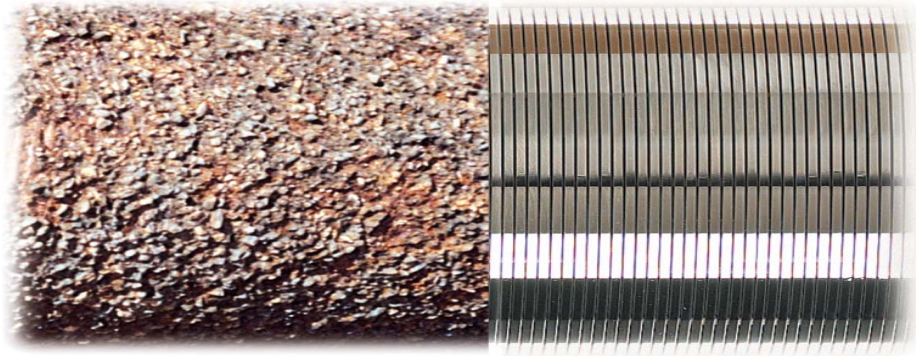




**CHEMICAL REHABILITATION:
THE SOLUTION FOR INEFFICIENT
WATER SYSTEMS**



NUWELL® CHEMICALS: ENVIRONMENTALLY-SAFE AND EFFECTIVE PRODUCTS TO IMPROVE YOUR WATER SYSTEM

To improve and maintain water systems, Johnson Screens is the single source for the industry's most comprehensive line of chemical solutions. Our chemicals:

Improve well production

Over time, water wells experience a build-up of biofilm, and/or mineral encrustation on the well screen which will degrade a well's production. Johnson's NuWell® products can remove these blockages and return a well to peak efficiency.

Lengthen well life

Keeping a well at peak efficiency eliminates or postpones costly replacement.

Are safe, easy, and convenient to apply

All of Johnson's products are NSF approved for use in potable water wells and other water filtering facilities. NuWell® Chemicals can be directly applied into a well, shortening costly

down time. This means faster, safer results without having to wait for less effective treatments to work.

Lower the cost of well operation

NuWell® Chemicals can lower the overall cost of operation. A highly efficient well means that pumps require less power to maintain a high output of water. Further, a pump that is working less has less wear, thus lowering maintenance requirements. A well that requires less power and maintenance costs less to operate.

Are safe to transport and store

All of our other NuWell® chemical products are considered non-hazardous materials and require no special handling or shipping precautions in standard containers. The only exception is NuWell® 120 Liquid Acid which is a strong liquid acid and must be shipped, stored, handled, and used as a hazardous material.



THE INDUSTRY'S BEST PRODUCT LINE GETS THE INDUSTRY'S BEST SUPPORT

In addition to offering a complete line of chemicals for water systems rehabilitation and maintenance, we offer unique and extensive support.

Our customer support staff ensures that every inquiry is answered in a timely, efficient manner.

The technical staff includes experts in the field of water well rehabilitation. We specialize in providing solutions to improve under-performing wells and other water handling facilities. Our chemicals have specific applications for specific problems. In addition, by combining various products the user can broaden the scope of rehabilitation. Included in this brochure are product applications and compatibility charts that will ensure the greatest effectiveness for each situation.

Johnson offers the following technical services:

- Well re-development options
- Pumping test analysis
- Troubleshooting Well Problems
- Chemical and bacterial analysis
- Chemical rehabilitation suggestions for any water handling facility

TREATMENT CHEMICALS

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NuWell® 100 PELLETIZED ACID



Description

- Dry pelletized acid that sinks in water for cleaning wells
- Cleans calcium & magnesium carbonate scale, iron deposits and moderate biological growth
- Contains inhibitor to protect metal surfaces and penetrants to clean deep into filter pack and formation
- Contains color indicator to allow visual monitoring of pH during treatment
- Can be poured directly into well without dangerous splashing and no vapors are released as evident with hydrochloric acid
- Easy to use and transport
- NSF certified for potable water well use

Application

NuWell 100 Pelletized Acid is formulated to be poured directly into the well. While it may be dissolved and pumped into the well as a liquid, the pellet form rapidly falls through the water column providing concentrated acid cleaning power at the bottom of the well. The sinking pellets are ideal for wells with short to moderate lengths of screen located at the bottom. Agitation of the acid into the blocked area will greatly enhance the effectiveness of the cleaning. The acid solution should remain in contact for a period of 12 to 24 hours, depending on the nature of the blockage. The table below provides recommended dosages for general well cleaning. The amount of acid consumed will depend on the degree of mineral scaling in the well.

	Screen Diameter	Number of 1-gal (9 lb) jars
Standard Dosage Recommended Quantities Per 5-ft. Screen Length	2 - inch	1/2
	3 - inch	1
	4 - inch	2
	5 - inch	3
	6 - inch	4
	8 - inch	5

Discharge the acid solution from the well, neutralize on the surface and dispose in accordance with the appropriate regulations.

Physical Properties, Shipping & Handling

Appearance Yellow-brown pellet
 Density Approx. 70 lbs/cu.ft.
 Solubility 20% by weight @ 20 C (Approximately 1 lb/gal of water)



- NuWell 100 Pelletized Acid is a strong acid-base and should not be stored with strong alkaline material or oxidizers
- Dust respirators and goggles should be worn where possibility of dust or mist exists
- Not regulated as a hazardous material under 49CFR 172.101, RECRA, SARA and CERCLA
- Can be shipped by UPS ground
- Additional physical and handling data are available on the product MSDS.
- Available in 4.5, 9, 45 and 70 lb. containers

NuWell® 110

GRANULAR ACID



Description

- Dry granular acid blend for cleaning residential, irrigation, commercial and municipal water wells
- Cleans calcium & magnesium carbonate scale, moderate iron deposits
- Contains inhibitor to protect metal surfaces and penetrants to clean deep into filter pack and formation
- Contains color indicator to allow visual monitoring of pH during treatment
- Can be poured directly into well without dangerous splashing
- No vapors are released as is evident with hydrochloric acid
- Easy to use and handle
- NSF certified for potable water well use

Application

NuWell 110 Granular Acid is used in well cleaning operations as a granular product introduced at the well head or dissolved and pumped into the well as a liquid. The granular form can settle throughout the water column providing a simple application, however, for improved cleaning, it is recommended to pull the pump and treat the well as follows:

1. **NuWell 110 Granular Acid** should be mixed into a tank containing a volume of water and acid equal to 40% of the total treatment volume. The attached table provides the recommended dosage for general well cleaning. When possible, obtain information on construction and performance history and submit samples for laboratory analysis before application to determine if dosage modifications are warranted.
2. This mixture should be placed evenly across the well screens. Placement methods should assure contact with affected regions at the desired concentration. Agitation of the acid into the plugged area will greatly enhance the effectiveness of the cleaning.
3. The acid solution should remain in contact for a period of 12 to 48 hours, depending on the nature of the plugging. Product has limited use where heavy deposits of gypsum are suspected (add **NuWell 310 BioAcid Dispersant** in this situation).
4. Monitor pH often during treatment and keep below 3.0 for effective cleaning. If pH rises above 3.0 add additional acid solution of approximately 20% of original dose. The amount of acid consumed will depend on the degree of mineral scaling.

Discharge the acid solution from the well, neutralize on the surface and dispose in accordance with the appropriate regulations.

For more effective acid cleaning use **NuWell 310 BioAcid Enhancer** with **NuWell 110 Granular Acid**. (See compatibility charts).

Physical Properties, Shipping & Handling:

Appearance	Yellow-white crystalline powder
Density	Approx. 80 lbs/cu.ft.
Solubility	20% by weight @ 20 C

- **NuWell 110 Granular Acid** is a strong acid-base and should not be stored with strong alkaline material or oxidizers
- Dust respirators and goggles should be worn where possibility of dust or mist exists
- Not regulated as a hazardous material under 49CFR 172.101, RECRA, SARA and CERCLA
- Can be shipped by UPS ground
- Additional physical and handling data are available on the product MSDS
- Available in 50 and 80 lb. containers



Certified to
ANSI/NSF 60

DOSAGE GUIDE

NuWell® 110 GRANULAR ACID

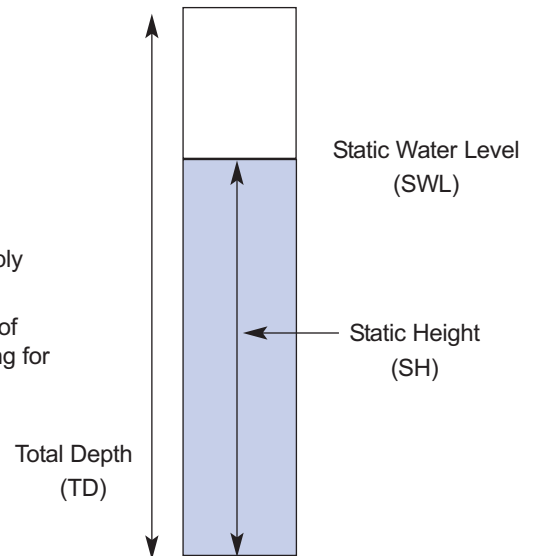
Nominal OD		Standard Dosage	
Inches	MM	Lbs/Ft	Kg/M
2	51	0.07	0.10
3	76	0.15	0.23
4	102	0.27	0.41
5	127	0.43	0.63
6	152	0.61	0.91
8	203	1.1	1.6
10	254	1.7	2.5
12	305	2.5	3.6
14	356	3.3	5.0
16	406	4.4	6.5
18	457	5.5	8.2
20	508	6.8	10.1
22	559	8.2	12.3
24	610	9.8	14.6
26	660	11.5	17.1
30	762	15.3	22.8
34	864	19.7	29.3
36	914	22.1	32.8

- STEP 1: Determine Static Height (TD - SWL)
- STEP 2: Multiply Static Height x table value
- STEP 3:* Mix NuWell 110 Granular Acid to water and apply

Example: Treat 12" Well, 180 ft TD, SWL = 40 ft

- STEP 1: Static Height = 180 - 40 = 140 ft
- STEP 2: Amt Acid = 140 ft x 2.5 lbs/ft = 350 lbs
- STEP 3:* Mix 350 lbs NuWell 110 Granular Acid to water and apply

* Better results can be achieved when the total treatment volume of chemical solution is 1.5 to 2 times the static well volume (allowing for penetration into surrounding formation).



NuWell® 120 LIQUID ACID

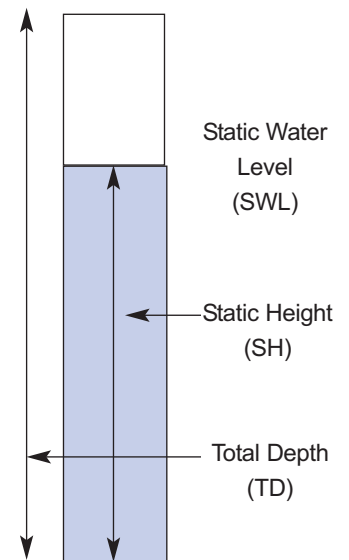
NuWell-120 Liquid Acid can be the optimum basic ingredient for many cleaning applications. It is a liquid food grade phosphoric mineral acid used in well, filter bed and water system equipment cleaning to remove common mineral deposits (Iron, Manganese, Sulfates and Carbonates).

Unlike Hydrochloric (Muriatic) Acid, NuWell-120 Liquid Acid is safer to use, has slower reactivity, and does not give off harmful vapors.

Unlike Hydrochloric (Muriatic) Acid, NuWell-120 Liquid Acid is far less corrosive to metals. (When used with NuWell-310 BioAcid Dispersant a degree of protective metal passivation results).

NuWell-120 Liquid Acid, properly mixed with NuWell-310 BioAcid Dispersant yields a very concentrated, effective, environmentally friendly, economical cleaning chemistry that is readily flushed from the system enabling quick return to service.

Nominal OD		Standard Dosage	
Inches	MM	Gals/Ft	L/M
2	51	0.01	0.17
3	76	0.03	0.38
4	102	0.06	0.68
5	127	0.09	1.07
6	152	0.12	1.54
8	203	0.2	2.7
10	254	0.3	4.3
12	305	0.5	6.1
14	356	0.7	8.4
16	406	0.9	10.9
18	457	1.1	13.8
20	508	1.4	17.1
22	559	1.7	20.7
24	610	2.0	24.6
26	660	2.3	28.9
30	762	3.1	38.4
34	864	4.0	49.3
36	914	4.5	55.3



STEP 1: Determine Static Height of Well: $SH = TD - SWL$

STEP 2: From Table, determine Std Dosage Value by Diameter

STEP 3: Calculate Volume NuWell 120 Liquid Acid required: $SH \times Dosage = (\text{Gal/Liters}) \text{ NW120}$

Example: Treat 12-inch Well, 180 ft Total Depth, Static Level = 40 ft

STEP 1: Static Height = $(180 \text{ ft} - 40 \text{ ft}) = 140 \text{ ft}$

STEP 2: Dosage Value = 0.5 Gal/Ft (12 inch well)

STEP 3: Vol NuWell 120 Liquid Acid = $(140 \text{ ft} \times 0.5 \text{ Gal/ft}) = 70 \text{ Gal}$

Physical Properties, Shipping & Handling

Appearance: Colorless to lightly colored liquid, no odor

Density: 13 Lbs/Gal

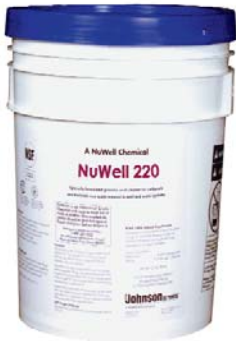
Solubility in Water: Complete

pH: Aqueous approximately 1.00 - 2.00

- NuWell 120 Liquid Acid is a strong acid-base and should not be stored with strong alkaline material or oxidizers
- Dust respirators and goggles should be worn where possibility of dust or mist exists
- Hazardous Class : 8, UNI 805, PGIII
- Can be shipped by UPS ground DOT Label CORROSIVE
- Additional physical and handling data are available on the product MSDS.
- Available in 15 and 55 Gal. containers

NuWell® 220

DISPERSANT POLYMER



Description

- Liquid dispersant chemistry specifically designed to remove mud and clay from the well environment more efficiently than other products
- Successfully develop new wells without using phosphate
- Eliminates food source for bacteria (100% water soluble, readily flushed from well)
- Rehabilitate old wells plugged with clays silts and fines
- NSF certified for potable water well use

Application

New Well Systems

Use [NuWell 220 Dispersant Polymer](#) as you would phosphates to break down drilling mud and develop wells. For optimal removal of bentonite drilling fluids separately pre-treat the well with 1,500 ppm chlorine to breakdown polyacrylamide polymers that are included in most commercial bentonite products. Determine borehole volume and apply [NuWell 220 Dispersant Polymer](#) at the rate of 1 gallon per 500 gallons of water. Vigorously agitate by mechanical means for several hours (approximately 1/2 hour per 20 ft. of intake). If left in overnight, agitate before pump out.

Older Well Systems

[NuWell 220 Dispersant Polymer](#) removes fine sands, mud and clays that have filled in the gravel pack and well borehole. Use at a rate of 1 gallon per 300 gallons of water (see dosage table). Vigorously agitate by mechanical means, let the solution stand overnight and repeat the agitation the next day before pump out.

Physical Properties, Shipping & Handling

Appearance	Clear, amber liquid
pH (as shipped)	7.0
Density	10.5 lbs/gal
Freeze point	26°
Solubility	100%

- Not regulated as a hazardous material under 49CFR 172.101, RECRA, SARA and CERCLA, however, in storage or use, avoid contact with strong acids or alkaline-based products
- Can be shipped by UPS ground
- Additional physical and handling data are available on the product MSDS
- [NuWell 220 Dispersant Polymer](#) is available in 1, 5, 30 and 55 gallon containers



Certified to
ANSISNF 60

DOSAGE GUIDE

NuWell® 220 CLAY DISPERSANT

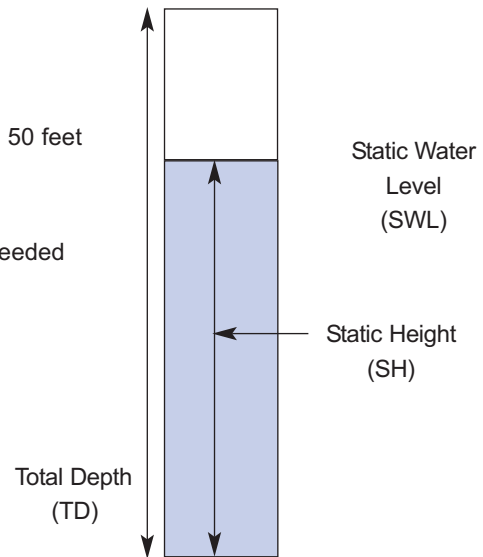
Nominal OD		Gallons / Foot		Liters / Meter of Depth	
Inches	MM	New Well	Old Well	New Well	Old Well
2	51	0.0005	0.0009	0.0068	0.0111
3	76	0.0012	0.0020	0.0152	0.0251
4	102	0.0022	0.0036	0.0270	0.0446
5	127	0.0034	0.0056	0.0422	0.0697
6	152	0.0049	0.0081	0.0608	0.1003
8	203	0.007	0.011	0.081	0.134
10	254	0.010	0.017	0.127	0.209
12	305	0.015	0.024	0.182	0.301
14	356	0.020	0.033	0.248	0.410
16	406	0.026	0.043	0.324	0.535
18	457	0.033	0.055	0.410	0.677
20	508	0.04	0.07	0.51	0.84
22	559	0.05	0.08	0.61	1.01
24	610	0.06	0.10	0.73	1.20
26	660	0.07	0.11	0.86	1.41
30	762	0.09	0.15	1.14	1.88
34	864	0.12	0.19	1.46	2.42
36	914	0.13	0.22	1.64	2.71

Note: Allowance for additional surface volume should be treated with an additional 1-Gal NuWell 220 / 500 Gals of surface system volume (2 liters / cubic meter of surface volume).

- STEP 1: Find Dosage Factor (Old or New Well)
 STEP 2: Multiply Static Height x Dosage Factor
 STEP 3: Mix and apply to well or circulating system

Example: Old 12 inch well, Total Depth = 600 ft, SWL = 50 feet

- 1: Dosage Factor = 0.024 Gal/Ft
- 2: 550 ft x 0.024 Gal/ft = 13 Gal
- 3: 13 Gallons of NuWell 220 Dispersant Polymer needed



NuWell® 310

BIOACID DISPERSANT



Description

NuWell 310 BioAcid Dispersant is a unique polymeric-acid chemistry that is the most effective product available for breaking down biofilm and dispersing mineral salts. **NuWell 310 BioAcid Dispersant** provides a considerable boost to any acid-cleaning operation, is readily biodegradable and may be used to treat potable water systems and related equipment. Some unique characteristics are:

- Maintains the acid reaction, holding minerals in suspension at elevated pH's above 3
- Controls sludging by preventing re-precipitation or adhesion for a more complete removal of biologic material during flushing
- Dislodges biofilm masses, associated with IRON OXIDIZING, SULFATE REDUCING and (more prevalent) SLIME-FORMING bacteria, which are not removed by mineral acids alone
- Sequesters iron and inhibits corrosion on metal surfaces. The iron sequestering allows the chemical solution to remove heavy accumulation of iron compounds, which often account for the fouling of water systems
- Protects all forms of metal in the system and will not attack plastic, neoprene, or other synthetic materials eliminating the need for acid inhibitors
- Provides passivation of metals when used with Phosphoric acid
- NSF certified for cleaning potable water wells, pipelines and filter systems

Application

NuWell 310 BioAcid Dispersant is designed to mix with acid solutions to improve the acid cleaning reaction. Standard dosage is 3% (1%-2% for maintenance). Dosage of **NuWell 310 BioAcid Dispersant** can range from 0.5% to 5% (by weight) of treatment volume. Optimum concentration depends on the type and severity of the deposit. Johnson recommends the client submit well construction and performance history along with water samples for lab analysis to properly determine dosage on large municipal and industrial wells.

1. Best application is to surface prepare a solution of water, acid and **NuWell 310 BioAcid Dispersant** equal to approximately 40% of the total static volume.
2. Into a vessel of appropriate size, first add water, then acid, then **NuWell 310 BioAcid Dispersant**. (**Note: NEVER add water to acid! Also: DO NOT mix NuWell 310 BioAcid directly to commercial concentrations of liquid acid as polymer destruction may occur.**)
3. The surface-solution should be placed evenly across the intake zone. Placement methods should assure contact with affected areas at the desired concentration. Agitation of the cleaning solution will greatly enhance the effectiveness of the cleaning.
4. The solution should remain in contact for 18 to 48 hours, depending on the nature of the deposit. The pH should be monitored and kept below 3.0 during treatment. If additional acid is needed (to lower pH) add an amount equal to approximately 20% of the initial amount of acid applied.
5. Discharge the acid solution from the well, neutralize at the surface and dispose in accordance with local regulations.

Physical Properties, Shipping & Handling

Appearance :	Amber Liquid	Solubility :	20% by weight @ 20 C.
Density :	Approx. 10 lbs/gal	pH (as shipped) :	2.3

- **NuWell 310 BioAcid Dispersant** is an acid-based liquid. Avoid contact with strong alkaline materials or oxidizers. Use of protective clothing is recommended especially where the possibility of inhalation exists. Most acids and alkaline material will not affect **NuWell 310 BioAcid Dispersant** at concentrations below 25%
- Not regulated as a hazardous material under 49CFR 172.101, RECRA, SARA and CERCLA
- Can be shipped by UPS ground
- Additional physical and handling data are available on the product MSDS
- **NuWell 310 BioAcid Dispersant** is available in 1, 5, 30, and 55 gallon containers



Certified to
ANSI/NSF 60

DOSAGE GUIDE

NuWell® 310 BIOACID DISPERSANT

Nominal OD		Well Volume		Standard Dosage - 3%	
Inches	MM	Gal/Ft	Liters/M	Gal/Ft	Liters/M
2	51	0.16	2	0.004	0.051
3	76	0.37	5	0.009	0.114
4	102	0.65	8	0.016	0.203
5	127	1.02	13	0.026	0.317
6	152	1.47	18	0.037	0.456
8	203	2.62	32	0.07	0.81
10	254	4.09	51	0.10	1.27
12	305	5.89	73	0.15	1.82
14	356	8.02	99	0.20	2.48
16	406	10.47	130	0.26	3.24
18	457	13.25	164	0.33	4.10
20	508	16.36	203	0.41	5.07
22	559	19.80	245	0.49	6.13
24	610	23.56	292	0.59	7.30
26	660	27.65	343	0.69	8.56
30	762	36.82	456	0.92	11.40
34	864	47.29	586	1.18	14.64
36	914	53.01	657	1.32	16.42

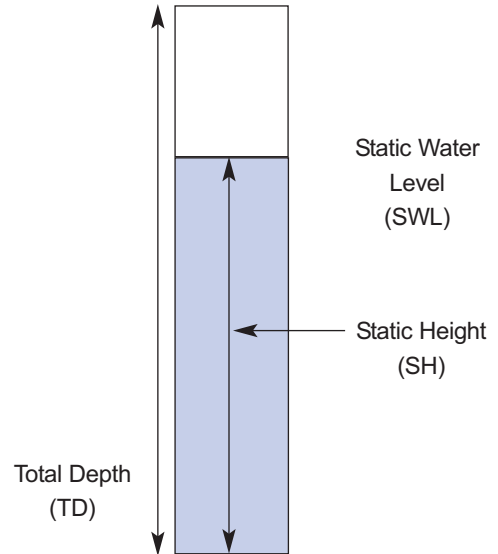
Note: Standard Dosage is for well rehabilitation. For routine maintenance, reduce dosage by 30%-50%.

- STEP 1: Determine Static Height of water in well
- STEP 2: Multiply height x Dosage above
- STEP 3:* Mix NuWell 310 BioAcid Dispersant into acid solution and apply to well

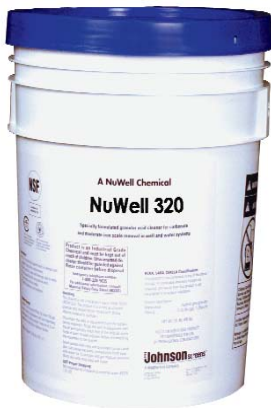
Example: 12 inch well, Total Depth=600 ft, SWL=50 ft

- STEP1: Static Height = 600 - 50 = 550 ft
- STEP2: 550 ft x 0.15 Gal/ft = 82.5 Gal
- STEP3*: 83 Gal NuWell 310 BioAcid Dispersant needed

* Better results can be achieved when the total treatment volume of chemical solution is 1.5 to 2 times the static well volume (allowing for penetration into surrounding formation)



NuWell® 320 BIOCAUSTIC DISPERSANT



Description

NuWell 320 Biocaustic Dispersant designed to enhance solubility of minerals and biological debris when used with caustic (alkaline) products for cleaning wells, potable water distribution lines or other structural systems. Water systems that are heavily fouled with bacteria are often cleaned with a strong caustic cleaner to help dissolve the biological matrix. While the caustic reaction effectively dissolves the polysaccharide exopolymer material (slime secreted by the bacteria), the high pH decreases the solubility of the mineral constituents causing precipitation of mineral-deposits in the area being cleaned. The unique characteristics of **NuWell 320 Biocaustic Dispersant** are:

- Prevents the precipitation of minerals that can clog openings while cleaning up the biological plugging
- Controls the sludge by preventing re-precipitation or adhesion for more complete removal of biologic material during flushing
- Dislodges biofilm masses, associated with Iron OXIDIZING, SULFATE REDUCING and (more prevalent) SLIME-FORMING bacteria, which are not completely removed by caustic solutions alone
- Increases the suspension of partially-dissolved minerals, silts, and bacterial slime
- Completely soluble in strong alkaline solutions with a pH of 7 to 14

Application

NuWell 320 Biocaustic Dispersant is typically used at a concentration of approximately 1.5 to 3% by weight of the treatment volume in the well or system being treated. In the case of pipe lines or storage tanks, the actual volume of cleaning solution being used should be the volume used for calculation. If the cleaning solution is to be surface blended then added to the well or water system, the caustic should be diluted at least one part caustic to nine parts water prior to the addition of the **NuWell 320 Biocaustic Dispersant**. Upon completion of cleaning, the caustic solution should be neutralized on the surface and disposed in accordance with the appropriate regulations.

Physical Properties, Shipping & Handling

Appearance	Amber Liquid
pH (as shipped)	8.4
Density	Approx. 9.5 lbs/gal
Solubility	100%

- This product is not considered dangerous and does not require special handling or disposal. However, in storage or use, avoid contact with strong acids or alkaline-based products. Most acids and alkaline material will not affect **NuWell 320 Biocaustic Dispersant** at concentrations below 25%
- Not regulated as a hazardous material under 49CFR 172.101, RECRA, SARA and CERCLA
- Can be shipped by UPS ground
- Additional physical and handling data are available on the product MSDS
- **NuWell 320 Biocaustic Dispersant** is available in 1, 5, 30, and 55 gallon containers



Certified to
ANSI/NSF 60

DOSAGE GUIDE

NuWell® 320 BIOCAUSTIC DISPERSANT

Nominal OD		Well Volume		Standard Dosage - 3%	
Inches	MM	Gal/Ft	Liters/M	Gal/Ft	Liters/M
2	51	0.16	2	0.004	0.051
3	76	0.37	5	0.009	0.114
4	102	0.65	8	0.016	0.203
5	127	1.02	13	0.026	0.317
6	152	1.47	18	0.037	0.456
8	203	2.62	32	0.07	0.81
10	254	4.09	51	0.10	1.27
12	305	5.89	73	0.15	1.82
14	356	8.02	99	0.20	2.48
16	406	10.47	130	0.26	3.24
18	457	13.25	164	0.33	4.10
20	508	16.36	203	0.41	5.07
22	559	19.80	245	0.49	6.13
24	610	23.56	292	0.59	7.30
26	660	27.65	343	0.69	8.56
30	762	36.82	456	0.92	11.40
34	864	47.29	586	1.18	14.64
36	914	53.01	657	1.32	16.42

Note: Standard Dosage is for Well Rehabilitation. For routine maintenance, reduce dosage by 30%-50%.

STEP 1: Determine Height of Static Water in Well

STEP 2: Multiply height X Dosage above

STEP 3:* Mix NuWell 320 Biocautistic Dispersant into caustic solution and apply to well

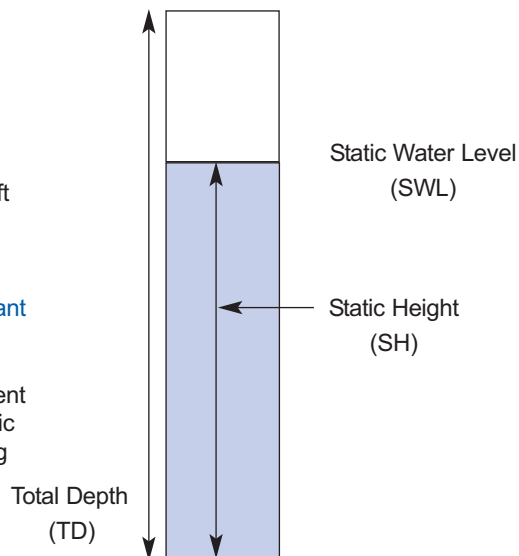
Example: 12 inch well, Total Depth=600 ft, SWL=50 ft

STEP1: Static Height = 600 - 50 = 550 ft

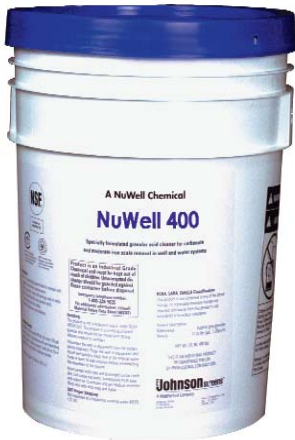
STEP2: 550 ft x 0.15 Gal/ft = 82.5 Gal

STEP3:* 83 Gal NuWell 320 Biocautistic Dispersant needed

* Better results can be achieved when the total treatment volume of chemical solution is 1.5 to 2 times the static well volume (allowing for penetration into surrounding formation).



NuWell® 400 NON-IONIC SURFACTANT



Description

NuWell 400 Non-Ionic Surfactant is a non-ionic surfactant capable of use over a wide pH range. The non-ionic nature assures that it will not react directly or interfere with any other chemistry being used. The surface active properties are excellent for improving penetration of hard deposits or for wetting surfaces to be cleaned.

NuWell 400 Non-Ionic Surfactant may also be used to improve flow characteristics of heavy fluid or muds used in well construction. By changing the surface tension **NuWell 400 Non-Ionic Surfactant** will improve clean up of oil or biologically fouled areas.

Application

NuWell 400 Non-Ionic Surfactant is used at the rate of 1 gallon per 1000 gallons of water in the system to be cleaned or the total gallons of cleaning solution to be used. If the system is being cleaned for oil or heavy biofouling, then use **NuWell 400 Non-Ionic Surfactant** at the rate of 1 gallon per 500 gallons.

Physical Properties, Shipping and Handling

Appearance	Straw Colored Liquid
Density	9.4 lbs/gal
Volatility	25%
pH	(as drummed) 8.5
Freeze Point	26° F
Solubility	100% in water

- Not regulated as a hazardous material under 49CFR 172.101 RCRA, RCRA 40CFR 261, SARA and CERCLA
- This product is not contained in any of the above listings; no reportable inventory listings are required; and waste from this product is not considered a hazardous substance
- The product is not considered dangerous and requires no special handling. Avoid contact with strong acids or alkaline-based products
- Additional physical and handling data are available on the product MSDS
- **NuWell 400 Non-Ionic Surfactant** is available in 1,5,30 and 55 gallon containers



Certified to
ANSI/NSF 60

DOSAGE GUIDE

NuWell® 400 NON-IONIC SURFACTANT

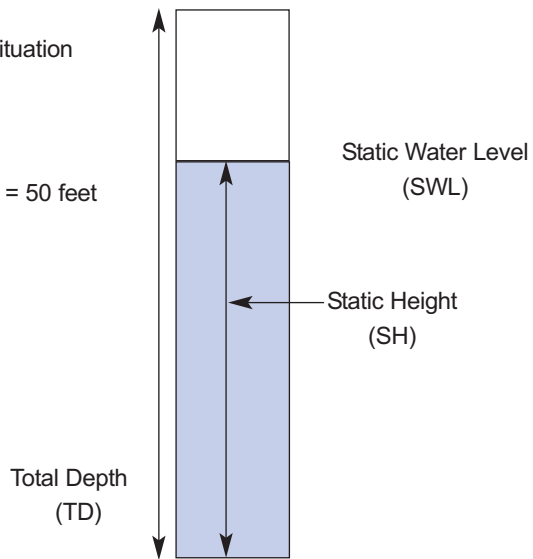
Nominal OD		Gallons / Ft		Liters / Meter	
Inches	MM	Standard Dose	Heavy Oils	Standard Dose	Heavy Oils
2	51	0.0003	0.0006	0.0041	0.0081
3	76	0.0007	0.0014	0.0091	0.0182
4	102	0.0012	0.0024	0.0162	0.0324
5	127	0.0019	0.0038	0.0253	0.0507
6	152	0.0027	0.0055	0.0365	0.0730
8	203	0.0036	0.0073	0.0486	0.0973
10	254	0.0057	0.0114	0.0760	0.1520
12	305	0.0082	0.0164	0.1094	0.2189
14	356	0.0111	0.0223	0.1490	0.2979
16	406	0.0145	0.0291	0.1946	0.3892
18	457	0.0184	0.0368	0.2463	0.4925
20	508	0.023	0.045	0.304	0.608
22	559	0.027	0.055	0.368	0.736
24	610	0.033	0.065	0.438	0.876
26	660	0.038	0.077	0.514	1.028
30	762	0.051	0.102	0.684	1.368
34	864	0.066	0.131	0.879	1.757
36	914	0.074	0.147	0.985	1.970

Note: Allowance for additional surface volume should be treated with an additional 1-Gal NuWell 400 /1000 Gals of surface system volume (1 liter / cubic meter of surface volume).

- STEP 1: Determine Static Height of water in well
- STEP 2: Find Dosage Factor for Std or (Heavy Oil) Situation
- STEP 3: Multiply Static Height x Dosage Factor
- STEP 4: This is the amount needed to treat a well.

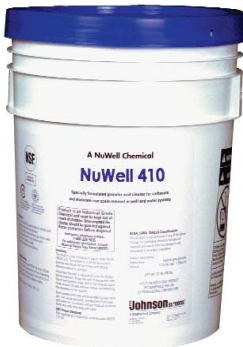
Example: Old 12 inch well, Total Depth = 600 ft, SWL = 50 feet with heavy accumulation of turbine oil.

- 1: Height = (600 - 50) = 550 ft
- 2: Dosage Factor = 0.0164 Gal/Ft
- 3: 550 ft x 0.0164 Gal/ft = 9.0 Gal
- 4: Add 9 gal into the cleaning solution.



NuWell® 410

CHLORINE ENHANCER



Description

- Use with hypochlorite to increase effectiveness of chlorination
- Maintains pH in well at 6.5 during chlorination, increasing hypochlorous acid
- Increases bacteriological activity by over 100 times that of hypochlorite
- Contains a penetrant to allow deeper and more complete disinfection
- Controls calcium in hard water to increase the effectiveness of calcium hypochlorite
- NSF certified for potable water well use

Application

Laboratory testing and field trials demonstrate that successful well chlorination is achieved with a chlorine concentration of 200 ppm. The following procedures are recommended for using **NuWell 410 Chlorine Enhancer** with chlorine concentrations of 200 ppm.

1. From p.17, determine the static volume, the amount of **NuWell 410 Chlorine Enhancer** and the amount of chlorine product necessary to treat the well. (Consideration should be given to increasing this volume by 2-4 times to allow sufficient disinfectant solution to reach all areas of the well and borehole that can harbor coliform bacteria or other contaminating organisms.)
2. In a tank on the surface, add the amount of **NuWell 410 Chlorine Enhancer** to water as estimated from dosage guide. Mix the solution and measure the pH. The pH of the solution should be between 4.5 and 5 before adding the hypochlorite. All mixing should be done in a well ventilated area.
Caution: When chlorine is placed in an acid pH of 5.0 or lower chlorine gas can be released. When the hypochlorite solution or powder is added, the pH will rise immediately preventing any further chlorine release, but you should add the hypochlorite quickly and move away until the pH rises.
3. Place the chlorine solution in the well evenly washing down the upper levels of the well before you place the solution throughout the water column. The mixture should be agitated or surged to ensure good coverage. Let the solution stand in the well for a period of 5 to 12 hours. Additional agitation prior to removal is beneficial. **NuWell 410 Chlorine Enhancer** is buffered to hold the pH at the optimum level, however if additional **NuWell 410 Chlorine Enhancer** is required, blend in a volume equal to 25% of the original mixed volume and add carefully so that the pH does not drop below 5.0 resulting in release of chlorine gas.
4. Pump the solution to the surface, neutralize using **NuWell 500 ChlorOut** and discharge in accordance with local rules and regulations.

Physical Properties, Shipping & Handling

Appearance	clear, light amber liquid
Density	9.3 lbs/gal
Volatility	non-volatile
pH (as shipped)	3.08
Solubility	100%

- This product is not considered dangerous and does not require special handling or disposal. Avoid contact with strong acids or alkaline-based products
- Not regulated as a hazardous material under 49CFR 172.101, RECLA, SARA and CERCLA
- Can be shipped by UPS ground
- Additional physical and handling data are available on the product MSDS
- **NuWell 410 Chlorine Enhancer** is available in 1, 5, 30 and 55 gallon containers



Certified to
ANSI/NSF 60

DOSAGE GUIDE

NuWell® 410 CHLORINE ENHANCER

Amounts of NuWell 410 Chlorine Enhancer and chlorine disinfectant needed per foot of static well depth.

Nominal Well Size	Well Volume in (Gal/Ft)	Amount of NuWell 410 (Quarts/Ft)	Amount of Chlorine Product		
			CaHypocl-65% (Lbs/Ft)	SodHyp-12% (Gal/Ft)	SodHyp-5% (Gal/Ft)
2	0.16	0.0007	0.0004	0.0003	0.0006
3	0.37	0.0015	0.0010	0.0006	0.0014
4	0.65	0.0026	0.0017	0.0011	0.0025
5	1.02	0.0041	0.0027	0.0017	0.0039
6	1.47	0.0059	0.0038	0.0025	0.0056
8	2.62	0.010	0.007	0.004	0.010
10	4.09	0.016	0.011	0.007	0.016
12	5.89	0.024	0.015	0.010	0.022
14	8.02	0.032	0.021	0.014	0.030
16	10.47	0.042	0.027	0.018	0.040
18	13.25	0.053	0.034	0.023	0.050
20	16.36	0.07	0.043	0.028	0.062
22	19.80	0.08	0.051	0.034	0.075
24	23.56	0.09	0.061	0.040	0.090
26	27.65	0.11	0.072	0.047	0.105
28	32.07	0.13	0.083	0.055	0.122
30	36.82	0.15	0.096	0.063	0.140
32	41.89	0.17	0.109	0.071	0.159
34	47.29	0.19	0.123	0.080	0.180
36	53.01	0.21	0.138	0.090	0.201
40	65.45	0.26	0.170	0.111	0.249
46	86.56	0.35	0.225	0.147	0.329

Note: Amounts based on application of 200-ppm chlorine concentration into well water with Alkalinity of 100-ppm.

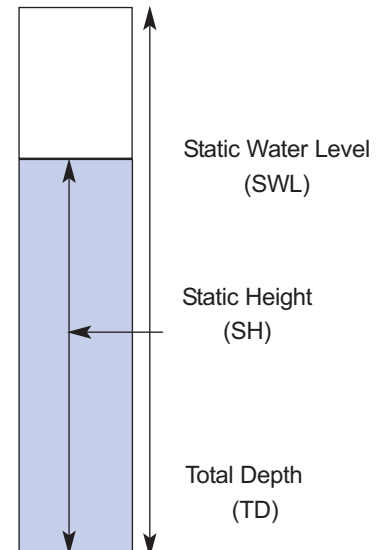
If well-water alkalinity, or the desired chlorine dosage level are greater than the standard values in the above table, adjust the amount of Chlorine Enhancer and the amount of hypochlorite concentrations as shown below.

NuWell 410 Chlorine Enhancer	Hypochlorite
Amount above x (Alk/100)	Amount above x (desired concentration/200)

- Step 1: Determine Static Height (TD - SWL)
 - Step 2: Multiply Amt Chlorine Enhancer from table x Static Ht
 - Step 3: Determine Amount of hypochlorite product from table above
 - Step 4: Surface Batch = Water + NuWell 410 Chlorine Enhancer + Hypochlorite
- Example: Disinfect a 16 inch well, TD = 300 ft, SWL = 50 ft with Calcium Hypochlorite 65% active

- Step 1: Static Ht = (300ft - 50ft) = 250 ft
- Step 2: Amt Enhancer = 250 ft x 0.042 qts/ft = 11 quarts
- Step 3: Amt Hyp = 250 ft x 0.027 lbs/ft = 6.8 lbs.
- Step 4: Batch: 250 ft x 10.47 gal/ft = 2,618 gal water (2,618 gal + 11 quarts + 6.8 lbs)

TIP: Optimum results are obtained when the surface solution is 2-4 times the well volume, providing sufficient hypochlorite-ions to disperse into the gravel pack and immediate surrounding formation where coliform organisms exist. (For large wells this may not be practical and multiple batches with proportions of chemistry may be required to achieve the desired results.)



NuWell® 500 CHLOROUT

Description:

- Use to neutralize chlorine solutions prior to disposal
- Concentrated crystal that is easy to dissolve for fast neutralization
- Safe to handle
- Easy to use

Application:

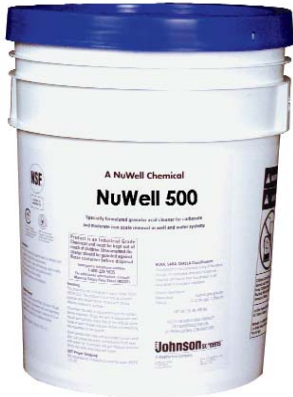
NuWell 500 ChlorOut is used on the surface after the well or system discharge has been pumped into a tank or holding pond as follows:

1. Measure the chlorine level in the water and calculate the dosage of NuWell 500 ChlorOut needed for neutralization as indicated on the table.
2. Mix NuWell 500 ChlorOut in with the chlorinated water and the chlorine levels will neutralize almost immediately. Where dechlorinating large volumes, dissolve NuWell 500 ChlorOut in one gallon of water for every pound of NuWell 500 ChlorOut required. Some heat is generated upon dilution.
3. Discharge to an approved outlet.

Physical Properties, Shipping & Handling:

Appearance	Odorless, coarse white to off white crystal
pH (7.5% solution)	8.6
Density	Approx. 80 lbs/cu.ft.
Solubility	100% in water

- This product is not considered dangerous and does not require special handling or disposal
- Not regulated as a hazardous material under 49CFR 172.101, RECRA, SARA and CERCLA
- Can be shipped by UPS ground
- Additional physical and handling data are available on the product MSDS
- NuWell 500 ChlorOut is available in 10 lb containers



Chlorine PPM at Discharge	Batch Volume To be Treated							
	Gallons				Cubic Meters*			
	100	250	500	1000	1	2	4	5
20	0.02	0.05	0.10	0.20	0.02	0.05	0.10	0.12
40	0.04	0.10	0.20	0.40	0.05	0.10	0.19	0.24
60	0.06	0.15	0.30	0.60	0.07	0.14	0.29	0.36
80	0.08	0.20	0.40	0.80	0.10	0.19	0.38	0.48
100	0.10	0.25	0.50	1.00	0.12	0.24	0.48	0.60
120	0.12	0.30	0.60	1.20	0.14	0.29	0.57	0.71
140	0.14	0.35	0.70	1.40	0.17	0.33	0.67	0.83
160	0.16	0.40	0.80	1.60	0.19	0.38	0.76	0.95
180	0.18	0.45	0.90	1.80	0.21	0.43	0.86	1.07
200	0.20	0.50	1.00	2.00	0.24	0.48	0.95	1.19
250	0.25	0.63	1.25	2.50	0.30	0.60	1.19	1.49
300	0.30	0.75	1.50	3.00	0.36	0.71	1.43	1.79
350	0.35	0.88	1.75	3.50	0.42	0.83	1.67	2.08
400	0.40	1.00	2.00	4.00	0.48	0.95	1.90	2.38
450	0.45	1.13	2.25	4.50	0.54	1.07	2.14	2.68
500	0.50	1.25	2.50	5.00	0.60	1.19	2.38	2.98
	Values are Lbs of NuWell 500 / Batch				Values are Kg of NuWell 500 / Batch			

NOTE: For best results, first dissolve NuWell 500 ChlorOut in water then add to the well discharge as a solution. (About 1 lb NuWell 500 ChlorOut to 1 gallon water) *1 cubic meter = 1,000 liters

The above table shows the amount (Lbs or Kg) of NuWell 500 ChlorOut that is necessary to mix into various volumes of discharge water to neutralize a specific chlorine concentration level. Example: To neutralize a 1000 gal. tank of well discharge with a chlorine concentration of 180 ppm, dissolve 1.8 lbs of NuWell 500 ChlorOut into approximately 2 gal. water then add to the tank.

PRODUCT APPLICATION GUIDE

PRODUCT	Code	Carbonate Scale Removal	Sulfate Scale Removal	Iron / Manganese Scale Removal	Biofilm Removal	Hydro-carbon Removal	Drill Mud Breakdown	Remove Clays & Bentonite	Buffer Chlorine	Neutralize Chlorine
NuWell® 100 Pelletized Acid	A	Good	Fair	Fair	Poor	Poor	NO	NO	Fair	NO
		(A+E) Very Good	(A+E) Very Good	(A+E) Very Good	(A+E) Good	(A+G) Fair-Good				
NuWell 110 Granular Acid	B	Good	Fair	Fair	Poor	Poor	NO	NO	Fair	NO
		(B+E) Very Good	(B+E) Very Good	(B+E) Very Good	(B+E) Good	(B+G) Fair-Good				
NuWell 120 Liquid Acid	C	Good	Good	Good	Poor	Poor	NO	NO	Good	NO
		(C+E) Very Good	(C+E) Very Good	(C+E) Very Good	(C+E) Very Good	(C+E+G) Good				
NuWell 220 Clay Dispersant	D	NO	NO	NO	NO	NO	Fair	Good	NO	NO
							(D+X) Very Good			
NuWell 310 BioAcid Dispersant	E	Poor	Poor	Poor	Good	Poor	NO	Fair	Good	NO
		(C+E) Very Good	(C+E) Very Good	(C+E) Very Good	(C+E) Very Good	(C+E) Fair		(E+G) Good		
NuWell 320 BioCaustic Dispersant	F	NO	NO	NO	Fair	Poor	NO	NO	NO	NO
					(Caustic+F) Very Good					
NuWell 400 Non-ionic Surfactant	G	Add Surfactant to NW-100, NW-110 or NW-120, NW-310 or NW-320 to improve penetration of cleaning chemistry and hydrocarbon solubility.					NO	NO	NO	NO
NuWell 410 Chlorine Enhancer	H	NO	NO	Good	Fair	Fair-Good	NO	NO	Very Good	NO
				(especially iron hydroxides)						
NuWell 500 ChlorOut	I	NO	NO	NO	NO	NO	NO	NO	NO	Very Good
	X	Commercial sodium or calcium hypochlorite up to 1200 ppm to facilitate polyacrylamide breakdown.								

PRODUCT COMPATIBILITY GUIDE

PRODUCT	NuWell 100	NuWell 110	NuWell 120	NuWell 220	NuWell 310	NuWell 320	NuWell 400	NuWell 410	NuWell 500
NuWell 100 Pelletized Acid		Yes	Yes	NO	Yes	NO	Yes	NO	NO
NuWell 110 Granular Acid	Yes		Yes	NO	Yes	NO	Yes	NO	NO
NuWell 120 Liquid Acid	Yes	Yes		NO	Yes	NO	Yes	NO	NO
NuWell 220 Clay Dispersant	NO	NO	NO		NO	Yes	NO	NO	NO
NuWell 310 BioAcid Dispersant	Yes	Yes	Yes	NO		NO	Yes	Yes	NO
NuWell 320 BioCaustic Dispersant	NO	NO	NO	Yes	NO		Yes	NO	NO
NuWell 400 Non-ionic Surfactant	Yes	Yes	Yes	NO	Yes	Yes		Yes	NO
NuWell 410 Chlorine Enhancer	NO	NO	NO	NO	Yes	NO	Yes		NO
NuWell 500 ChlorOut	NO	NO	NO	NO	NO	NO	NO	NO	
	YES - Products blend well together for enhanced performance.								
	NO - Blending of these products in not recommended.								

Note: Johnson Screens, Inc. assumes no liability if the recommended dosage and application instructions are not followed.



A COMPREHENSIVE OVERVIEW OF CHEMICAL USE IN WATER WELLS

The Chemical Cleaning, Disinfection and Decontamination of Water Wells is a compact but complete assessment of the important place certain chemicals have in modern water treatment and water system construction and maintenance programs.

Included in this text are complete descriptions of nearly every chemical frequently used in water supply applications. The focus is on effective, efficient use of these chemicals singly or in combination to achieve better well rehabilitation, water system cleaning and water

quality treatment. Diagrams, formulas, mix ratios and other technical data are included. Also included is a discussion of the proper handling techniques for each chemical and, where appropriate, clear warnings about possible hazards and the conditions that can cause them.

The text is in a convenient 6 3/8" x 9 1/4" format for taking on job sites as well as classrooms or labs. Contact Johnson Screens for ordering information.



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