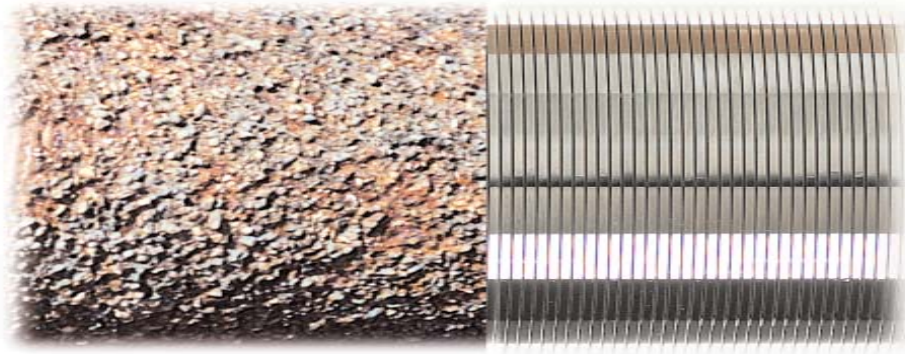




**CHEMICAL REHABILITATION:
THE SOLUTION FOR INEFFICIENT
WATER SYSTEMS**



NUWELL® CHEMICALS: ENVIRONMENTALLY SAFE AND EFFECTIVE PRODUCTS FOR IMPROVING YOUR WATER SYSTEM

Johnson Screens is the single source for the industry's most comprehensive line of chemical solutions for improving and maintaining water systems.

Improve well production

Over time, water well screens accumulate a build up of biofilm and/or mineral encrustation which will degrade well 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.

Apply safely, easily, conveniently

Most 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

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

Lower cost of well operation

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

Transport and store safely

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 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 a complete line of chemicals for water system rehabilitation and maintenance, Johnson Screens offers 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, you 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 redevelopment options
- Pumping test analysis
- Well Troubleshooting
- Chemical and bacterial analysis
- Chemical rehabilitation suggestions for any water handling facility

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NuWell® 100 PELLETIZED ACID



Description

- Dry, pelletized acid that sinks in water for cleaning wells
- Cleans calcium and magnesium carbonate scale, iron deposits and moderate biological growth
- Contains inhibitor for protecting metal surfaces and penetrants for cleaning 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 without releasing vapors, as with hydrochloric acid
- Easy to use and transport
- NSF certified for potable water well use

Application

NuWell 100 pelletized acid is formulated for pouring 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 at the bottom. Agitation of the acid into the blocked area will greatly enhance 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 and Handling

Appearance Yellow-brown pellet
 Density Approximately 70 lb/ft³
 Solubility 20% by weight @ 68°F(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 common carrier, DOT Label CORROSIVE.
- 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 and magnesium carbonate scale, and moderate iron deposits
- Contains inhibitor for protecting metal surfaces and penetrants for cleaning 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 released, as with hydrochloric acid
- Easy to use and handle
- NSF certified for potable water well use

Application

NuWell 110 granular acid is effective for cleaning wells, either introduced at the well head in granular form 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, we recommend pulling the pump and treating the well as follows:

1. **Mix NuWell 110 granular acid** into a tank containing a volume of water and acid equal to 40% of the total treatment volume. The table on page 6 provides the recommended dosages for general well cleaning. When possible, obtain information on construction and performance history and submit samples for laboratory analysis before application to determine whether dosage modifications are warranted.
2. Place the mixture evenly across the well screens, ensuring contact with affected regions at the recommended concentration. Agitate the acid into the plugged area to enhance the effectiveness of the cleaning.
3. Leave the acid solution in contact for 12 to 48 hours, depending on the nature of the plugging. Where heavy deposits of gypsum are suspected, add **NuWell 310 bioacid dispersant**.
4. Monitor pH often during treatment and keep below 3.0 for effective cleaning. If pH exceeds 3.0 add more acid solution to equal about 20% of the original dose. The amount of acid consumed will depend on the degree of mineral scaling.
5. Discharge the acid solution from the well, neutralize on the surface and dispose in accordance with applicable regulations.

For more effective acid cleaning, use **NuWell 310 bioacid enhancer** with **NuWell 110 granular acid**. (See compatibility charts, page 19.)

Physical Properties, Shipping & Handling:

Appearance	Yellow-white crystalline powder
Density	Approximately 80 lbs/ft ³
Solubility	20% by weight at 68°F(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 common carrier DOT label corrosive.
- Additional physical and handling data are available on the product MSDS.
- Available in 50- and 80-lb. containers.



DOSAGE GUIDE

NuWell® 110 GRANULAR ACID

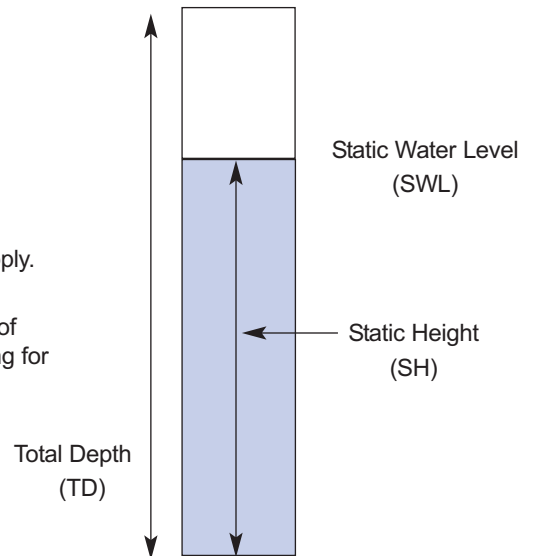
Nominal Well Size		Standard Dosage	
In.	MM	Lb/Ft	Kg/M
2	51	0.07	0.10
3	76	0.15	0.23
4	102	0.27	0.41
5	127	0.43	0.63
6	152	0.61	0.91
8	203	1.10	1.60
10	254	1.70	2.50
12	305	2.50	3.60
14	356	3.30	5.00
16	406	4.40	6.50
18	457	5.50	8.20
20	508	6.80	10.10
22	559	8.20	12.30
24	610	9.80	14.60
26	660	11.50	17.10
30	762	15.30	22.80
34	864	19.70	29.30
36	914	22.10	32.80

- STEP 1: Determine static height (TD-SWL)
- STEP 2: Multiply static height by table value.
- STEP 3:* Mix NuWell 110 granular acid with water, and apply.

Example: Treat 12-in. well, 180 ft TD, SWL = 40 ft

- STEP 1: Static height = 180 - 40 = 140 ft
- STEP 2: Amount acid = 140 ft x 2.5 lb/ft = 350 lb
- STEP 3:* Mix 350 lb NuWell 110 granular acid with 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

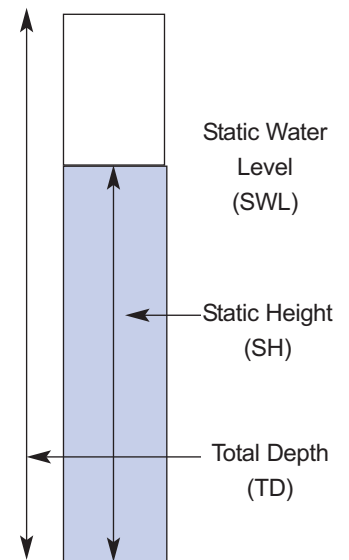
NuWell 120 liquid acid is the optimal basic ingredient for many cleaning applications. This liquid food-grade phosphoric mineral acid effectively removes common mineral deposits found in well, filter bed and water system equipment (iron, manganese, sulfates and carbonates).

NuWell 120 liquid acid is safer to use than hydrochloric (muriatic) acid, has slower reactivity, and does not emit harmful vapors.

It is also far less corrosive to metals than hydrochloric acid. (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, economical cleaning chemistry. This environmentally friendly mixture is readily flushed from the system, enabling quick return to service.

Nominal Well Size		Standard Dosage	
in.	mm	gal/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	0.20	2.70
10	254	0.30	4.30
12	305	0.50	6.10
14	356	0.70	8.40
16	406	0.90	10.90
18	457	1.10	13.80
20	508	1.40	17.10
22	559	1.70	20.70
24	610	2.00	24.60
26	660	2.30	28.90
30	762	3.10	38.40
34	864	4.00	49.30
36	914	4.50	55.30



- STEP 1: Determine static height of well: $SH = TD - SWL$
- STEP 2: From table, determine standard dosage value by diameter
- STEP 3: Calculate volume of NuWell 120 liquid acid required: $SH \times \text{Dosage} = (\text{gal/L}) \text{ NuWell120}$

Example: Treat 12-in. well, 180 ft totaldepth, 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 in. well)
- STEP 3: Volume of 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 lb/gal
Solubility in water	Complete
pH	Aqueous approximately 1.00 to 2.00

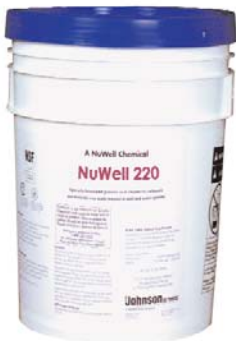
- NuWell 120 liquid acid is a strong acid base and should not be stored with strong alkaline material or oxidizers.
- Dust respirators and goggles should be worn where possibility of dust or mist exists.
- Hazardous Class: 8, UNI 805, PGIII
- Can be shipped ground by common carrier DOT label CORROSIVE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

USDA
APPROVED



NuWell® 220

DISPERSANT POLYMER



Description

- NuWell 220 dispersant polymer uses liquid - dispersant chemistry specifically designed to remove mud and clay from the well environment more efficiently than other products.
- Successfully develops new wells without using phosphate.
- Eliminates food source for bacteria (100% water soluble, readily flushed from well).
- Rehabilitates old wells plugged with clays, silts and fines.
- NSF approved for potable water well use.

Application

In new well systems use, NuWell 220 dispersant polymer as you would phosphates for drilling mud breakdown and well development. For optimal removal of bentonite drilling fluids, separately pre-treat the well with 1,500 ppm chlorine to break down the polyacrylamide polymers that are included in most commercial bentonite products. Determine borehole volume, and apply NuWell 220 dispersant polymer at the rate of 1 gal per 500 gal of water. Vigorously agitate by mechanical means for several hours (approximately 1/2 hr per 20 ft of intake). If left in the well overnight, agitate before pump-out.

In older well systems use, NuWell 220 dispersant polymer to remove fine sands, mud and clays that have filled in the gravel pack and borehole. Use at a rate of 1 gal per 300 gal of water. (See dosage table, page 9.). Vigorously agitate by mechanical means, let the solution stand in the well 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 lb/gal
Freeze point	78.8°F (26°C)
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.
- 1 gallon and 5 gallon containers can be shipped by UPS ground delivery.
- Additional physical and handling data are available on the product MSDS.
- NuWell 220 dispersant polymer is available in 1-, 5-, 30- and 55-gal containers



DOSAGE GUIDE

NuWell® 220 CLAY DISPERSANT

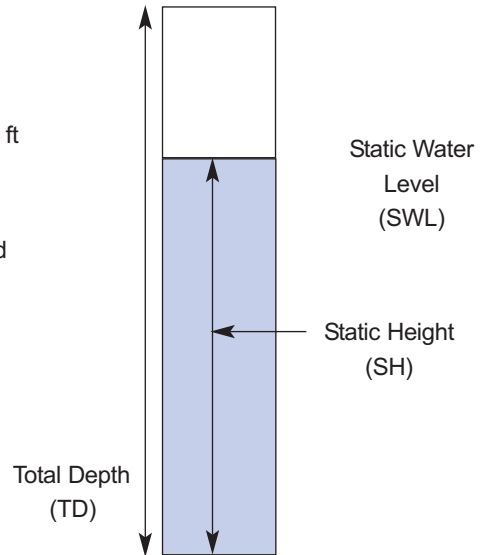
Nominal Well Size		gal /ft		L / m	
In	mm	New Well	Old Well	New Well	Old Well
2	51	0.0005	0.0009	0.0068	0.0111
3	76	0.0012	0.0020	0.0152	0.0251
4	102	0.0022	0.0036	0.0270	0.0446
5	127	0.0034	0.0056	0.0422	0.0697
6	152	0.0049	0.0081	0.0608	0.1003
8	203	0.007	0.011	0.081	0.134
10	254	0.010	0.017	0.127	0.209
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 gal of surface system volume (2 l/m³ of surface volume).

- STEP 1: Find dosage factor (old or new well).
- STEP 2: Multiply static height by dosage factor.
- STEP 3: Mix, and apply to well or circulating system.

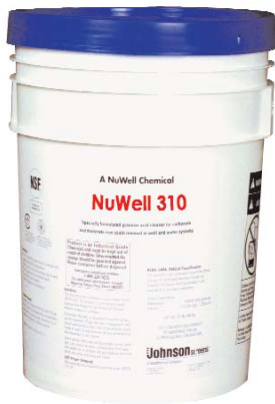
Example: Old 12 in well, total depth = 600 ft, SWL = 50 ft

- STEP 1: Dosage factor = 0.024 gal/ft
- STEP 2: 550 ft x 0.024 gal/ft = 13 gal
- STEP 3: 13 gal 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.

- Maintains the acid reaction, holding minerals in suspension at pH levels of 3.0 and higher
- Controls sludging by preventing re-precipitation or adhesion, for thorough 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. Iron sequestering allows the chemical solution to remove heavy accumulation of iron compounds, often the cause of 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 approved for cleaning potable water wells, pipelines and filter systems

Application

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

1. 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! DO NOT mix NuWell 310 bioacid dispersant directly to commercial concentrations of liquid acid as polymer destruction may occur.)**
3. Place the surface-solution evenly across the intake zone, ensuring contact with affected areas at the recommended concentration. Agitate the cleaning solution to enhance the effectiveness of cleaning.
4. Leave the solution should remain in contact for 18 to 48 hours, depending on the nature of the deposit. Monitor the pH and keep it 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 and Handling

Appearance	Amber Liquid		
Density	Approximately 10 lb/gal	Solubility	20% by weight at 68°F(20° C)
		pH (as shipped)	2.3

- NuWell 310 bioacid dispersant is an acid-based liquid. Avoid contact with strong alkaline materials or oxidizers. Use protective clothing, 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, RECLA, SARA and CERCLA
- 1 gallon and 5 gallon containers can be shipped by UPS ground delivery.
- Additional physical and handling data are available on the product MSDS.
- NuWell 310 bioacid dispersant is available in 1-, 5-, 30- and 55- gal containers



DOSAGE GUIDE

NuWell® 310 BIOACID DISPERSANT

Nominal Well Size		Well Volume		Standard Dosage, 3%	
in	mm	gal/ft	L/m	gal/ft	L/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

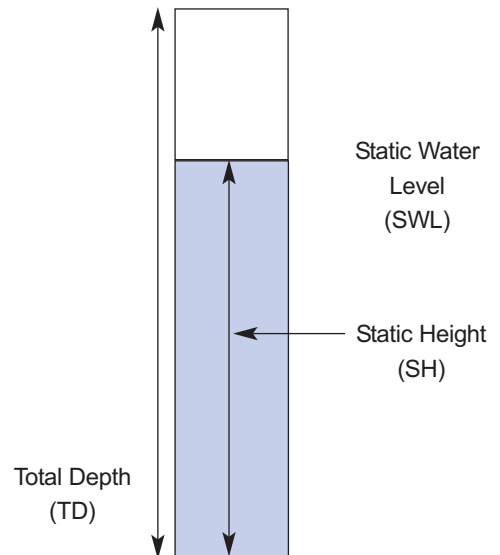
Note: Standard dosage is for well rehabilitation. For routine maintenance, reduce dosage by 30 to 50%.

- STEP 1: Determine static height of water in well
- STEP 2: Multiply height by dosage factor.
- STEP 3:* Mix NuWell 310 bioacid dispersant into acid solution, and apply to well.

Example: 12-in well, total depth = 600 ft, SWL = 50 ft

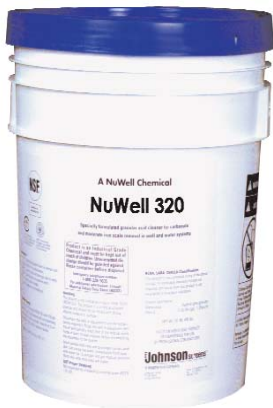
- STEP1: Static height = 600 - 50 = 550 ft
- STEP2: 550 ft x 0.15 gal/ft = 82.5 gal
- STEP3*: 83 gal NuWell 310 bioacid dispersant needed

* 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](#) is 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.

- Prevents precipitation of minerals that can clog openings while removing biological plugging
- Controls 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 pipelines or storage tanks, the actual volume of cleaning solution used should be the volume used for calculation. If the cleaning solution is to be surface blended and 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 of in accordance with applicable regulations.

Physical Properties, Shipping and Handling

Appearance	Amber liquid
pH (as shipped)	8.4
Density	Approx. 9.5 lb/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
- 1 gallon and 5 gallon containers can be shipped by UPS ground delivery.
- Additional physical and handling data are available on the product MSDS.
- Available in 1-, 5-, 30-, and 55- gal containers.

DOSAGE GUIDE

NuWell® 320 BIOCAUSTIC DISPERSANT

Nominal Well Size		Well Volume		Standard Dosage - 3%	
in	mm	gal/Ft	L/m	gal/ft	L/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% to 50%.

STEP 1: Determine height of static water in well.

STEP 2: Multiply height X dosage factor.

STEP 3:* Mix NuWell 320 biocaustic dispersant into caustic solution and apply to well.

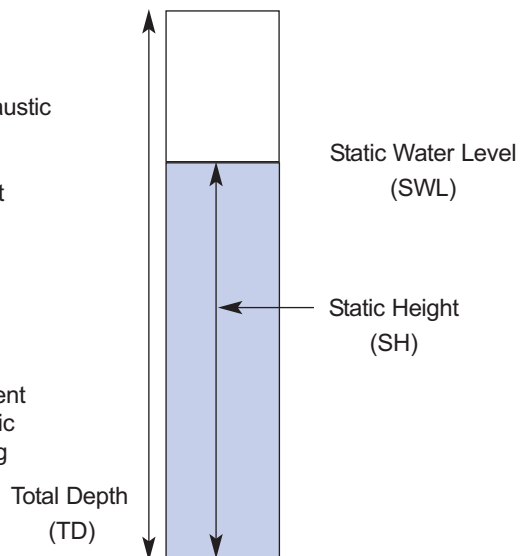
Example: 12-in well, total depth = 600 ft, SWL = 50 ft

STEP1: Static height = 600 - 50 = 550 ft

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

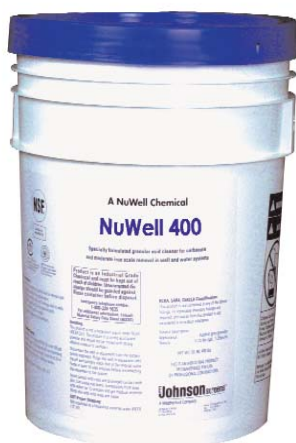
STEP3:* 83 gal NuWell 320 biocaustic dispersant needed

* 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 ensures that the surfactant neither react directly nor interfere with any other chemical being used. The surface-active properties of NuWell 400 non-ionic surfactant 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 improves cleanup of oil or biologically fouled areas.

Application

NuWell 400 non-ionic surfactant is used at the rate of 1 gal per 1000 gal 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, use NuWell 400 non-ionic surfactant at the rate of 1 gal per 500 gal of water.

Physical Properties, Shipping and Handling

Appearance	Straw-colored liquid
Density	9.4 lb/gal
Volatility	25%
pH	(as drummed) 8.5
Freeze point	26°F (-3.3°C)
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.
- 1 gallon and 5 gallon containers can be shipped by UPS ground delivery.
- Additional physical and handling data are available on the product MSDS.
- Available in 1-,5-,30- and 55- gal containers.



DOSAGE GUIDE

NuWell® 400 NON-IONIC SURFACTANT

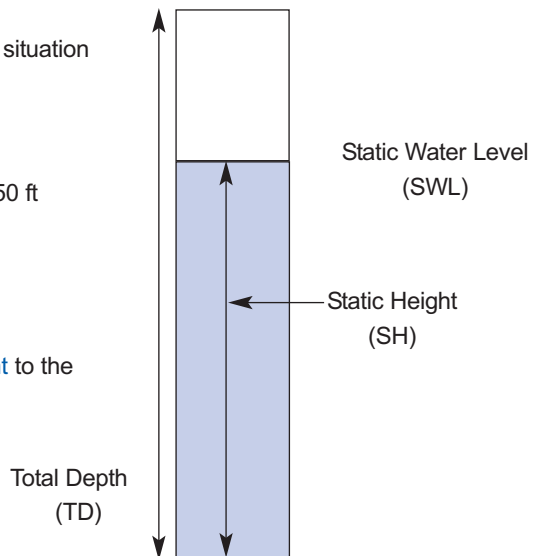
Nominal Well Size		gal/ft		L/m	
in	mm	Standard Dose	Heavy Oils	Standard Dose	Heavy Oils
2	51	0.0003	0.0006	0.0041	0.0081
3	76	0.0007	0.0014	0.0091	0.0182
4	102	0.0012	0.0024	0.0162	0.0324
5	127	0.0019	0.0038	0.0253	0.0507
6	152	0.0027	0.0055	0.0365	0.0730
8	203	0.0036	0.0073	0.0486	0.0973
10	254	0.0057	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 1gal of NuWell 400 per 1000 gal of surface system volume (1 L/m³ of surface volume).

- STEP 1: Determine static height of water in well
- STEP 2: Find dosage factor for standard 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-in well, total depth = 600 ft, SWL = 50 ft with heavy accumulation of turbine oil.

- STEP1: Height = (600 - 50) = 550 ft
- STEP2: Dosage factor = 0.0164 gal/ft
- STEP3: 550 ft x 0.0164 gal/ft = 9.0 gal
- STEP4: Add 9 gal of NuWell 400 non-ionic surfactant to the cleaning solution.



NuWell® 410

CHLORINE ENHANCER



Description

- Used with hypochlorite to increase effectiveness of chlorination
- Maintains pH in well at 6.5 during chlorination, increasing hypochlorous acid
- Increases bacteriological activity by more than 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. Determine the static volume, the amount of [NuWell 410 chlorine enhancer](#) and the amount of chlorine product necessary to treat the well according to page 17. (Consideration should be given to increasing this volume by two to four 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.
4. Agitate or surge the mixture to ensure good coverage.
5. Let the solution stand in the well for 5 to 12 hours. Additional agitation before removal is beneficial. [NuWell 410 chlorine enhancer](#) is buffered to hold the pH at the optimal 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.
6. Pump the solution to the surface neutralize using [NuWell 500 chlorout](#), and discharge in accordance with local rules and regulations.

Physical Properties, Shipping and Handling

Appearance	Clear, light amber liquid
Density	9.3 lb/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.
- 1 gallon and 5 gallon containers can be shipped by UPS ground delivery.
- Additional physical and handling data are available on the product MSDS.
- [NuWell 410 chlorine enhancer](#) is available in 1-, 5-, 30- and 55- gal containers.

DOSAGE GUIDE

NuWell® 410 CHLORINE ENHANCER

Nominal Well Size (in)	Well Volume (gal/ft)	Amount of NuWell 410 (qt/ft)	Amount of Chlorine Product		
			CaHypocl,65% (lb/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 200ppm chlorine concentration into well water with alkalinity of 100ppm.

If well-water alkalinity or the recommended chlorine dosage level is 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 (recommended concentration/200)

STEP 1: Determine static height (TD - SWL).

STEP 2: Multiply amount chlorine enhancer from table by static height.

STEP 3: Determine amount of hypochlorite product from table above.

STEP 4: Surface batch = water + NuWell 410 chlorine enhancer + hypochlorite

Example: Disinfect a 16-in well, TD = 300 ft, SWL = 50 ft with calcium hypochlorite 65% active.

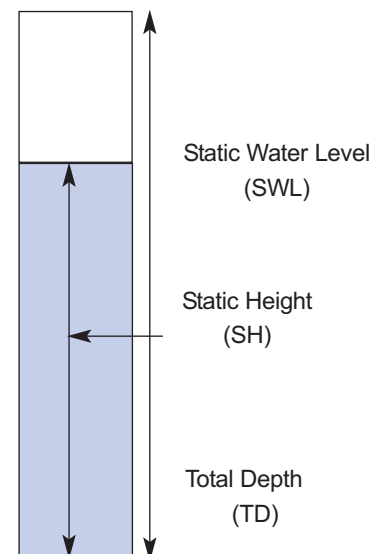
STEP 1: Static height = (300ft - 50ft) = 250 ft

STEP 2: Amount enhancer = 250 ft x 0.042 qt/ft = 11 qt

STEP 3: Amount hypochlorite = 250 ft x 0.027 lb/ft = 6.8 lb.

STEP 4: Batch: 250 ft x 10.47 gal/ft = 2,618 gal water (2,618 gal + 11 qt + 6.8 lb)

TIP: Optimal results are obtained when the surface solution is two to four 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 desired results.)



NuWell® 500 CHLOROUT



Description

- Used to neutralize chlorine solutions before their 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 below.
2. Mix NuWell 500 chlorout with the chlorinated water. The chlorine levels will neutralize almost immediately. If dechlorinating a large volume, dissolve NuWell 500 chlorout in 1 gal 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 and Handling:

Appearance	Odorless, coarse white to off-white crystal
pH (7.5% solution)	8.6
Density	Approx. 80 lb/ft ³
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.
- 10 pound containers can be shipped by UPS ground delivery.
- Additional physical and handling data are available on the product MSDS.
- NuWell 500 chlorout is available in 10-lb containers.

Chlorine Discharge (ppm)	Batch Volume to Be Treated							
	(gal)				(m ³)			
	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 of NuWell 500 chlorout to 1 gal of water) *1 m³ = 1,000 L

The above table shows the amount (lb 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 1,000- gal tank of well discharge with a chlorine concentration of 180 ppm, dissolve 1.8 lb of NuWell 500 chlorout into approximately 2 gal of water then add to the tank.

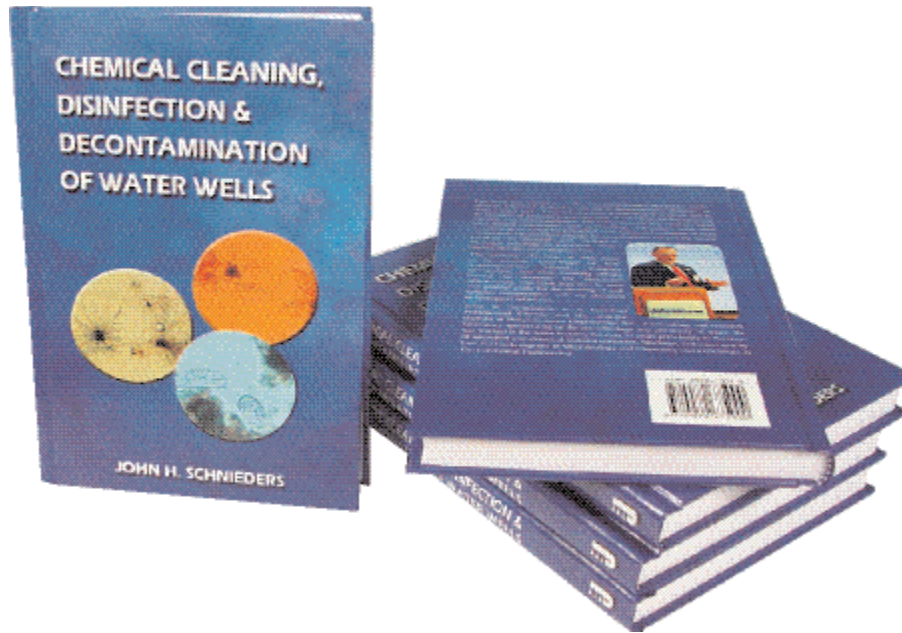
PRODUCT APPLICATION GUIDE

Product	Code	Remove Carbonate Scale	Remove Sulfate Scale	Remove Iron/Manganese Scale	Remove Biofilm	Remove Hydrocarbon	Drill Mud Break Down	Remove Clays and Bentonite	Buffer Chlorine	Neutralize Chlorine
NuWell® 100 Pelletized Acid	A	Good <small>(A+E) Very Good</small>	Fair <small>(A+E) Very Good</small>	Fair <small>(A+E) Very Good</small>	Poor <small>(A+E) Good</small>	Poor <small>(A+G) Fair-Good</small>	No	No	Fair	No
NuWell 110 Granular Acid	B	Good <small>(B+E) Very Good</small>	Fair <small>(B+E) Very Good</small>	Fair <small>(B+E) Very Good</small>	Poor <small>(B+E) Good</small>	Poor <small>(B+G) Fair-Good</small>	No	No	Fair	No
NuWell 120 Liquid Acid	C	Good <small>(C+E) Very Good</small>	Good <small>(C+E) Very Good</small>	Good <small>(C+E) Very Good</small>	Poor <small>(C+E) Very Good</small>	Poor <small>(C+E+G) Good</small>	No	No	Good	No
NuWell 220 Clay Dispersant	D	No	No	No	No	No	Fair <small>(D+X) Very Good</small>	Good	No	No
NuWell 310 BioAcid Dispersant	E	Poor <small>(C+E) Very Good</small>	Poor <small>(C+E) Very Good</small>	Poor <small>(C+E) Very Good</small>	Good <small>(C+E) Very Good</small>	Poor <small>(C+E) Fair</small>	No	Fair <small>(E+G) Good</small>	Good	No
NuWell 320 BioCaustic Dispersant	F	No	No	No	Fair <small>(Caustic+F) Very Good</small>	Poor	No	No	No	No
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 <small>(especially iron hydroxides)</small>	Fair	Fair-Good	No	No	Very Good	No
NuWell 500 ChlorOut	I	No	No	No	No	No	No	No	No	Very Good
	X	Commercial sodium or calcium hypochlorite up to 1,200 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 & Decontamination of Water Wells is a concise but complete assessment of the important role certain chemicals play 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 individually 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 are 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-in format for use on job sites as well as classrooms and labs. Contact Johnson Screens for ordering information.



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