the invention is a process involving the sequential mixing (as that term was construed above) of cement, aggregate, water, and an admixture, and the admixture is made up of substances from three component groups. Accordingly, in the context of claim 20 of the '194 patent, the Court concludes that the phrase "comprising incorporating an admixture comprising mixtures of" must be construed to remove ambiguity, as follows: "and also an admixture including, but not limited to." This construction ensures that the jury will better understand the claimed process.

4. "***A Process for Accelerating the Hardening of Hydraulic Cement Mixes***"

[9] The preamble clause of claim 20 explains that the invention is "a process for accelerating the hardening of hydraulic cement mixes." Initially, MBT argued this clause needed no special construction. Euclid argued that the clause begged the question "acceleration relative to what?", and asserted the Court should construe the term to mean "a process for accelerating the hardening of hydraulic cement mixes *relative to plain cement mixes* " (emphasis added).

In the course of briefing this issue, MBT stated it was "willing to adopt" Euclid's construction as "accurately reflective of the understanding a person of ordinary skill in the art would have of this term." Euclid's claim construction brief at 17. Accordingly, the Court construes this term as proposed by Euclid and agreed to by MBT.

5. "***Said Additive Being Present in an Amount Sufficient to Accelerate the Rate of Hardening of Said Hydraulic Cement Mix and to Increase its Compressive Strength after Hardening***"

All three claims contain an identical function clause, which states that addition of the admixture will "accelerate the rate of hardening [of the cement mix and] increase its compressive strength after hardening." FN9 Again, Euclid argues this clause begs two questions: accelerate the rate of hardening *relative to what,* and increase its compressive strength *relative to what?* To answer these questions, Euclid asserts the Court should construe this phrase to mean that addition of the admixture will "(1) accelerate the rate of hardening of the hydraulic cement mix relative to a plain mix at initial set and final set; and (2) increase the compressive strength of the hydraulic cement mix relative to a plain mix at any age of the hydraulic cement mix after it hardens." MBT concedes that the claim language needs clarification, but objects that Euclid's proposed construction is too complex and also imports limitations into the claims which simply should not be there. Instead, MBT asserts the Court should construe the phrase to mean that addition of the additive will "decrease the amount of time of set of the cement and ... increase the compressive strength of the cement relative to plain mix (with no admixture)." The Court resolves this dispute by breaking the functional clause in question into two parts, and examining each part separately.

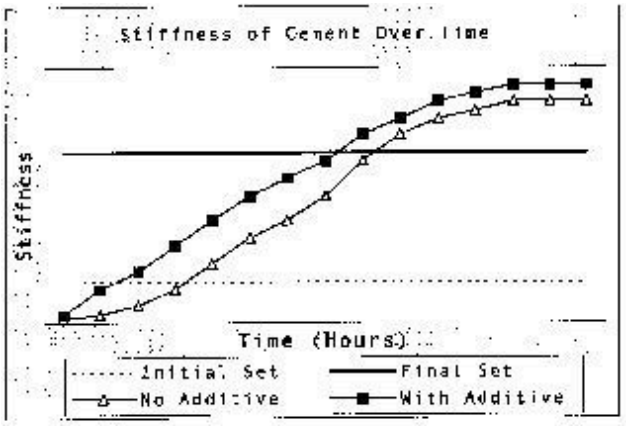
FN9. Actually, the functional clause of claims 1 and 20 refer to an "additive," while claim 38 refers to an "admixture." In their written briefs, the parties disputed the meaning of the word "additive." At oral argument, however, the parties largely agreed (and, in any case, the Court concludes that one skilled in the art would understand) that the two terms are synonymous.

a. "Accelerate the Rate of Hardening "

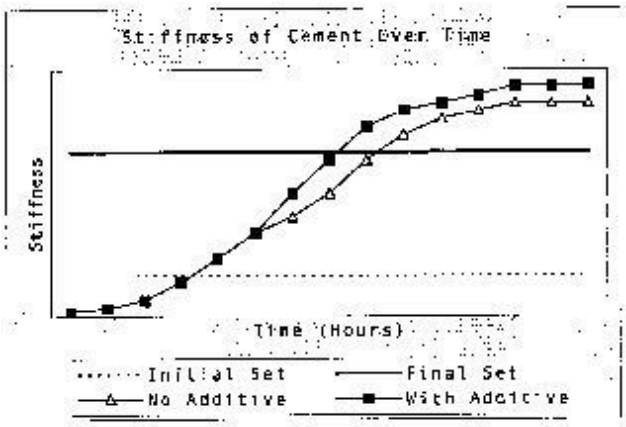
[10] The functional clause first states that addition of the admixture will "accelerate the rate of hardening of [the] hydraulic cement mix." Euclid argues the Court should construe this language to mean "accelerate the rate of hardening of the hydraulic cement mix *relative to a plain mix at initial set and final set* " (emphasis added). MBT agrees that the acceleration is "relative to a plain mix," but MBT does not agree to the references to initial set and final set: "one of ordinary skill in the art would have read this claim language as calling for a general acceleration of hardening, and not as calling for acceleration of hardening at two particular times, as [Euclid] contends." MBT's claim construction brief at 14. MBT insists there is "no basis for the assertion that acceleration of the rate of hardening must be evinced at initial set, final set, or both of these points." Id. at 15. MBT does concede, however, that to "accelerate the rate of hardening" is to "decrease the amount of time of set." Joint claims chart at 5. It is unclear precisely what MBT means by "time of set."

The critical question raised by the parties is: *how* do you determine whether, in fact, the admixture has "accelerated the rate of hardening" of a cement mix? Euclid says the rate of hardening was "accelerated," as claimed by MBT, only if the time to reach *both* initial set and final set has decreased. MBT objects, saying the claim language "calls for a general acceleration of hardening, and not as calling for acceleration of hardening at two particular times." Construction brief at 14. The problem with MBT's objection, however, is that whether acceleration has occurred must be measured at *some* point in time. In all of the three cases shown below, for example, acceleration in the rate of hardening arguably did occur, but the *point in time* of acceleration varies. Does the patent cover only the admixture shown in scenario one, where both the time to initial set and final set are decreased, or does it also cover the admixtures shown in scenarios two and three, where only one of these benchmarks times is decreased?

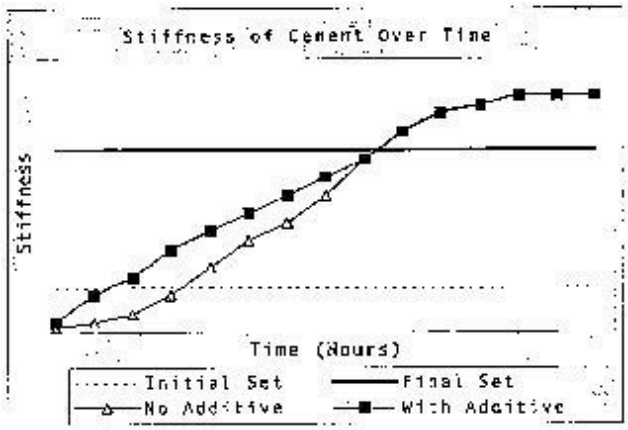
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Scenario 1: The additive immediately causes the cement to stiffen quicker, and the cement continues to stiffen quicker. Comparing a cement mix with the additive to a cement mix without the additive, the time to initial set and final set is shorter.



Scenario 2: The additive initially has no effect on the cement, but later causes it to stiffen quicker. Comparing a cement mix with the additive to a cement mix without the additive, the time to initial set is the same, but the time to final set is shorter.



Scenario 3: The additive initially causes the cement to stiffen quicker, but this effect wears off. Comparing a cement mix with the additive to a cement mix without the additive, the time to initial set is shorter, but the time to final set is the same.

Importantly, the claim language, itself, does not refer to "initial set" or "final set;" indeed, the '194 patent does not claim anywhere that the admixture will affect the rate of *setting*. Rather, the claim language only asserts the admixture will acceleratethe rate of *hardening*. This distinction is critical because, while "setting" and "hardening" are related, it is clear that a person skilled in the art accords different meanings to the terms. Indeed, the same is true of a layman.

In the context of concrete, the ordinary and customary meaning of the term "hardened," to a layman, refers to the point in time when the cement is completely stiff-it is no longer wet or malleable. Put simply, once the cement has hardened, a child cannot scratch his initials into the sidewalk with a stick. In contrast, if

concrete is still "setting," it remains malleable, to some degree; perhaps it is soupy, perhaps it is mucky, perhaps it is like dried mud, but concrete that is still "setting" is not "hardened." Similarly, to a layman, the ordinary and customary meaning of the term "accelerate the rate of hardening" means that it will take less time for a concrete mix to reach a state of hardness. The speed of hardening is quicker; the time to reach hardness is less. A layman, however, would not necessarily believe that, if a wet concrete mix takes less time to become "hard," it will also take less time to become mucky. Maybe; maybe not.

In this case, the layman's understanding completely parallels that of one skilled in the art, and is borne out by other language in the patent, including the patent specification, as well as extrinsic evidence.FN10 In several places, the patent distinguishes between "setting" and "hardening." In the "background of the invention" section, the patent describes the principal benefit of the invention as being "acceleration of rate of hardening *and setting*. " '194 patent, col. 1, lines 14-16 (emphasis added). Similarly, in the "summary of the invention" section, the patent states that "[i]t is another object of this invention to provide hydraulic cement mixes ... which include an admixture which will advantageously accelerate the rate of hardening *and setting* of the cement mix." Id. at col 3, lines 1-7 (emphasis added). This language highlights the patent drafter's choice to claim only that the invention "accelerates the rate of hardening." The drafter did not *claim* that the invention also accelerated the rate of setting, even though the drafter earlier noted that this was one of the objects of the invention. It is significant that the drafter did not use the term "setting" of concrete in the claims language, only "hardening," and that the drafter did not specify any particular point (or points) in time, before final hardening, at which or by which the claimed acceleration must occur. In other words, there is negative support in the patent background and patent summary for Euclid's argument that an accelerated rate of hardening must be measured with reference to initial set and final set.

FN10. The prosecution history and prior cited art do not shed light on the appropriate construction of the phrase "accelerate the rate of hardening."

Euclid does point to the patent's "description of the preferred embodiments," which is replete with examples of the temporal decrease that different formulations of the patented admixtures caused various types of cement mixes to reach "initial set," "final set" or both. In particular, the specification lists 72 examples of cement mixes to which were added various admixture formulations. *See* patent Tables I-XX.FN11 These Tables generally show that the three-component admixtures claimed in the patent, when added to a plain cement mix: (1) decrease time to initial and final set, and increase compressive strength; and (2) are superior in these areas to one- and two-component admixtures. The Tables "prove" that the admixtures accelerate hardening by showing the decrease in time it took for the cement mix to reach initial set and final set, when the admixture was added. As an example, Table XIII, mix 62 shows that addition of a particular formulation of the three-component admixture decreased the time to initial set by 3 3/8 hours, and decreased the time to final set by 4 1/2 hours. Euclid argues that MBT's continued references to initial set and final set in the patent specification show that one skilled in the art would *measure* acceleration of hardness by measuring time to both initial and final set. FN12

FN11. The Tables include a total of 74 cement mixes. Mixes 1 and 6 include no admixture. The other mixes contain admixtures, but only some of these admixtures include all three of the components claimed by the patent; the other admixtures contain only 1 or 2 of the 3 components, and are presented for the sake of comparison. *See,* for example, Table XI, mix 37 (the admixture contains all three components, being the thiocyanate, the alkanolamine, and the nitrate); Table XI, mix 36 (the admixture contains only the thiocyanate and the nitrate); Table XI, mix 35 (the admixture contains only the nitrate); Table XI, mix 34 (the admixture contains only the thiocyanate); and Table IV, mix 12 (the admixture contains only the alkanolamine and the nitrate). Of the 74 mixes listed, only about half of them contain the patented three-component admixture.

FN12. MBT responds to this argument, in part, by noting that some of the tables list data only for final set, and do not address initial set. Tables XIX and XX, for example, show only the decrease in time to final set. MBT asserts this shows that time to initial set is not relevant to measuring whether the admixture accelerated hardness. The eight admixtures in these two tables, however, contain only one of the three components recited by the patent-that is, the admixtures in these tables include only the alkanolamine, and not the thiocyanate or the nitrate. The data in these Tables (and in others) are apparently presented to "separate out" the effect of one of the three specific components of the patented invention, and to show how the three components have a "surprising" beneficial interactive effect. For *every* cement mix containing the patented, three-component admixture, the Tables present data showing a decrease in time to both initial *and* final set. Thus, while the Court ultimately agrees with MBT that the '194 patent does not claim the admixture will accelerate the rate of initial set, Tables XIX and XX do not support MBT's position.

[11] It is hornbook law, however, that the scope of a claim should not be limited to the preferred embodiment or specific examples disclosed in the specification. Vitronics, 90 F.3d at 1582; Ekchian, 104 F.3d at 1303. While the preferred embodiments may prove that MBT's invention achieves its "objective" of "advantageously accelerat[ing] the rate of hardening and setting of the cement mix," MBT chose to claim only that the admixture would accelerate the rate of hardening.

Extrinsic evidence also strongly supports this conclusion. The evidence was clear, and the parties do not dispute, that, to a person reasonably skilled in the art, there are two critical points in time regarding the stiffness of a cement mix-when it reaches initial set, and when it reaches final set. This is because, as noted above, the time of initial set is when the concrete should no longer be worked, and the time of final set is when the forms into which the concrete was poured can be removed. These benchmarks are so important that there are several different, accepted tests for determining when "initial set" and "final set" occur, and these tests do not necessarily agree with each other. *See* footnote 4, above (describing three different penetrometer tests and the "slump test," all of which are standardized ASTM tests); *see also* ASTM C 125 at 3 (defining the terms "time of setting," "time of final setting," and "time of initial setting," and noting that "[d]evelopment of rigidity during setting is a gradual and continuous process, and the time of setting is defined arbitrarily in terms of a given test method") (emphasis added); ASTM C 403/C at para. 5.1 ("[s]ince the setting of concrete is a gradual process, any definition of time of setting must necessarily be arbitrary").FN13 Indeed, in the "description of preferred embodiments" section, MBT states it measured these beneficial effects "in accordance with current applicable ASTM standards. " '194 patent, col. 4, lines 31-32.

FN13. While MBT used the "slump test" (ASTM C 143) to measure initial and final set in Tables I-XX, a person reasonably skilled in the art would understand that the results would have been essentially the same using the other tests, as well.

This extrinsic evidence confirms, however, that it is only when the cement has stiffened to the point that it has reached "final set" that the cement is described as "hard." ASTM C125, which recites the "standard terminology relating to concrete," explains that admixtures are used to modify the properties of a cement mix that is "freshly mixed, setting, *or* hardened." ASTM C 125 at 1 (defining "admixture") (emphasis added). The use of the disjunctive suggests that an admixture can modify the *setting* properties of cement without modifying *hardening,* and vice versa. One skilled in the art, then, would surely understand and adopt the following explanation of the difference and relation between "setting" and "hardness," taken from a leading treatise in the field:

"The stiffening times of cement paste or mortar fraction are determined by setting times. The setting

characteristics are assessed by "initial set" and "final set." When the concrete attains the stage of initial set it can no longer be properly handled and placed. *The final set corresponds to the stage at which hardening begins*."

Concrete Admixtures Handbook: Properties, Science, and Technology, s. 1.7 ("Cement Science, Setting") at 15 (V.S. Ramachandran ed.1984). This same treatise makes clear that setting and hardening are related but separate concepts: "accelerating admixtures slightly accelerate or do not modify setting times, therefore the word 'accelerating' should be employed to indicate early strength development, in place of 'setting times.' " *Id*. s. 3.1.1 at 120.

In sum, a person skilled in the art would understand that the term "accelerate the rate of hardness" must be construed with reference only to final set, for the simple reason that the time it takes cement to "harden" is only passingly related to the time it takes for the cement to reach initial set. Thus, Euclid's suggested construction is inaccurate by virtue of requiring too much. MBT's suggested construction, however, is inaccurate by virtue of requiring too little. As noted above, the question of whether acceleration has occurred must be measured at *some* point in time, and MBT suggests, vaguely, only that the measurement be a "decrease [in] the amount of time of set of the cement." The rate of hardening must be measured relative to *final* set.

The ordinary and customary meaning, to a person skilled in the art, of the term "hardened," refers, at the earliest, to the point in time that the cement reaches final set. It is at this juncture that the cement is first classified as "hardened" by persons skilled in the art. Indeed, only after cement has reached final set can it reasonably be strength-tested-it would be impossible to attempt to fracture a cube-shaped piece of cement if the cement mix still has a slump. Once the cement reaches final set, it may become still harder and stronger, but the point in time of final set is when it becomes "hardened." To accelerate the rate of hardening of cement, then, must mean, to one skilled in the art, to decrease the time it takes for the cement to reach final set.

Ultimately, then, the Court concludes that, when MBT claimed invention of an additive that will "accelerate the rate of hardening of [the] hydraulic cement mix," it claimed invention of an admixture that will "decrease the amount of time it will take for an hydraulic cement mix to reach final set, relative to a plain mix." The Court construes the claim language accordingly.

b. "Increase Compressive Strength after Hardening "

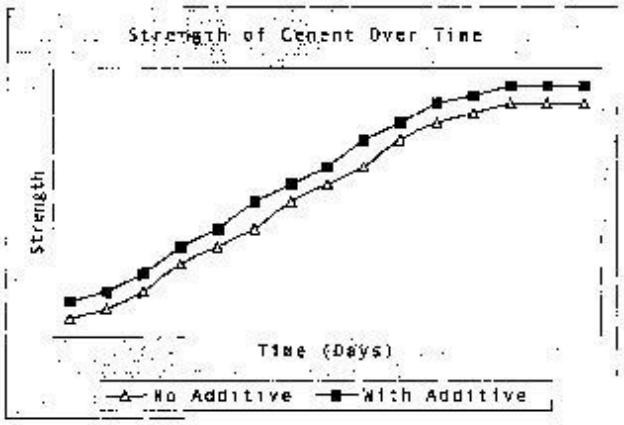
[12] The second function described in the functional clause of claims 1, 20, and 38 is that the admixture will "increase [the] compressive strength [of the hydraulic cement mix] after hardening." Euclid asserts the Court should construe this phrase to mean that addition of the admixture will "increase the compressive strength of the hydraulic cement mix relative to a plain mix at any age of the hydraulic cement mix after it hardens." FN14 MBT, while conceding that the claim language needs clarification, objects especially to inclusion of the phrase "at any age." MBT first proposed, instead, that the Court should construe the phrase to mean that addition of the additive will "increase the compressive strength of the cement relative to plain mix (with no admixture)." Joint claim construction chart at 5. Over the course of briefing MBT modified its position somewhat, stating it claimed that cement to which its patented admixture was added, "after hardening, must exhibit a compressive strength greater than that of a like, but plain, cement mix (absent the additive/admixture) at a like time interval after mixing." Answering brief at 11. With this change, the difference between MBT's and Euclid's suggested constructions appears slight.

FN14. Notably, this proposed construction supports the Court's construction of the term "accelerate the rate of hardening." Euclid's reference to the strength of cement "after it hardens" confirms that hardening occurs at a specific juncture, so that measurement of the rate of hardening with reference to more than one point in

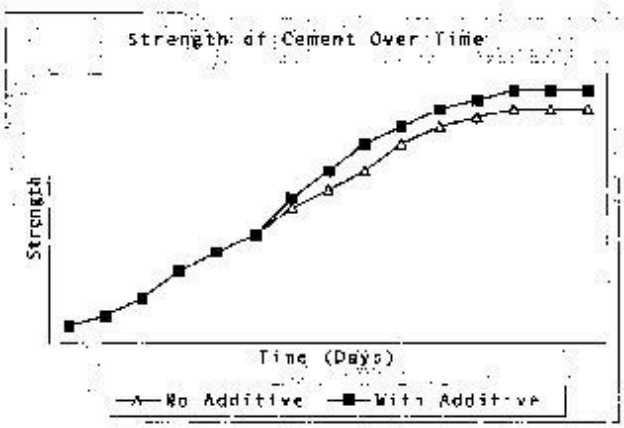
time is inappropriate.

To begin with, as noted above, the phrase "after hardening" clearly refers to, at the earliest, a point in time *after* final set has occurred. The question raised by the parties is whether the claimed increase in compressive strength must appear at *every* time of measurement thereafter, or only at *some* point(s) thereafter. Put differently, does the patent cover only the admixture shown in scenario four, below, where the compressive strength of the concrete with the admixture is superior at all times after hardening, or does it also cover the admixtures shown in scenarios five and six, where compressive strength is superior only early or late in the life of the hardened concrete?

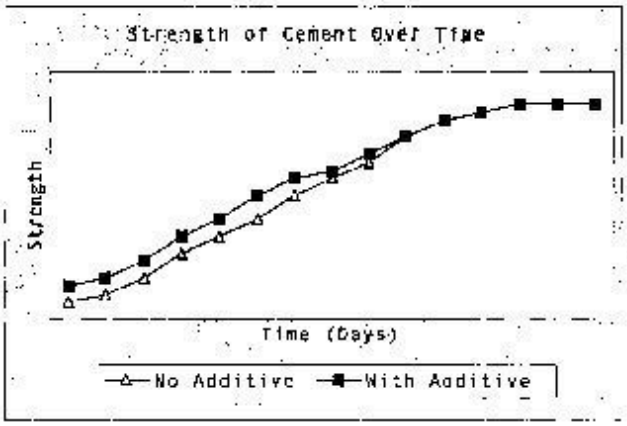
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Scenario 4: The additive gives the cement greater strength at initial hardening and at all times subsequent.



Scenario 5: The additive does not increase the strength of the cement at initial hardening or for some period thereafter, but eventually gives the cement greater strength.



Scenario 6: The additive gives the cement greater strength at initial hardening and for some period thereafter, but eventually a "plain mix" obtains equal strength.

The Court concludes that the claim language, the patent specification, the prior cited art, and the extrinsic evidence all point to the same conclusion: the '194 patent claims that the admixture will "increase the compressive strength of the hydraulic cement mix, relative to a plain mix, when measured at a like time interval after hardening."

First, the plain language of the claim states simply that, when the admixture is added to an hydraulic cement mix, it will "increase its compressive strength after hardening." Put simply, the ordinary and customary meaning of this phrase is that, once the cement is hardened, it will be stronger. The plain language does not suggest that the cement will be stronger for a while, but then only equally strong as a cement without the

admixture; nor does the plain language suggest that the cement will only become stronger some time long after it has hardened. MBT adopts this position itself when it states that the claim language "is neither limited to early compressive strength, nor to ultimate compressive strength, nor to the strength at any other particular time." Answering brief at 11. Rather, a layman would understand the ordinary and customary meaning of the claim language to assert that, if you compare two cement mixes after they have hardened-one with and one without the admixture-the one with the admixture would be stronger. Furthermore, a layman would understand that the strength of the two cement mixes must be measured at similar points in time-the patent is not claiming that a *5-day-old* cement mix with the additive will be stronger than a *25-day-old* plain cement mix. Rather, if you compare two hardened cement mixes of equal age, the one containing the admixture will have higher compressive strength.

The patent specification language supports this conclusion. The "background of the invention" section of the patent notes that the "invention relates to admixture compositions for incorporation into hydraulic cement mixes ... to provide ... compressive strength *at all ages*." '194 patent, col. 1, lines 14-16 (emphasis added). In the "summary of the invention" section, MBT explains that the admixture "yields beneficial effects ... on *early and ultimate* compressive strength [of cementitious mixes] after hardening." Id. at col. 2, lines 59-61 (emphasis added).FN15 The data presented by MBT in the patent specification then confirms that the patent is referring to a comparison between (1) cements with and without the admixture (2) when measured at any similar period of time after hardening. In the "description of preferred embodiments," MBT provides extensive data showing the increases that different formulations of the patented admixtures have on the compressive strength of cement mixes. As noted earlier, the specification lists 72 examples of cement mixes to which were added various admixture formulations. These Tables generally show that the 1-day, 3-day, 7-day, and 28-day compressive strength measurements for cement mixes to which were added the patented three-component admixtures are stronger than the same mixes without the admixture. Thus, for example, Table X, mix 29 shows that the admixture increased 1-day compressive strength by 45% and 3-day compressive strength by 12%. Some of the Tables present compressive strength data for only the 1-day time period (e.g., Table V), some for the 1-day and 3-day time periods (e.g., Table X), and some for the 1-day, 7-day, and 28-day time periods (e.g., Table XII). While the scope of the claims should not be limited to the preferred embodiment or specific examples, the claims should be read in view of their specification. Vitronics, 90 F.3d at 1582. Here, the specification is completely parallel with the Court's understandingof the ordinary and customary meaning of the claim language.

FN15. In describing the "object[s] of the invention," however, MBT does not address "ultimate" compressive strength, stating only that one objective is to "increase the *early* compressive strength." '194 patent, col. 3, lines 1-7 (emphasis added).

The prior art cited by MBT in its '194 patent also supports the conclusion that the claim language "increase compressive strength after hardening" is not limited to a period of time shortly after hardening, or any other period. MBT cites the "Burge Patent" (no. 3,782,991) and the "Rosskopf patent" (no. 4,373,956). The Burge patent is directed at a cement admixture with the "significant object" of providing " *early* strength." '991 patent at col. 2, lines 9-12 (emphasis added). The compressive strength measurements presented in the '991 patent specification cover only the first 48 hours after final set. Id. at col. 6, lines 42-53. The specification then makes special mention of the fact that the "rapid development of *early* strength, that is to say, 9 to 15 hours after preparation, can be clearly recognized." Id. at col. 6, lines 59-61 (emphasis added). In other words, the Burge patent uses the term "early strength" to mean the first two days after final set; after this time, the compressive strength is no longer referred to as "early," so that early strength does not mean, say, the first 28 days after final set.

In contrast, the Rosskopf patent (which, itself, cites Burge) is directed at increasing "the compressive strength" of cement mixes, not just the "early" compressive strength. '956 patent, col. 2, lines 65-68 ("use of

this additive ... results in an increase in compressive strength"). The Rosskopf patent specification, like MBT's '194 patent, then presents compressive strength data for the 1-day, 7-day, and 28-day periods after final set. *See, e.g.,* id. at col. 16, Table V. Further, the Rosskopf patent specification makes special mention of "the *early (one day)* compressive strength" data. Id. at col. 6, line 56 (emphasis added). This suggests that the two phrases used by MBT in the '194 patent specification-"early and ultimate compressive strength," and "compressive strength at all ages"-would be understood by a person reasonably skilled in the art as meaning the compressive strength during the entirety of the period following hardening, or final set.

Finally, the expert testimony at the *Markman* hearing made clear that: (1) the compressive strength of concrete normally increases with time over the first 28 days, and then levels off; and (2) measurements of compressive strength are commonly measured at the end of 16 hours, and then at the end of 1, 3, 7, 28, 60, and 365 days. (Generally, the latter two measurements merely confirm that any changes in compressive strength after 28 days are slight.) Given that compressive strength of concrete is commonly measured by those skilled in the art for such a long period of time, and given that the '194 patent claim language (as opposed to the patent specification) does not limit itself to "early" or "ultimate" compressive strength, the Court concludes MBT has claimed that its additive will make cement stronger after hardening, regardless of when after hardening the strength of the cement is measured. It appears that MBT's position, at least as stated in its answering brief, is the same.

Accordingly, the Court construes the functional clause of claims 1, 20, and 38 of the '194 patents as follows: "said admixture being present in an amount sufficient to: (1) decrease the amount of time it will take for an hydraulic cement mix to reach final set, relative to a plain mix; and (2) increase the compressive strength of the hydraulic cement mix, relative to a plain mix, when measured at a like time interval after hardening."

III. Procedure.

Having construed the claims, the next step in this litigation is to determine validity and infringement. The Court has previously extended the deadlines for discovery, expert reports, and dispositive motions. If the parties believe that, with the benefit of the Court's construction of the patent claim language, a status conference and/or settlement conference would be helpful or appropriate, they should contact the Court. Otherwise, the parties should strictly adhere to the existing deadlines for discovery, exchange of expert reports, and dispositive motions, as most recently extended by the Court's Order dated September 16, 2002.FN16

FN16. Having now closely examined the nature of the parties' disputes, the Court is less convinced that its claims construction materially affects the scope of discovery in this case. Thus, the Court now questions the wisdom of having earlier allowed repeated extensions of time for discovery, pending issuance of this opinion. As a result, the Court expects the parties to pursue this matter within the time frames set out in its September 16, 2002 Order. ***No further extensions of time will be granted.***

IT IS SO ORDERED.

N.D.Ohio,2002.
SKW Americas v. Euclid Chemical Co.

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