REGULATORY INFORMATION DISTRIBUTION SYSTEM (RIDS)

ACCESSION NBR:7910120189 DOC.DATE: 79/10/02 NOTARIZED: NO DOCKET #
FACIL:STN-50-528 Palo Verde Nuclear Station, Unit 1, Arizona Publi 05000528
STN-50-529 Palo Verde Nuclear Station, Unit 2, Arizona Publi 05000529
STN-50-530 Palo Verde Nuclear Station, Unit 3, Arizona Publi 05000530
AUTH.NAME AUTHOR AFFILIATION
VANBRUNT,E.E. Arizona Public Service Co.
RECIP.NAME RECIPIENT AFFILIATION
GILBERT,R.A. Assistant Director for Environmental Projects

SUBJECT: Notifies that const of wastewater conveyance pipeline has been completed.Requests exemption to Item 21 of FES re use of weed killer chemicals along pipeline right-of-way.

DISTRIBUTION CODE: C002B COPIES RECEIVED:LTR 1 ENCL 1 SIZE: 27
TITLE: Environ. Comments.

NOTES: STANDARDIZED PLANT.

	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL	RECIPIENT ID CODE/NAME	COPIES LTTR	COPIES ENCL
ACTION:	05 PM R GILBERT	1	1	17 BC EPB #2	1	1
	18 LA EPB #2	1	1	AD MOORE	1	0
INTERNAL:	01 REG FILE	1	1	02 NRC PDR	1	1
	07 I&E	2	2	09 ENVN SPEC BR	1	1
	10 CST BNFT ANL	1	1	11 TA/EDO	1	1
	12 AD SITE TECH	2	2	14 ACDENT ANALY	1	1
	15 EFLT TRT SYS	1	1	16 RAD ASMT BR	1	1
	19 DIR DSE	1	1	AD ENVIRON TECH	1	0
	AD SITE ANALY	1	0	OELD	1	0
EXTERNAL:	03 LPDR	1	1	04 NSIC	1	1
	20 NATL LAB	5	5	ACRS	1	0

OCT 16 1979

LTR
LWR
LWR #3 BC
E. LICITRA
LWR #3 LA

ENV
4

32
28 23

ARIZONA NUCLEAR POWER PROJECT
Post Office Box 2166 Phoenix, Arizona 85036

October 2, 1979
ANPP-13943 - JMA/JRM

Dr. Robert A. Gilbert
Environmental Projects Branch
United States Nuclear Regulatory Commission
Washington, D.C. 20555

Subject: Docket Nos. STN 50-528/529/530
Final Environmental Statement
Related to Construction of
Palo Verde Nuclear Generating
Station
File: 79-054-026

Dear Dr. Gilbert:

Construction of the wastewater conveyance pipeline has been completed in several portions of the overall right-of-way. Our Land department has received a letter (Enclosure 1) from the Buckeye Town Manager requesting that we initiate some type of weed control on the ANPP right-of-way through the town. We have also had similar requests from farmers located adjacent to our ROW up to 8 miles west of Buckeye. The total acreage affected is approximately 30 acres.

The preferred and most cost-effective method of weed control is the application of a weed killer chemical followed by discing as needed. Paragraph 4.5.1, Item 21 of the Final Environmental Statement related to construction of Palo Verde Nuclear Generating Station Units 1,2&3 appears to prohibit the use of weed killer chemicals along the pipeline ROW. Considering the weed problem now in evidence, we are requesting an exemption from this requirement for the specified portions of the ROW.

Details of the areas to be sprayed are discussed in a memo from the APS Land department to E. E. Van Brunt, Jr. (Enclosure 2). Application would be at a rate of 5 pounds per acre, once per year.

C002
ES/1

Enclosure 3 is a request from the APS Land department to Desert Weed Control for information on weed control products. Enclosure 4 is a letter from E. I. DuPont De Nemours & Co. to Desert Weed Control describing KARMEX Weed Killer, which is the preferred agent for this application.

Please evaluate the environmental impact of this application and advise us if we may proceed.

Very truly yours,

E. E. Van Brunt

E. E. Van Brunt, Jr.
APS Vice President,
Nuclear Projects
ANPP Project Director

EEVBJr/JRM/av
Attachment

cc: J. M. Allen
A. C. Rogers
A. C. Gehr
M. S. Cheema
W. H. Wilson
P. Buck

ENCLOSURE 1

Town Of Buckeye

P. O. Box 157
Buckeye, Arizona 85326

Telephone (602) 386-4691
Phoenix Line 935-4532

September 18, 1979

Mr. Philip M. Buck
Senior Right of Way Agent
Arizona Public Service Company
P. O. Box 21666
Phoenix, Arizona 85036

Dear Mr. Buck:

Please let this service as an official request from the Town of Buckeye to initiate some type of weed control measures along the ANPP water conveyance pipeline through the Town.

The present abundance of weeds not only creates an eye-sore but could become a potential fire hazard.

Your earliest consideration of this request would be greatly appreciated.

Sincerely,

Steven L. Thompson
Town Manager

FORM 212-00C

NS Doc. Cntr

79-009-600

79-029-220

cc: C. Young

ENCLOSURE 2

ARIZONA PUBLIC SERVICE COMPANY

COMPANY CORRESPONDENCE

July 20, 1979

TO. E. E. Van Brunt, Jr., APS Vice President and ANPP Project Director.

FROM: Philip M. Buck, Right of Way Project Leader, Land Department

SUBJECT: PVNGS Water Pipeline - Weed Control

Enclosed are the right of way maps with the potential weed hazard areas indicated in red. This area consists of approximately 30 acres and is located within the Town limits of Buckeye and extends 8 miles West to the Hassayampa River. If these areas remain uncontrolled, they present a two-fold problem to the local residents:

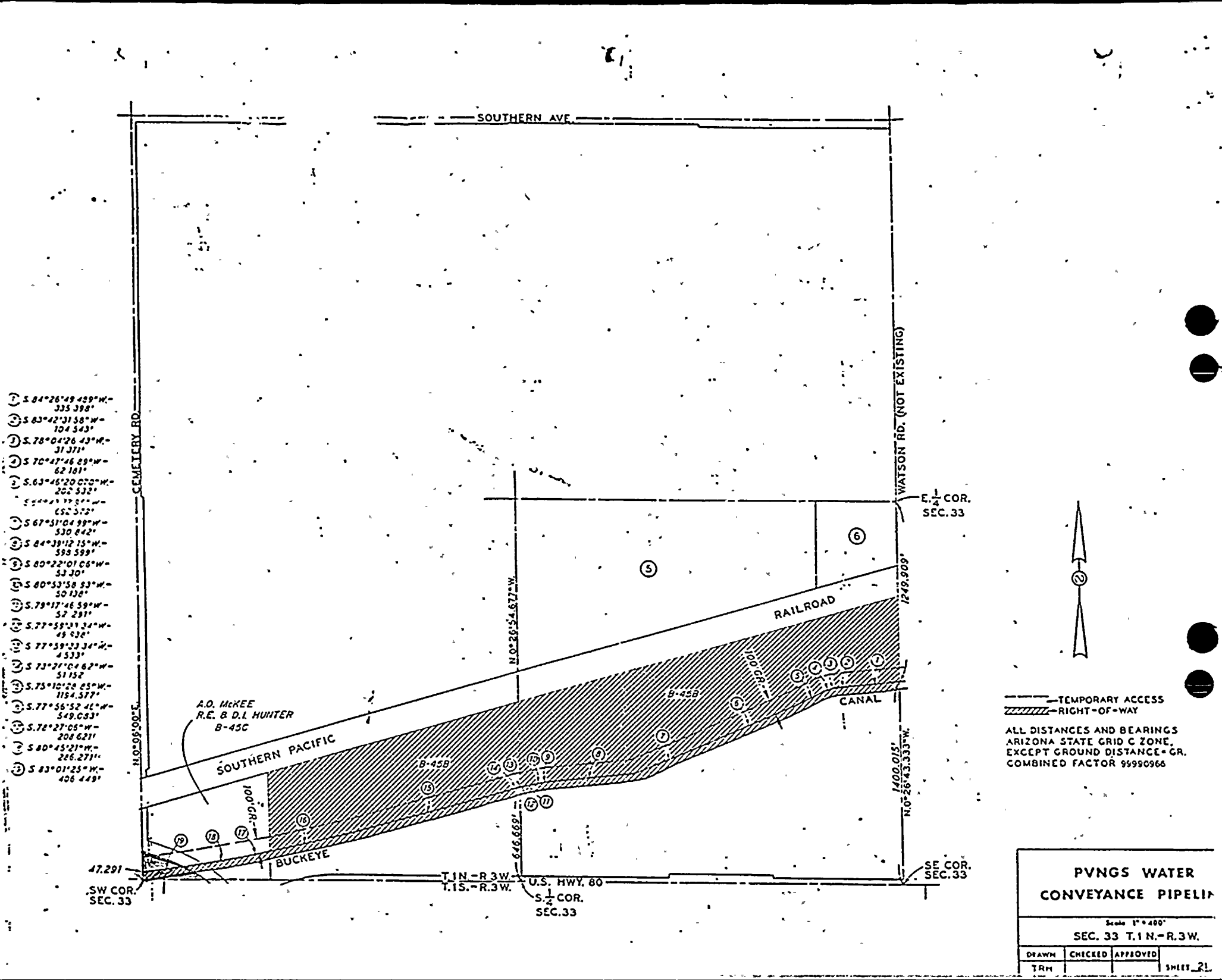
1. Weeds located adjacent to farmland will result in a reduced crop yield, and increased cost to the farmers for weed eradication within their farmland.

2. The weeds, upon reaching maturity, are in excess of 3 feet in height and present a potential fire hazard to the farmlands and buildings and residences located within the town limits.

The Town Manager of Buckeye has made a verbal request that we perform some type of weed control to eliminate this potential hazard. I have not as yet received from the applicator, the type of chemicals to be used or the frequency of application. I have also requested information concerning the cost of discing in the event that chemical sprays are not allowed.

I will provide this information upon receiving it from the applicator.

PMB:nr
Enc.



—— TEMPORARY ACCESS
▨ RIGHT-OF-WAY

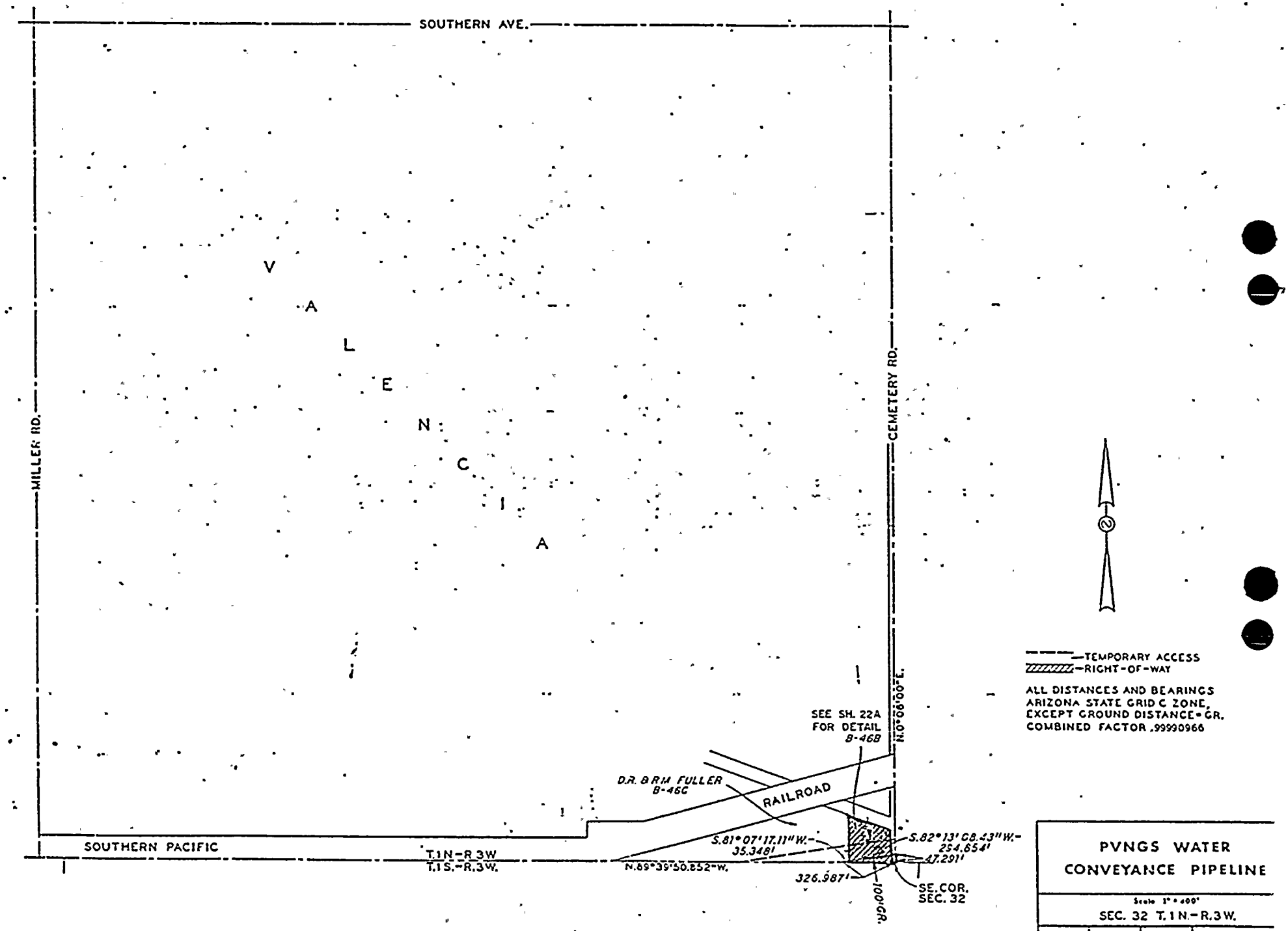
ALL DISTANCES AND BEARINGS ARIZONA STATE GRID C ZONE, EXCEPT GROUND DISTANCE=GR. COMBINED FACTOR 99990966

PVNGS WATER CONVEYANCE PIPELI

Scale 1" = 400'

SEC. 33 T.1 N.-R.3 W.

DRAWN	CHECKED	APPROVED	SHEET 21
TRM			



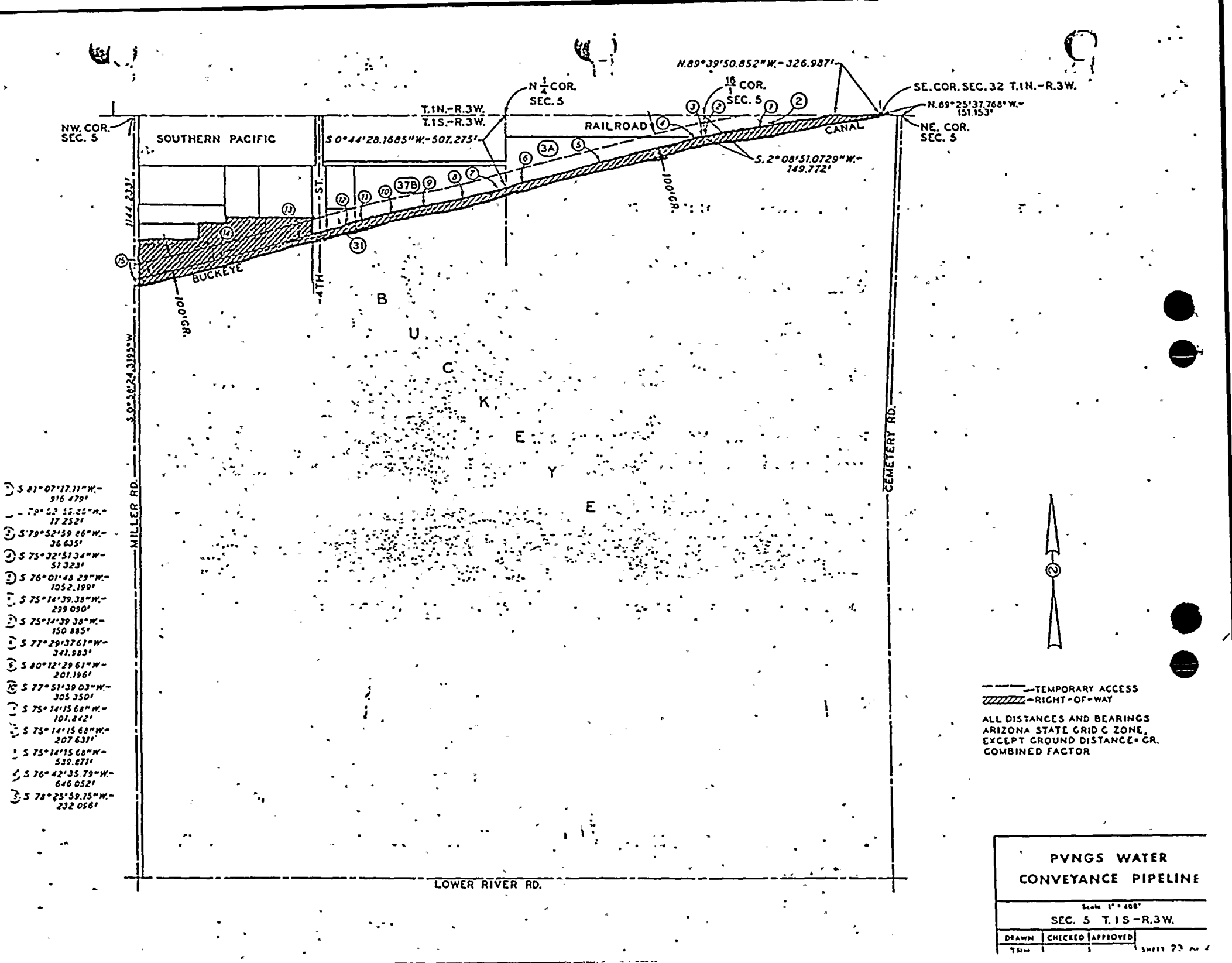
PVNGS WATER CONVEYANCE PIPELINE

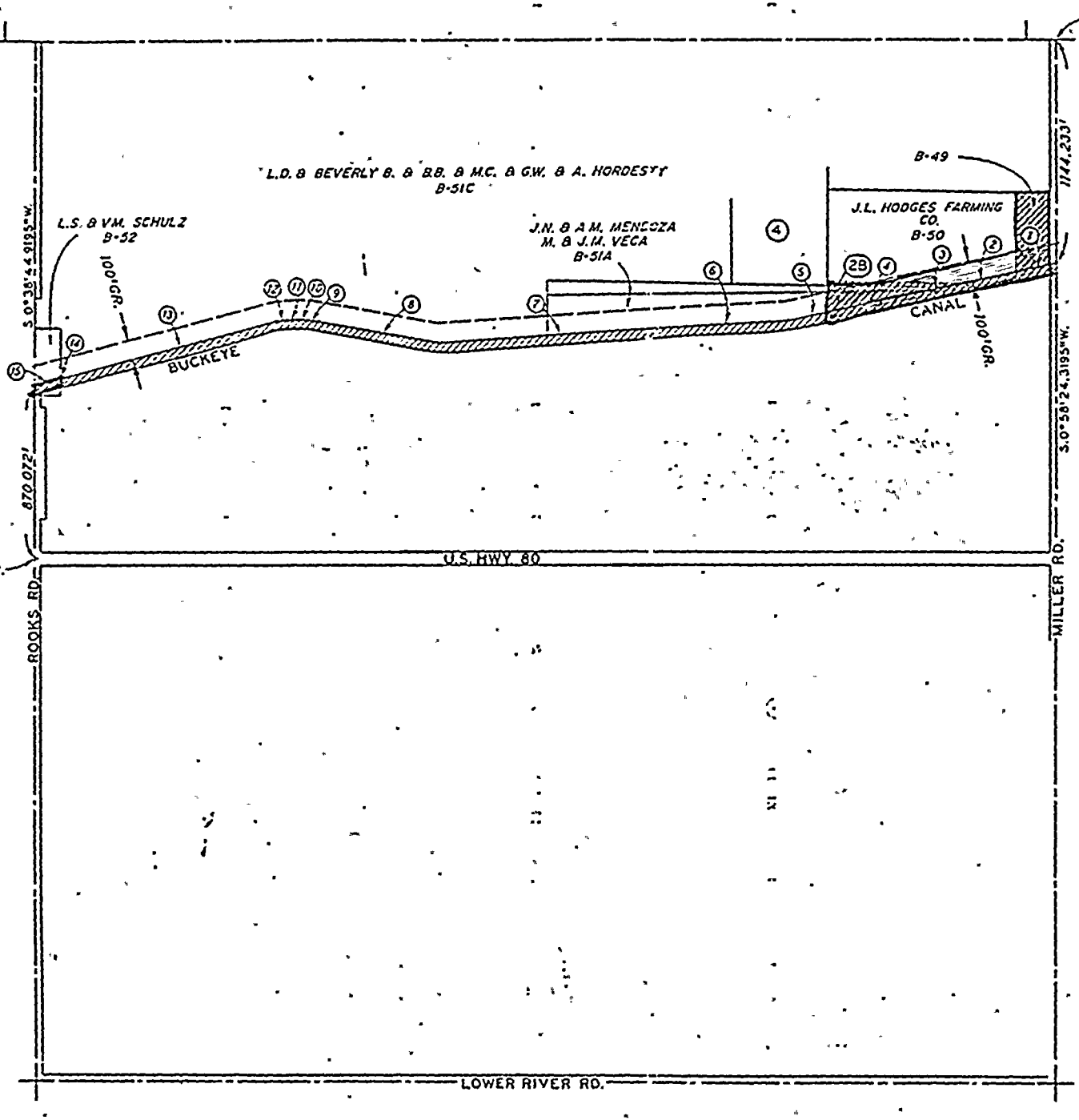
Scale 1" = 400'

SEC. 32 T. 1 N.-R. 3 W.

DRAWN	CHECKED	APPROVED

SHEET 22 OF


N.89°39'50.852"W.-326.987'
N 1/4 COR. SEC. 5
16/1 COR. SEC. 5
SE. COR. SEC. 32 T.1N.-R.3W.
N.89°25'37.768"W.-151.153'
T.1N.-R.3W.
T.1S.-R.3W.
NW. COR. SEC. 5
SOUTHERN PACIFIC
RAILROAD
CANAL
NE. COR. SEC. 5
S 0°44'28.1685"W.-507.275'
S.2°08'51.0729"W.-149.772'
1144.232'
ST.
100' GR.
BUCKEYE
4TH
S.0°36'24.3195"W.
MILLER RD.
CEMETERY RD.
LOWER RIVER RD.
B U C K E Y E
1) S 81°07'17.11"W.-916.479'
2) S 79°52'59.86"W.-36.635'
3) S 75°32'51.34"W.-51.323'
4) S 76°01'48.29"W.-1052.199'
5) S 75°14'39.38"W.-299.090'
6) S 75°14'39.38"W.-150.885'
7) S 77°29'37.61"W.-341.983'
8) S 80°12'29.61"W.-201.196'
9) S 77°51'39.03"W.-305.350'
10) S 75°14'15.68"W.-101.842'
11) S 75°14'15.68"W.-207.631'
12) S 75°14'15.68"W.-539.671'
13) S 76°42'35.79"W.-646.052'
14) S 78°23'59.15"W.-232.056'
TEMPORARY ACCESS
RIGHT-OF-WAY
ALL DISTANCES AND BEARINGS ARIZONA STATE GRID C ZONE, EXCEPT GROUND DISTANCE = GR. COMBINED FACTOR
PVNGS WATER CONVEYANCE PIPELINE
SEC. 5 T.1S-R.3W.
DRAWN
CHECKED
APPROVED
TRM



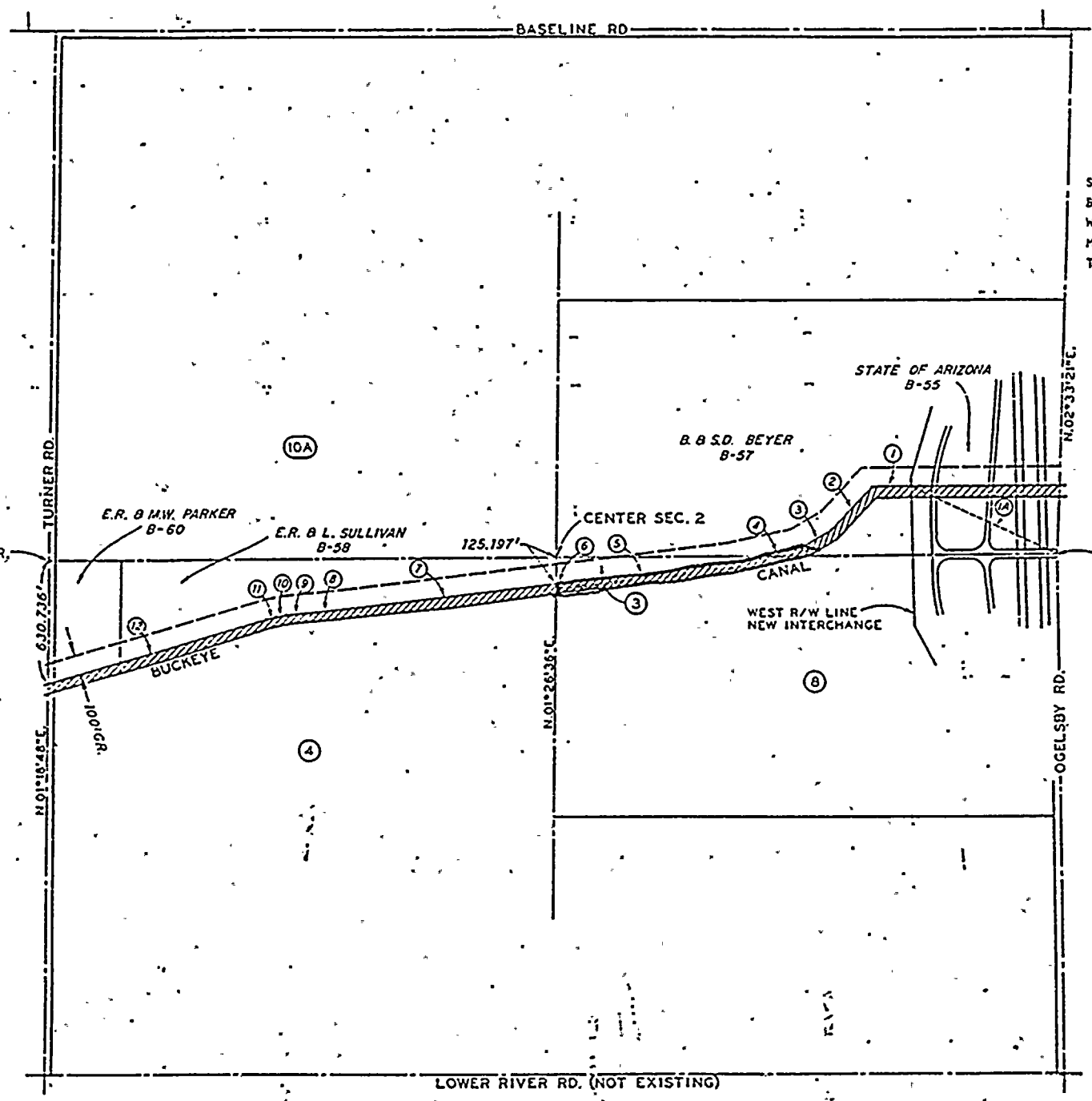
JAMES E. BUTTS, BEING DULY SWORN, SAYS THAT HE IS A REGISTERED LAND SURVE BY ARIZONA PUBLIC SERVICE COMPANY; THAT WAS MADE UNDER HIS SUPERVISION DURING MARCH, 1977, AS SHOWN AND DESCRIBED ON THAT THIS MAP WAS PREPARED UNDER HIS D

——— —TEMPORARY ACCE
▨▨▨ —RIGHT-OF-WAY

ALL DISTANCES BEAR ARIZONA STATE GRID C ZO EXCEPT GROUND DISTANC COMBINED FACTOR .9999

PVNGS
CONVEYANCE

SEC 6 T



(2) TIE - N 63°38'21" W. - 830.11'
(1) WEST - 203.484'
(14) S. 43°30'00" W. - 297.70'
(13) S. 60°33'11" W. - 187.522'
(12) S. 78°11'24" W. - 388.565'
(11) S. 83°40'09.4" W. - 845.563'
(10) S. 83°38'53.1" W. - 43.689'
(9) S. 83°38'53.1" W. - 1102.118'
(8) S. 84°41'02.1" W. - 195.309'
(7) S. 84°30'19.6" W. - 104.719'
(6) S. 79°09'25.7" W. - 55.560'
(5) S. 77°21'32.5" W. - 52.751'
(3) S. 74°08'07.8" W. - 1184.641'

JAMES E. BUTTS, BEING DULY SWORN, DEPOSES A
SAYS THAT HE IS A REGISTERED LAND SURVEYOR EMPLOY
BY ARIZONA PUBLIC SERVICE COMPANY; THAT THIS SURV
WAS MADE UNDER HIS SUPERVISION DURING THE MONTH O
MARCH, 1977, AS SHOWN AND DESCRIBED ON THIS MAP;
THAT THIS MAP WAS PREPARED UNDER HIS DIRECTION.

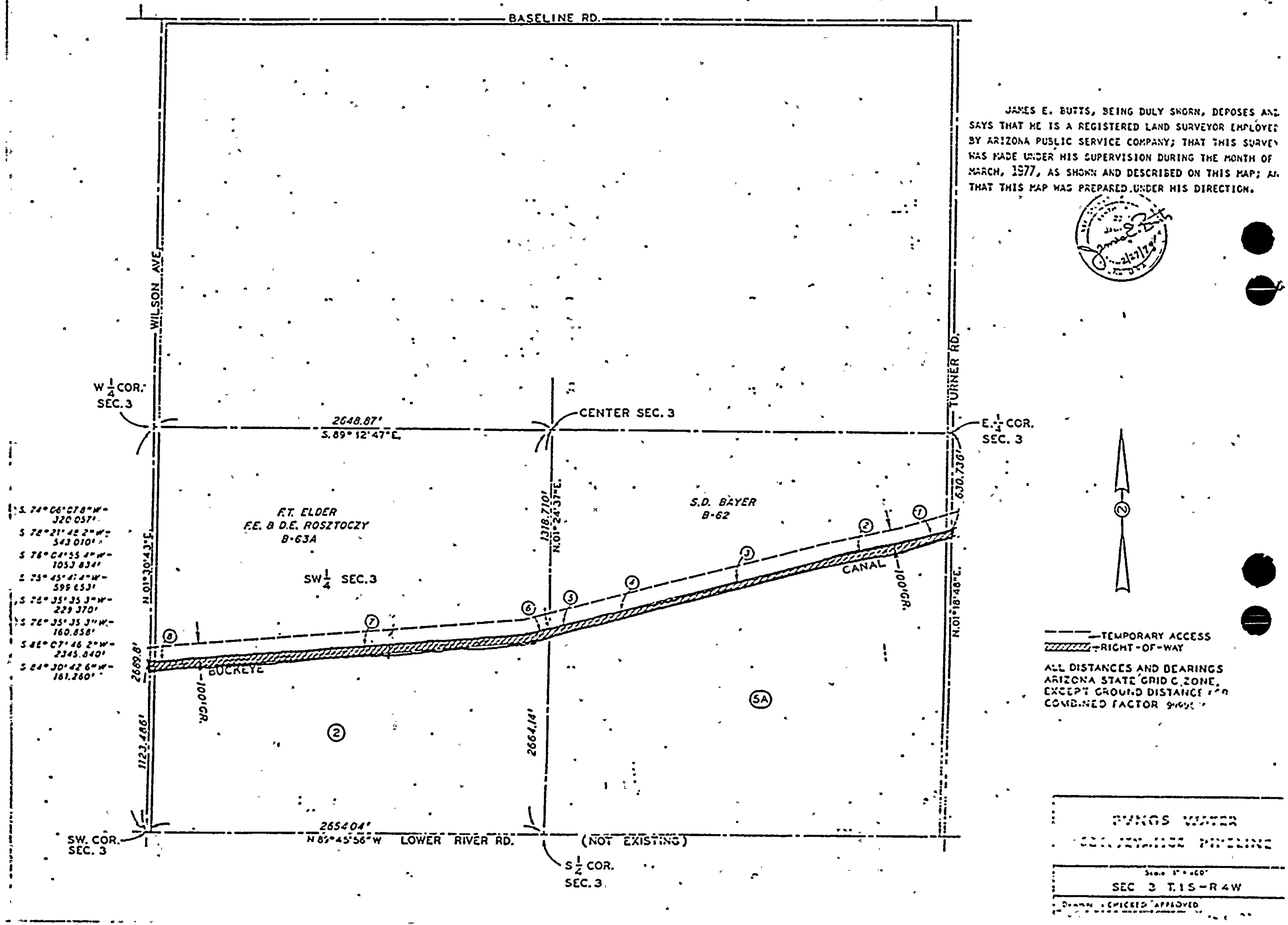
—— TEMPORARY ACCESS
▨ RIGHT-OF-WAY

ALL DISTANCES AND BEARINGS
ARIZONA STATE GRID C ZONE,
EXCEPT GROUND DISTANCE = GR.
COMBINED FACTOR .99950966

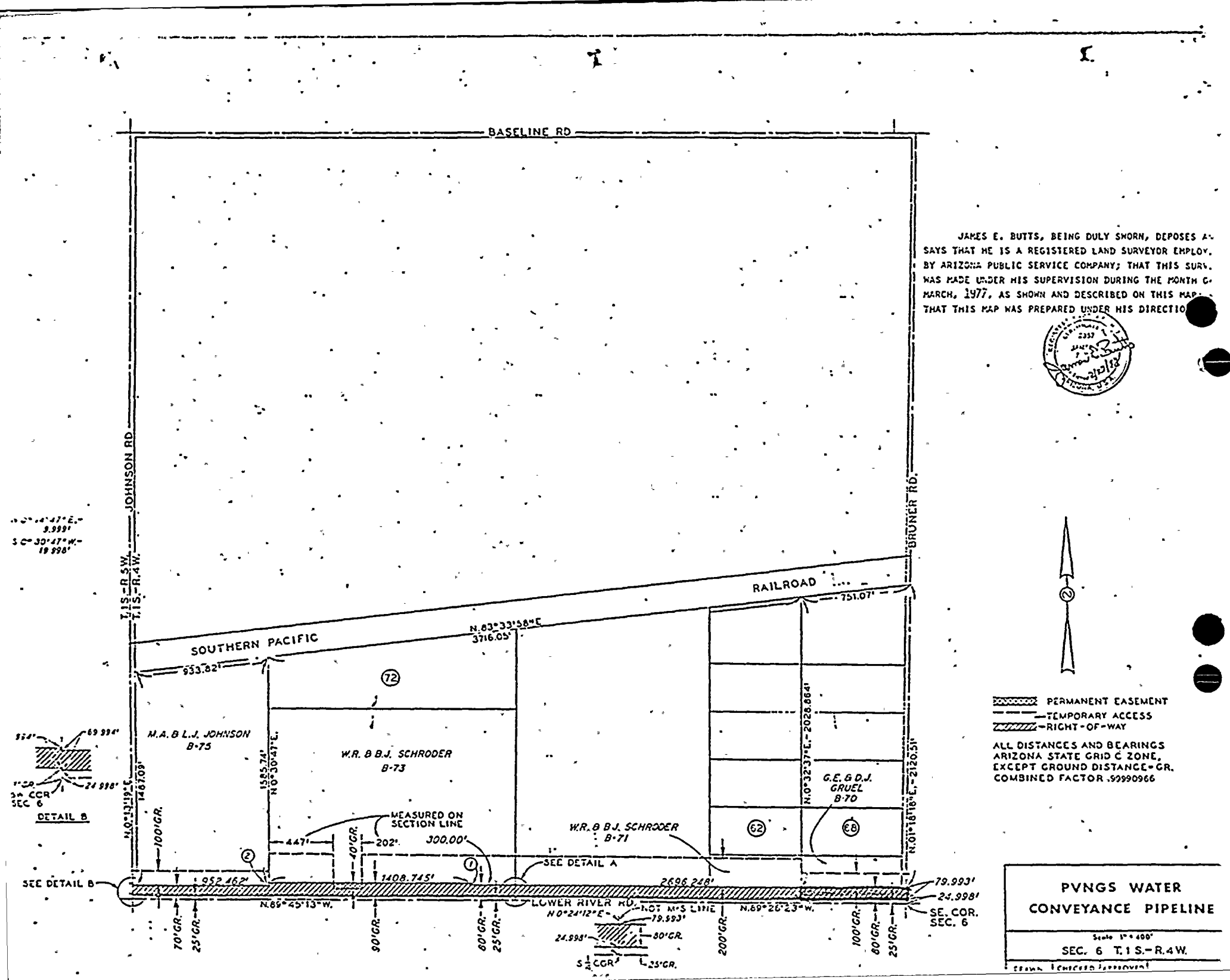
PVNGS WATER
CONVEYANCE PIPELI

Scale 1" = 400'
SEC. 2 T. 1 S. - R. 4 W.

DRAWN | CHECKED | APPROVED
TEH | | SHEET 2



JAMES E. BUTTS, BEING DULY SWORN, DEPOSES AND SAYS THAT HE IS A REGISTERED LAND SURVEYOR EMPLOYED BY ARIZONA PUBLIC SERVICE COMPANY; THAT THIS SURVEY WAS MADE UNDER HIS SUPERVISION DURING THE MONTH OF MARCH, 1977, AS SHOWN AND DESCRIBED ON THIS MAP; AND THAT THIS MAP WAS PREPARED UNDER HIS DIRECTION.



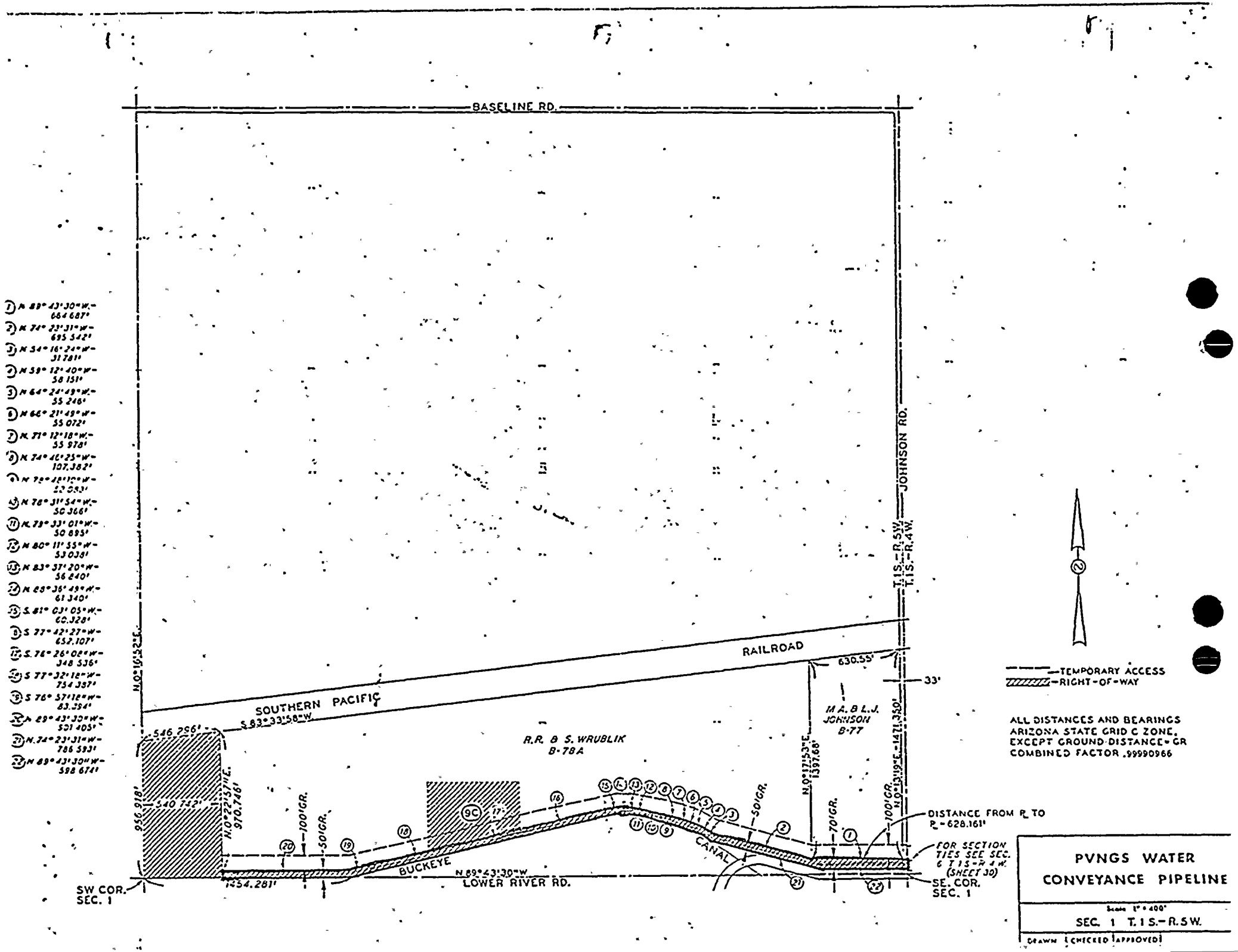
JAMES E. BUTTS, BEING DULY SWORN, DEPOSES AND SAYS THAT HE IS A REGISTERED LAND SURVEYOR EMPLOYED BY ARIZONA PUBLIC SERVICE COMPANY; THAT THIS SURVEY WAS MADE UNDER HIS SUPERVISION DURING THE MONTH OF MARCH, 1977, AS SHOWN AND DESCRIBED ON THIS MAP; AND THAT THIS MAP WAS PREPARED UNDER HIS DIRECTION.

PVNGS WATER CONVEYANCE PIPELINE

Scale 1" = 400'

SEC. 6 T. 1 S.- R. 4 W.

DRAWN | CHECKED | APPROVED


BASELINE RD.
JOHNSON RD.
T.1S.-R.5W.
T.1S.-R.4W.
N.0°16'52"E.
RAILROAD
SOUTHERN PACIFIC
S.83°33'58"W.
630.55'
33'
M.A.B.L.J. JOHNSON B-77
R.R. B S. WRUBLIK B-78A
N.0°17'53"E. 1397.68'
N.0°13'19"E. 1471.350'
546.256'
956.918'
540.742'
N.0°22'37"E. 970.746'
100'GR.
50'GR.
70'GR.
100'GR.
50'GR.
9C
17'
BUCKEYE CANAL
N.89°43'30"W. 1454.281'
LOWER RIVER RD.
SW COR. SEC. 1
SE. COR. SEC. 1
DISTANCE FROM R TO P = 628.161'
FOR SECTION TIES SEE SEC. 6 T.1S.-R.4W. (SHEET 30)
1) N. 89° 43' 30" W. - 664.687'
2) N. 74° 23' 31" W. - 695.542'
3) N. 54° 16' 24" W. - 31.781'
4) N. 59° 12' 40" W. - 56.151'
5) N. 64° 24' 49" W. - 55.246'
6) N. 66° 21' 49" W. - 55.072'
7) N. 71° 12' 18" W. - 55.978'
8) N. 74° 40' 25" W. - 107.382'
9) N. 78° 28' 10" W. - 52.083'
10) N. 76° 31' 54" W. - 56.366'
11) N. 79° 33' 01" W. - 50.895'
12) N. 80° 11' 55" W. - 53.038'
13) N. 83° 37' 20" W. - 56.840'
14) N. 69° 36' 49" W. - 61.340'
15) S. 81° 03' 05" W. - 60.328'
16) S. 77° 42' 27" W. - 652.107'
17) S. 76° 26' 06" W. - 348.536'
18) S. 77° 32' 18" W. - 754.397'
19) S. 76° 57' 18" W. - 83.294'
20) N. 89° 43' 30" W. - 501.405'
21) N. 74° 23' 31" W. - 786.593'
22) N. 89° 43' 30" W. - 598.674'
TEMPORARY ACCESS
RIGHT-OF-WAY
ALL DISTANCES AND BEARINGS ARIZONA STATE GRID C ZONE, EXCEPT GROUND DISTANCE - GR COMBINED FACTOR .99990966
PVNGS WATER CONVEYANCE PIPELINE
Scale 1" = 400'
SEC. 1 T. 1 S. - R. 5 W.
DRAWN & CHECKED (APPROVED)

ENCLOSURE 3

ARIZONA PUBLIC SERVICE COMPANY
STA. 2385
P. O. BOX 21666 · PHOENIX, ARIZONA 85036

July 20, 1979

Mr. Stan Gable
Desert Weed Control
P.O. Box 150
Arlington, Arizona 85322

Dear Mr. Gable:

Pursuant to our meeting of July 9th, I am enclosing maps indicating the PVNGS Pipeline Right of Way. The areas indicated in red consisting of approximately 30 acres, present a potential weed hazard area. However, before allowing any work to be performed on these areas, we are required to provide the Nuclear Regulatory Commission with the following information:

The type of chemical to be used for the weed eradication and its potential toxic affect on humans or farm vegetation, if any. Also, the frequency of application that will be required to provide reasonable control.

I need these two items plus you are to provide me with the cost for discing the weeds on approximately 5 acres between 4th Street and Miller Road. Please write your reply on the back of this letter and return to me in the enclosed envelope.

Sincerely,

Philip M. Buck
Senior Right of Way Agent
Land Department

PMB:nr
Enc.

ENCLOSURE 4

8-31001

E. I. DU PONT DE NEMOURS & COMPANY
INCORPORATED
WILMINGTON, DELAWARE 19898

BIOCHEMICALS DEPARTMENT

August 8, 1979

Mr. Stan Gable
Desert Weed Control
P. O. Box 150
Arlington, AZ 85322

Dear Mr. Gable:

With reference to your letter of July 30, KARMEX® Weed Killer is registered with the U. S. Environmental Protection Agency for non-crop weed control and for selective use in crops, as detailed in the enclosed product labeling. Technical information on the active ingredient, diuron, is furnished in the enclosed Technical Data Sheet.

You will note that diuron has a low order of toxicity and presents little hazard to humans. It also has low acute oral toxicity to farm animals (cattle, sheep) as shown by the enclosed excerpt from "The Toxicity of Some Organic Herbicides to Cattle, Sheep and Chickens", J. S. Palmer and R. D. Radeleff, U.S.D.A. Production Research Report No. 106, May 1969. From their studies with diuron, the U.S.D.A. investigators concluded that "the 9.6 pound rate would not be hazardous for cattle and sheep"; this is twice the use rate indicated in your letter.

Thanks for contacting us, Mr. Gable, and we trust this information will be helpful to you.

Yours very truly,

D. E. Rosen
Supervisor, Product Registration

DER/pah
Enc.

DIURON

TECHNICAL DATA SHEET

Common Name: diuron (Reference: American Standard K62.3, 1957, reaffirmed 1962.)

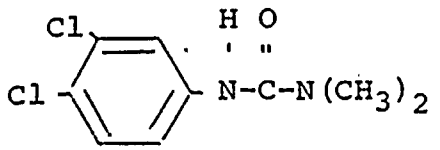
Formulations: "Karmex"® diuron weed killer, wettable powder containing 80% diuron.

"Karmex"® DL diuron weed killer, a water suspension containing 28% diuron (2.8 lbs. diuron/gallon).

"Krovar"® I weed killer, a wettable powder containing 40% diuron and 40% bromacil.

"Krovar"® II weed killer, a wettable powder containing 27% diuron and 53% bromacil.

Chemical Name: 3-(3,4-dichlorophenyl)-1,1-dimethylurea

Structural Formula: 

CAS Registry Number: 330-54-1

Empirical Formula: $C_9H_{10}Cl_2N_2O$ M.W. 233.1

Chemical & Physical Properties (pure compound):

Physical Form: White, crystalline solid

Odor: Odorless

Melting Point: 158-159°C.

Vapor Pressure: 0.31×10^{-5} mm Hg (50°C.); 148×10^{-5} (100°C.)

Hydrolysis Rate: Negligible at ordinary temperatures and in the neutral pH range. Both elevated temperatures and more acid or alkaline conditions appreciably raise the hydrolysis rate.

Solubility: Very low in hydrocarbon solvents and water; approximately 42 ppm at 25°C. in distilled water.

Stability: Stable toward oxidation and moisture under conventional conditions. Decomposition at 180-190°C.

Diuron (Cont'd)

Analytical Methods:

Assay: Clearing House Methods No. 365.02 and No. 365.14

Residues: J. Ag. & Food Chem., 10,279 (1962), or J.A.O.A.C. 45 (2), 377 (1962). If diuron is only substituted urea involved, shorter chromatographic column prescribed in J. Ag. & Food Chem., 2, 682 (1954) is satisfactory and less time consuming.

Toxicity: Haskell Laboratory for Toxicology and Industrial Medicine (Du Pont)

Acute Oral (Rats): LD_{50} 3400 mg/kg.

Chronic (Rats and Dogs): Low order of toxicity in two-year feeding studies. Fd. Cosmet. Toxicol. (5) 513-531 (1967)

Dermal Effects (Guinea Pigs): A 50% water paste was non-irritating to intact skin and moderately irritating to broken skin; a 10% aqueous suspension caused mild irritation to broken skin. Diuron did not produce allergic skin sensitization.

Effects on Eyes (Rabbits): Eye tests with "Karmex" diuron weed killer (wettable powder) produced very mild transient conjunctival irritation without effect on cornea or iris.

Residue Tolerances: 7 ppm in or on asparagus, Bermudagrass, and Bermudagrass hay. 2 ppm in or on alfalfa; corn fodder, or forage (including sweet corn, field corn, and popcorn); grass crops (other than Bermudagrass); grass hay (other than Bermudagrass hay); hay, forage, and straw of barley, oats, rye, and wheat; hay, and forage of birdsfoot trefoil, clover, peas, and vetch; peppermint hay, sorghum fodder, and forage. 1 ppm in or on apples, artichokes, barley grain, blackberries, blueberries, boysenberries, citrus fruits, corn in grain or ear form, cottonseed, currants, dewberries, gooseberries, grapes, huckleberries, loganberries, oat grain, olives, pears, peas, pineapple, potatoes, raspberries, rye grain, sorghum grain, sugarcane, vetch (seed), wheat grain. 1 ppm in or on meat, fat, and meat by-products of cattle, goats, hogs, horses, and sheep. 0.5 ppm in or on papayas, 0.1 ppm in or on bananas, nuts, peaches.

Uses: For selective control of weed seedlings in certain crops, diuron is applied before weed emergence at dosages of 0.6 to 4.8 lbs. active per acre (of area actually treated).

Diuron (Cont'd)

Combinations with bromacil ("Krovar" weed killers) used for citrus and non-cropland weed control.

For general weed control on non-cropland areas where bare ground is desired for an extended period, 4 to 6 lbs. active per acre controls most annual weeds; 16 to 48 lbs. controls most annual and perennial weeds. Established stands of some deep-rooted perennials require higher rates of application.

Personnel Precautions: Caution! May irritate eyes, nose, throat, and skin. Avoid breathing dust or spray mist. Avoid contact with skin, eyes, and clothing. Keep out of reach of children.

Use Precautions: Do not apply (except as recommended for crop use), or drain or flush equipment on or near desirable trees or other plants, or on areas where their roots may extend, or on areas where the chemical may be washed or moved into contact with their roots. Do not use on home plantings of trees, shrubs or herbaceous plants nor on lawns, walks, driveways, tennis courts, or similar areas. Prevent drift of dry powder or spray to desirable plants. Do not contaminate domestic waters. Do not re-use container, bury when empty.

Equipment Cleaning: Thoroughly clean all traces of the herbicide from application equipment immediately after use; otherwise, crop injury may result when equipment is used again. Flush tank, pump, hoses, and boom with several changes of water after removing nozzle tips and screens (clean these parts separately).

Soil Relationships: Fate and rate of disappearance in soils is described in Agronomy Journal, 47, 93 (1955), and J. Ag. & Food Chem., 12 (1), 30 (1964).

Storage and Shipping Directions: Keep from contact with fertilizers, insecticides, fungicides, and seeds. Nonregulatory under D.O.T. (I.C.C.) regulations.

E. I. du Pont de Nemours & Company, Inc.
Biochemicals Department
Wilmington, Delaware 19898
February, 1974

The Toxicity of Some Organic Herbicides To Cattle, Sheep, and Chickens

Production Research Report No. 106

Agricultural Research Service
UNITED STATES DEPARTMENT OF AGRICULTURE

17
19

3-(3,4-Dichlorophenyl)-1,1-dimethylurea (diuron)

Cattle and sheep were dosed by either drench or capsule, chickens by capsule (table 12). One yearling dosed at 100 mg./kg. by drench was poisoned; another dosed by capsule had no ill effects. One sheep dosed at 100 mg./kg. by drench was poisoned after 2 doses and had a significant weight loss during the next 8 days. Chickens dosed at 10 mg./kg. showed a significant decrease in weight gain. One chicken died at 100 mg./kg. after 10; the 4 surviving chickens showed weight loss.

Signs of poisoning in the yearling and the sheep were anorexia, depression, dyspnea, and prostration. In the 2 poisoned sheep, an uncoordinated gait was observed. Both sheep recovered after treatment was discontinued. At necropsy on chickens, there was congestion of the intestinal mucosa and an enlarged, congested liver.

Application rates for diuron most commonly range from 0.2 to 9.6 pounds actual per acre. Rates in excess of 1 pound per acre would be hazardous for chickens. The 9.6-pound rate would not be hazardous for cattle and sheep. A rate of 80 pounds actual per acre is used in irrigation ditches and would be highly hazardous for all three test species.

TABLE 12.—*Results of multiple oral dosing of cattle, sheep, and chickens with 3-(3,4-dichlorophenyl)-1,1-dimethylurea (diuron)* [1]

Animal and dosage received (mg./kg.)	Doses	Means of dosing	Results and remarks [2]
	Number		
Cattle:			
50	10	Drench	NIE.
100	10	do	Poisoned and survived, 9-percent weight loss.
100	10	Capsule	NIE.
Sheep:			
25	10	Drench	Do.
50	10	Capsule	Do.
50	10	Drench	Do.
50	10	do	Do.
100	2	do	Poisoned and survived, 12-percent weight loss.
250	1	do	Poisoned and survived, 8-percent weight loss.
Chickens: [3]			
5	10	Capsule	58-percent weight gain.
10	10	do	37-percent weight gain.
25	10	do	37-percent weight gain.
50	10	do	14-percent weight gain.
100	10	do	1 poisoned and died after 10, 17-percent weight loss in survivors.
250	9	do	All died after 8 or 9.
Controls			50-percent weight gain.

[1] Karmex 8, 80 percent wettable powder, E. I. DuPont de Nemours and Co., Wilmington, Del.
[2] NIE indicates no ill effects apparent.
[3] Average results of 5 treated chickens.

DU PONT

REG U.S. PAT. & TM. OFF.

KARMEX®

WEED KILLER

WETTABLE POWDER

Product Labeling

DIRECTIONS FOR USE

E. I. DU PONT DE NEMOURS & CO. (INC.)
BIOCHEMICALS DEPT., WILMINGTON, DEL.

B-20160 11-78 Made in U.S.A. Printed in U.S.A.

ACTIVE INGREDIENT:

Diuron [3-(3,4-dichlorophenyl)-1,1-dimethylurea] 80%

INERT INGREDIENTS 20%

EPA Reg. No. 352-247-AA

Keep out of reach of children.

CAUTION! MAY IRRITATE EYES, NOSE, THROAT, AND SKIN.
Avoid breathing dust or spray mist.
Avoid contact with skin, eyes, and clothing.

IMPORTANT—Injury to or loss of desirable trees or other plants may result from failure to observe the following:

Do not apply (except as recommended for crop use), or drain or flush equipment on or near desirable trees or other plants, or on areas where their roots may extend, or in locations where the chemical may be washed or moved into contact with their roots. Do not use on home plantings of trees, shrubs or herbaceous plants, nor on lawns, walks, driveways, tennis courts, or similar areas. Prevent drift of dry powder or spray to desirable plants. Do not contaminate any body of water. Keep from contact with fertilizers, insecticides, fungicides, and seeds.

Thoroughly clean all traces of "Karmex" from application equipment immediately after use. Flush tank, pump, hoses, and boom with several changes of water after removing nozzle tips and screens (clean these parts separately). Do not contaminate water by cleaning of equipment or disposal of wastes. Do not reuse container. When empty, bury bag; crush and bury drum.

GENERAL INFORMATION

Du Pont "Karmex" Weed Killer is a wettable powder to be mixed in water and applied as a spray for selective control of weeds in certain crops and for nonselective weed control on non-cropland areas. It is noncorrosive to equipment, nonflammable and nonvolatile.

"Karmex" may be applied to soil prior to emergence of weeds to control susceptible weed seedlings for an extended period of time; the degree of control and duration of effect will vary with the amount of chemical applied, soil texture, rainfall and other conditions. Soils high in clay or organic matter require higher dosages than soil low in clay or organic matter to obtain equivalent herbicide performance. Moisture is required to activate the chemical; best results occur if rainfall (or sprinkler irrigation) occurs within 2 weeks of application.

"Karmex" may also be used to control emerged weeds. Results vary with rate applied and environmental conditions; best results are obtained on succulent weeds growing under conditions of high humidity and temperatures of 70°F or higher. Addition of a surfactant such as Du Pont Surfactant WK to the spray (where recommended) increases contact effects of "Karmex".

Since the effect of "Karmex" varies with soils, uniformity of application, and environmental conditions, it is suggested that growers limit their first use to small areas. Observe all cautions and limitations on labeling of all products used in mixtures.

NOTICE OF WARRANTY

Du Pont warrants that this product conforms to the chemical description on the label thereof and is reasonably fit for purposes stated on such label only when used in accordance with the directions under normal use conditions. It is impossible to eliminate all risks inherently associated with the use of this product. Crop injury, ineffectiveness or other unintended consequences may result because of such factors as weather conditions, presence of other materials, or the manner of use or application, all of which are beyond the control of Du Pont. In no case shall Du Pont be liable for consequential, special or indirect damages resulting from the use or handling of this product. All such risks shall be assumed by the Buyer. DU PONT MAKES NO WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE NOR ANY OTHER EXPRESS OR IMPLIED WARRANTY EXCEPT AS STATED ABOVE.

DIRECTIONS

"Karmex" Weed Killer should be used only in accordance with recommendations on this label, or in

separate published Du Pont recommendations available through local dealers. Do not use on any crop in Kern County, California.

SELECTIVE USE IN CROPS

PREEMERGENCE USE (Germinating Weeds): "Karmex", at rates of ¾ to 1 lb. per acre, controls annual weeds such as barnyardgrass (watergrass), crabgrass, lambsquarters, pigweed, purslane and ragweed; at rates of 1½ to 2 lbs. per acre, it controls weeds such as annual bluegrass, annual groundcherry, annual morningglory, annual sweet vernalgrass, chickweed, corn spurry, dogfennel, fiddleneck (amsinckia), foxtail, gromwell, knawel, pennycress, rattail fescue, red sprangletop, shepherdspurse, tansymustard, velvetgrass, wild buckwheat, wild lettuce and wild mustard. Rates of 2 to 6 lbs. per acre control weeds such as ageratum, annual lovegrass, annual ryegrass, annual smartweed, annual sowthistle, corn speedwell, dayflower, Flora's paintbrush, hawksbeard, horseweed, kochia, kyllinga, marigold, Mexican clover, orchardgrass, peppergrass, pineappleweed, pokeweed, rabbit tobacco, ricegrass, sandbur, seedling johnsongrass, spanishneedles, velvetleaf (buttonweed), and wild radish.

Partial control of the following weeds usually occurs at rates stated: 1 lb. per acre, annual morningglory, cocklebur, prickly sida (teaweed), sesbania and sicklepod; 4 lbs. per acre, quackgrass and horsenettle; 8 to 10 lbs. per acre, guineagrass, maidencane and pangolagrass.

POSTEMERGENCE USE (Emerged Seedling Weeds): "Karmex" at recommended rates, controls annual weeds such as annual morningglory, barnyardgrass (watergrass), crabgrass, crowfoot, goosegrass, pigweed and purslane. Addition of Surfactant WK to the spray (where recommended) increases contact effects of "Karmex". Best results are obtained on succulent weeds growing under conditions of high humidity and temperatures of 70°F or higher.

EQUIPMENT—SPRAY VOLUMES AND PRESSURES: Use a tractor-mounted fixed-boom power sprayer properly calibrated to a constant speed and rate of delivery. Openings in screens should be equal to or larger than 50 mesh. Continuous agitation in the spray tank is required to keep the material in suspension. Agitate by mechanical or hydraulic means; if by-pass or return line is used, it should terminate at bottom of tank to minimize foaming. Avoid overlapping, and shut off spray booms while starting, turning, slowing or stopping, or injury to the crop may result.

For preemergence application, use 25 to 40 gals. per acre and spray pressure of 30 to 40 psi. For postemergence application, use sufficient volume (min. 25 gals. per acre) for thorough coverage of weed foliage; use spray pressure of 20 to 25 psi to keep spray drift to a minimum.

Aerial: For alfalfa, asparagus, barley (winter), cotton (preplant or preemergence only), grass seed crops, pineapple, sugarcane and wheat (winter), application may be made by aircraft (5 to 10 gals. per acre); avoid overlapping of spray swath and avoid application under conditions where excessive drift may occur. Where land is bedded, make application parallel to rows.

SPRAY PREPARATION: Mix proper amount of "Karmex" into necessary volume of water; where use of Du Pont Surfactant WK is recommended, dilute with 10 parts of water and add as last ingredient to nearly full tank.

USE RATES: All dosages of "Karmex" are expressed as broadcast rates; for band treatment, use proportionately less. For example, use ⅓ of the broadcast rate when treating a 14" band where row spacing is 42". Where a range of dosages is given, use the lower rate on coarse textured soils (low in clay or organic matter) and the higher rate on fine textured soils (high in clay or organic matter); for postemergence application, use the lower rate on smaller weeds and the higher rate on larger weeds.

SOIL LIMITATIONS: Crop injury may result from failure to observe the following:

Unless otherwise directed, do not use on sand, loamy sand, gravelly soils or exposed subsoils; nor on alfalfa, apples, artichoke, barley (winter), bermudagrass pasture, citrus, cotton, grapes, oats, olives, papayas, peaches, pears, plumosus fern, sorghum, sugarcane, walnuts and wheat (winter) where organic matter is less than 1%; nor on blueberries, birdsfoot trefoil, caneberries, gooseberries, macadamia nuts and peppermint where organic matter is less than 2%.

REPLANTING: Unless otherwise directed, do not replant treated areas to any crop within 2 years after last application as injury to subsequent crops may result.

FIELD CROPS

(See Soil Limitations)

A good seedbed must be prepared before preemergence use of "Karmex" as crop injury may result if application is made to ground which is cloddy or compacted resulting in improperly planted seed. Plant seed to depth specified. Unless otherwise directed, surface of the soil should not be cultivated or disturbed after application of "Karmex" and before emergence of the crop as weed control may be reduced and crop injury may result. However, if moisture is insufficient to activate the herbicide, a shallow cultivation (rotary hoe preferred) should be made after emergence of crops while weeds are small enough to be controlled by mechanical means.

ALFALFA: Treat only stands established for 1 year or more. Do not apply to seedling alfalfa nor to alfalfa-grass mixtures; do not apply to alfalfa under stress from disease, insect damage, shallow root penetration (such as on shallow hard pans), alkali spots; nor to flooded fields as crop injury may result.

Idaho, Oregon, Washington: Use 1½ to 3 lbs. per acre; for control of volunteer alfalfa, use 4 lbs. per acre. Apply in fall after alfalfa becomes dormant but no later than mid-December.

California (Dormant and Semi-Dormant Varieties): Use 1½ to 3 lbs. per acre; for control of volunteer alfalfa, use 4 lbs. per acre. Apply in fall or winter after alfalfa becomes dormant or semi-dormant, but before growth begins in the spring. Crop injury may result if application is made to actively growing alfalfa. For best results, apply before weeds have emerged or become established (2" in height or diameter). Control of established weeds is improved by applying "Karmex" with a suitable contact herbicide registered for such use. Sufficient rainfall for soil activation of "Karmex" is unlikely in California after February 1.

Arizona, Nevada: Use 1½ to 3 lbs. per acre; apply in fall after alfalfa becomes dormant but no later than January.

Eastern Colorado, Kansas: For control of tansymustard, apply 1 lb. per acre shortly after emergence of mustard in the fall or winter; use 2 lbs. per acre if weeds are 2" to 4" in height. Alternatively, if other annual

weeds are present, apply 2 to 3 lbs. per acre in February or March.
Other Areas Where Alfalfa Becomes Winter Dormant: Use 1½ to 3 lbs. per acre (1½ to 2 lbs. per acre East of Appalachian Mountains). Apply in March or early April, but before spring growth begins.

ARTICHOKE—California: Apply 2 to 4 lbs. per acre in late fall or early winter after the last cultivation. Apply before weeds germinate or to emerging seedlings. Direct spray to cover the area between the rows and at the base of artichoke plants, keeping contact with crop plants at a minimum.

ASPARAGUS: Apply as a band or broadcast treatment. Do not apply to young plants during the first growing season (except as noted below), nor to newly seeded asparagus, nor on plants with exposed roots as severe injury may result.

Established Plantings: On light sandy soils and other soils low in clay or organic matter, apply 1 to 2 lbs. per acre. On soils high in clay or organic matter, use 2 to 4 lbs. per acre. Two applications may be used: the first application should be made before weeds become established but no earlier than 4 weeks before spear emergence and no later than the early cutting period (if weeds are controlled into the cutting period by cultural practices, application may be delayed until immediately after the last cultivation); a second application may be made immediately following completion of harvest provided rainfall is expected. When two applications are used in one season, do not exceed 3 lbs. per acre per application. In Washington (irrigated crop), apply only a single treatment of 4 lbs. per acre in late November or December.

Newly Planted Crowns—California (San Joaquin Delta): Make a single application of 2 to 4 lbs. per acre on soils high in clay or organic matter; use the lower rate on clay loams and the higher rate on peat soils. Do not use on soils containing less than 2% organic matter. Soil must be settled by rainfall or irrigation prior to treatment. Do not treat crowns planted to a depth of less than 2".

BARLEY, WINTER (Drill-Planted)—Western Oregon and Western Washington: Make a single application of 1½ to 2 lbs. per acre as soon as possible after planting but before emergence of barley. Do not replant treated areas to any crop within 1 year after last application as injury to subsequent crops may result.

BERMUDAGRASS PASTURES (Newly Sprigged): Apply 1 to 3 lbs. after planting and before emergence of bermudagrass or weeds. Alternatively, for control of emerged annual weeds up to 4" in height, apply ½ to 1 lb. per acre; add 1 pt. Surfactant WK per 25 gals. of spray. If bermudagrass has emerged at time of treatment, temporary burn of exposed plant parts may occur.

Plant sprigs (stolons) 2" deep in a well-prepared seed bed; do not treat areas where sprigs are planted less than 2" deep as crop injury may result. Do not graze or feed foliage from treated areas to livestock within 70 days after application.

BIRDSFOOT TREFOIL (Lotus)—Western Oregon: Treat only stands established for at least 1 year; do not apply to seedling trefoil as injury may result. Make a single application of 2 lbs. per acre when trefoil is dormant (October 15 to December 15). Do not replant treated areas to any crop within 1 year after last application as injury to subsequent crops may result.

CORN (FIELD):

Postemergence—Make a single application of ¾ lb. per acre in combination with non-pressure nitrogen solution. If nitrogen solution is not used, apply 1 lb. per acre; add 1 pt. Surfactant WK per 25 gals. of spray. Apply as a directed spray when corn is at least 20" high and weeds are no taller than 3". DO NOT APPLY OVER TOP OF CORN. Do not replant to any crop within 1 year, except that cotton, corn and grain sorghum may be planted the spring following treatment.

Preemergence—Arkansas, Louisiana, Mississippi and Tennessee: Make a single application of ⅔ to 1 lb. per acre as a broadcast or band treatment after planting but before corn emerges. Plant corn at least 1½" deep. Do not replant treated areas to crops other than corn or cotton within 4 months following band treatment and 6 months following broadcast treatment as crop injury may result.

COTTON: "Karmex", alone or as recommended combinations, may be applied as preplant, preemergence, early postemergence, and/or lay-by treatments. However, during a single crop season, do not exceed the following amounts of "Karmex" per acre as injury to subsequent crops may result: 1 lb. on loamy sand; 1½ lbs. on sandy loam; 2 lbs. on clay loam; 2¾ lbs. on clay. Do not allow livestock to graze treated cotton.

Preplant—Arizona and California: Use "Karmex" alone, or apply as a separate operation following preplant broadcast treatment with "Treflan"* (incorporated according to directions on "Treflan" label). Apply "Karmex" as a broadcast spray after beds are formed, preirrigated, and final seed beds prepared. Prior to planting, drag-off the tops of the beds and plant in moist soil not treated with "Karmex". Treated soil is returned to the bed after planting when irrigation furrows are reformed after cotton has emerged. If more than two furrowing-out operations are made prior to lay-by, or deep furrows are made early, weed control may be reduced in furrow bottoms. Use at the following rates:

"Karmex" Alone: 1 to 2½ lbs. per acre.

"Karmex" Following "Treflan":

Soil Texture	Product Per Acre—Preplant "Treflan"	"Karmex"
Sandy loam, loam, silt loam, silt	1 pt.	⅔ to 1 lb.
Sandy clay loam, clay loam, silty clay loam, sandy clay, clay	1½ pts.	1 to 1¼ lbs.

Note: Seedling disease may weaken plants and increase the possibility of injury from the use of "Treflan" followed by "Karmex". These treatments should be used only in conjunction with a standard fungicide seed treatment plus a good supplemental soil fungicide program such as Du Pont "Demosan" 65W Fungicide or captan-PCNB mixture.

*Reg. trademark of Elanco Products Co.; "Treflan" contains 4 lbs. trifluralin per gal.

Preemergence—U.S. except for Arizona and California: Use "Karmex" alone or apply as a separate operation following preplant treatment with "Treflan". Apply "Karmex" after planting but before cotton emerges. Do not treat cotton in deep furrows as crop injury may result; use only where cotton is planted on flat or

raised seedbeds. Shallow incorporation (no deeper than ¼") with a rotary hoe or similar equipment following planting usually improves results especially during dry weather. A wide press wheel should be used on the planter to provide a level seed bed for subsequent early season postemergence treatments. If moisture is insufficient to activate "Karmex" or if soil becomes crusted before crop emerges, a shallow rotary hoeing (no deeper than ¼") should be made before weeds become established.

"Karmex" Alone: Make a single application as a broadcast or band spray, using the following broadcast rates: for band treatment, use proportionately less.

Soil Texture**	Lbs. "Karmex" Per Acre
Loamy sand	⅔
Sandy loam, loam, silt loam, silt	1
Sandy clay loam, clay loam, silty clay loam, sandy clay	1¼
Silty clay, clay	2

**Do not use on soils with less than 1% organic matter as crop injury may result.

"Karmex" Following "Treflan" Preplant: Apply "Treflan" prior to planting as a broadcast or band treatment; incorporate according to directions on "Treflan" label. As a separate operation, apply "Karmex" as a band treatment (14" to 20" wide) after planting but before cotton emerges. Use at the following broadcast rates: for band treatment, use proportionately less. See "Note" under Preplant above.

	Product Per Acre	
Soil Texture**	Preplant "Treflan"	Preemergence "Karmex"
Loamy sand	½ pt.	⅓ lb.
Sandy loam, loam, silt loam, silt	1 pt.	⅔ lb.
Sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, clay	1½ pts.	1 lb.

**Do not use on soils with less than 1% organic matter as crop injury may result.

Postemergence—U.S.: Apply only as a directed spray to cover weed foliage; adjust nozzles to minimize contact of cotton leaves with spray or drift or crop injury may result. DO NOT SPRAY OVER TOP OF COTTON.

Early Season—Apply when cotton is at least 6" tall (at least 12" tall for Western irrigated cotton), and when weeds are actively growing and do not exceed 2" in height. Apply as a band treatment at following rates; for each 25 gals. of spray, add 1 pt. Surfactant WK. Two applications may be made if needed.

Weed Problem (Up to 2" Tall)	Lbs. "Karmex" Per Acre (Broadcast Basis)
Annual grasses	½
Pigweed	¼

For control of seedling perennial grasses such as johnsongrass and partial control of nutsedge or when weed growth is under drought stress or as high as 4", add 2 to 3½ lbs. disodium methylarsonate (DSMA; 63% anhydrous or equivalent) to above spray mixture. If DSMA is used, do not apply after first bloom.

Late Season (Lay-By)—Apply 1 to 1½ lbs. per acre (1 to 2 lbs. in Arizona and California) when cotton is at least 12" tall (at least 20" tall for Pima S-2). For control of germinating weed seedlings, apply to soil beneath cotton plants and between rows immediately after last cultivation. In irrigated cotton, best weed control is obtained if the field is irrigated within 3 to 4 days after application; thoroughly wet the surface of the ground over the row to carry the herbicide into the root zone of germinating weeds. Alternatively, for control of emerged annual weeds (up to 4" in height) at lay-by time, make a single application in combination with Surfactant WK (1 pt. per 25 gals. spray), or use ½ to ¾ lb. "Karmex" (plus surfactant) per acre and repeat later if needed.

Replanting: If initial seeding fails to produce a stand, cotton may be replanted in soil treated preplant or preemergence with "Karmex", alone or following "Treflan". Wherever possible, avoid disturbing original bed. If necessary to rework soil before replanting, use shallow cultivation such as discing; do not relist nor move soil into the original drill area. Plant seed at least 1" deep. Do not retreat field with a second preplant or preemergence application during the same crop year as injury to the crop may result.

Subsequent Crops:

"Karmex"—Type of Application	Crops That May Follow Treated Cotton
Band preemergence or postemergence	Any crop 4 months after last application.
Band preemergence plus postemergence ·or· Broadcast preemergence (and preplant) ·or· Broadcast preemergence plus band postemergence	Cotton, soybeans, corn or grain sorghums (not sorgos or forage sorghums nor grass sorghums) the next spring. Do not replant treated areas to any other crop within one year after last application as injury to subsequent crops may result.
Broadcast postemergence (lay-by)	Cotton, corn, grain sorghums (not sorgos or forage sorghums nor grass sorghums) the next spring. Do not replant treated areas to any other crop within one year after last application as injury to subsequent crops may result.

Colorado, Kansas, New Mexico and Oklahoma: On sand bluestem, side oats grama and switchgrass, apply 2 to 3 lbs. per acre during the dormant period shortly before weed seedlings emerge. Do not apply after crop begins growth in the spring as crop injury may result. In fields where ash residues have accumulated from burning straw, use 3 lbs. per acre; spread unburned chaff or straw with a harrow or chopper before application.

Western Oregon: On alta fescue, Astoria bentgrass, Highland bentgrass, Kentucky bluegrass (Merion bluegrass) and orchardgrass, apply 2 to 4 lbs. per acre between October 1 and November 15. In fields where ash residues have accumulated from burning straw, use 3 to 4 lbs. per acre; spread unburned chaff or straw with a harrow or chopper before application. If perennial velvetgrass *(Holcus lanatus)* is a problem, use 4 lbs. per acre. For best results, apply as soon as possible after fall rains start. Established weeds (beyond 2 to 4 leaf stage) should be removed prior to treatment.

Well established vigorous stands of spring-planted alta fescue, Kentucky bluegrass and orchardgrass may be treated the following fall provided the crop is planted before April 1 and treatment is not applied before October 15; use 2 lbs. per acre.

Oregon: For use in newly planted bentgrass, Chewings fescue, Kentucky bluegrass, perennial ryegrass, orchardgrass and tall fescue. During planting operation, spray Aqua Nu Char† or Gro-Safe†† (activated charcoal) as a 1" band on soil surface at rate of 300 lbs. per acre (broadcast basis; equivalent to 15 lbs. per acre of crop where row spacing is 20"). Mount nozzles to apply directly over seed rows to prevent crop injury. Follow with "Karmex" as a single broadcast spray at rate of 2½ to 3 lbs. per acre; apply as soon as possible after planting but before crops or weeds emerge and before rains or sprinkler irrigation. Fall or spring plantings may be treated; best results usually occur with early fall plantings. Treatment will not control downy brome or wild oats.

† Reg. trademark of Westvaco Corp.
†† Reg. trademark of ICI United States Inc.

OATS (Drill-Planted): Do not replant treated areas to any crop within one year after last application as injury to subsequent crops may result.

Spring Oats—Idaho, Eastern Oregon, Eastern Washington: Use in areas where average annual rainfall exceeds 16". Make a single application of 1 to 1½ lbs. per acre after planting, either before or after oats emerge but within 6 weeks of planting. Best results are usually obtained when application is made 3 to 4 weeks after planting. Apply before weeds are 3" to 4" tall.

Winter Oats and Mixtures with Peas or Vetch—Western Oregon and Western Washington: Make a single application of 1½ to 2 lbs. per acre as soon as possible after planting but before emergence of the crop.

PEPPERMINT—Pacific Northwest: Apply 3 lbs. per acre just after the last cultivation in the spring prior to emergence of peppermint. Do not apply to newly planted (less than 1 year) nor to emerged peppermint as injury may result.

SORGHUM (GRAIN)—Southwestern States: Apply ¼ to ½ lb. per acre; add 1 pt. Surfactant WK per 25 gals. of spray. Apply as a directed postemergence broadcast or band spray after sorghum is 15" tall to control weeds 2" to 4" in height. DO NOT SPRAY OVER TOP OF SORGHUM. Use the lower rate on broadleaved weeds up to 2" tall; use the higher rate on grasses up to 2" and broadleaved weeds up to 4" tall. When the lower rate is used, a second application may be made if needed provided the amount applied in one crop year does not exceed ½ lb. per acre. Treatment of weeds under drought stress is usually ineffective.

Do not replant treated areas to crops other than cotton or corn within 4 months following band treatment and 6 months following broadcast treatment as crop injury may result.

SUGARCANE: To prevent possible crop injury on new cane varieties, tolerance to "Karmex" should be determined prior to adoption as field practice. Do not treat sugarcane growing on thinly covered subsoils or rocky areas as crop injury may result. Temporary chlorosis of the crop may result from application over emerged cane; to minimize chlorosis, use directed postemergence sprays.

Florida: Preemergence—For high organic soils, apply 2 to 4 lbs. per acre as a broadcast or band spray prior to weed emergence after planting or after harvesting plant crop (for ratoon crop). Postemergence—Make 1 or 2 applications of 2 lbs. per acre as needed by directed spray inter-row. Alternatively, for panicum control, make up to 3 applications of ½ to 1 lb. per acre as a directed spray after cane has emerged but before panicum exceeds 2" in height; add 1 qt. Surfactant WK per 100 gals. of spray. Adjust nozzles to spray beneath cane plants and between rows to cover weed foliage and to minimize contact of cane leaves with spray or drift. Do not apply more than 6 lbs. total per acre between planting (or ratooning) and harvest.

Hawaii and Puerto Rico: Apply 4 to 8 lbs. per acre as a broadcast spray prior to weed emergence after planting or after harvesting plant crop (for ratoon crop). A second and third application of 2 to 4 lbs. per acre may be made as a broadcast spray over emerged cane or by directed spray inter-row.

If weeds are emerged, add a surfactant (such as Surfactant WK, "Osamul" 95 or "Sterox" SK) to the spray at the rate of 1 to 2 qts. per 100 gals. and apply as a directed spray. DO NOT SPRAY OVER TOP OF CANE.

Do not apply more than 3 treatments nor more than 10 lbs. (Puerto Rico) or 12 lbs. (Hawaii) total per acre between planting (or ratooning) and harvest. Treated areas may be planted to sugarcane or pineapple one year after last application.

Louisiana: Use on plant cane seeded on fallowed ground. Make a single application of 3 to 3¾ lbs. per acre at either of the following times. Fall Treatment (August through October)—Treat a 2 ft. band over the row after planting of cane, but before weeds or cane emerge. Spring Treatment (January through April)—if shaving and off-barring are practiced, treat a 2 ft. band over the row before weeds or cane emerge.

WHEAT, WINTER (Drill-Planted): Crop injury may result where severe winter stress, disease or insect damage follows application; winter-sensitive varieties such as McDermid and Hyslop may be less tolerant of "Karmex" than winter-hardy varieties such as Gaines and Nugaines. Crop injury may also result from failure to observe the following: Do not use on sand or loamy sand soils, nor on gravelly or sandy loams low in organic matter (less than 1%), nor on thinly covered or exposed subsoil areas (clay knobs); do not treat wheat planted less than 1" deep; do not treat wheat where winter climatic conditions have caused "heaving" of plants; do not treat wheat plants lacking in vigor due to poor emergence, insect damage, disease or [illegible]

New Jersey—Blueberries: For control of winter annuals, apply 2 lbs. per acre in October, November or December.

California—Raspberries, Blackberries, Boysenberries, Dewberries and Loganberries: For control of winter annuals, apply 2 lbs. per acre in October or November; repeat at same rate in late spring to control summer annuals. A single application of 3 lbs. per acre in January or February will control both winter and summer annuals in some areas, but the separate fall and spring schedule is preferred.

Western Oregon and Western Washington—Blueberries, Caneberries and Gooseberries: Use same schedule as recommended for California.

CITRUS: Use only under trees established in the grove for at least 1 year. Time application as indicated for specific areas, except application may be made any time of the year where sprinkler or flood irrigation can be timed to activate the herbicide. Established perennial weeds require other special control procedures. Do not apply under citrus trees that have been subjected to freezing within 6 months.

Arizona (except Yuma area) and California (except Imperial and Coachella Valleys)—Oranges, Lemons and Grapefruit: Apply 3 to 4 lbs. per acre shortly after grove has been laid-up in final form (nontillage program) in late fall or early winter. Alternatively, apply 2 lbs. per acre in October or November and repeat at the same rate in March or April. Subsequent annual applications of 2 to 3 lbs. per acre will usually give adequate weed control.

Florida—Oranges, Grapefruit, Tangelos and Tangerines: Make a single application of 4 to 8 lbs. per acre, or apply 3 to 4 lbs. per acre followed by the same rate 4 to 6 months later. On bearing citrus, apply any time when seasonal rains are expected; on nonbearing trees, apply when winter banks are pulled down.

For control of guineagrass, loosestrife, maidencane, paragrass, primrose willow and seamyrtle in ditches adjacent to citrus groves, use 1 lb. per 1000 sq. ft. (40 lbs. per acre) in sufficient water (min. 4 gals. per 1000 sq. ft.) to provide thorough and uniform coverage. Apply in the spring before weed growth starts or after removal of vegetation. Repeat treatment on a spot basis to control hard-to-kill species such as guineagrass. In bedded groves, do not treat water furrows between the beds as injury to the trees may result.

Texas—Oranges and Grapefruit: Apply 2 to 4 lbs. per acre for annual weeds; use 4 to 6 lbs. per acre for control of johnsongrass seedlings. Best results accompany application in the spring; well established weeds should be eliminated by cultivation prior to treatment.

GRAPES: Apply only to established vineyards (at least 3 years old) as a band treatment to grape rows. Do not apply to vines with trunks less than 1½" in diameter as injury may result. On soils low in clay or organic matter (1 to 2%), severe plant injury may result if heavy rainfall or more than one inch of irrigation occurs soon after treatment. This risk must be assumed by the user.

East of the Rocky Mountains: On soils low in clay or organic matter (1 to 2%), apply 2 to 3 lbs. per acre; on soils high in clay or organic matter, apply 3 to 6 lbs. per acre. Apply in the spring just prior to germination and growth of annual weeds.

West of the Rocky Mountains: Apply in November, December or January. For initial treatment, apply 3 to 4 lbs. per acre; subsequent annual applications of 2 lbs. per acre will usually give adequate weed control.

New York and Pennsylvania—Perennial Grasses: Use only in established vineyards (at least 4 years old) for spot control of perennial grasses such as orchardgrass, quackgrass and ryegrass. Apply in the spring as a band treatment to ridged soil (2" to 4" high) under the trellis at the rate of 8 to 12 lbs. per acre. Band width should not exceed 30". Do not apply more than once every 4 years. Use only on heavy soils such as loams, silt loams, clay loams. Do not use in areas where grape roots are shallow or exposed because of high bedrock, poor drainage, or erosion as injury to grapes may result.

MACADAMIA NUTS—Hawaii: Use only under trees established in the orchard for at least 1 year. Apply 2 to 6 lbs. per acre immediately after harvest, preferably before weeds emerge; if weeds have emerged, add 1 pt. Surfactant WK per 25 gals. of spray. Retreat as needed but do not exceed 10 lbs. per acre per year.

OLIVES—California: Use only under trees established in the grove for at least 1 year. Apply 2 lbs. per acre after grove has been laid-up in final form in late October or November; repeat at same rate in March or April. Remove weed growth prior to treatment.

PAPAYAS: Use only under trees established in the orchard for at least 1 year. Apply 2½ to 5 lbs. per acre, preferably before weeds emerge; if weeds have emerged, add 1 pt. Surfactant WK per 25 gals. of spray.

PEACHES—Use "Karmex" alone, or apply as a tank mixture with "Sinbar".

"Karmex" Alone—Use only under trees established in the orchard for at least 3 years. Apply 2 to 5 lbs. per acre in the early spring before weeds emerge or during the early seedling stage of weed growth. Do not apply within 3 months of harvest; in the Far West, do not apply within 8 months of harvest.

"Karmex" + "Sinbar"—Use only under trees established in the orchard for at least 2 years. Apply either in the spring or after harvest in the fall before weeds emerge or during early seedling stage of weed growth.

	Lbs. Product Per Acre	
Soil Texture	1 to 2% Organic Matter "Karmex" + "Sinbar"	More Than 2% Organic Matter "Karmex" + "Sinbar"
Sandy loam	1 + 1	1½ + 1½
Loam, silt loam, silt	1½ + 1½	2 + 2
Clay loam, clay	2 + 2	2 + 2

Where crop is grown under furrow irrigation or under raised-berm flood irrigation (trees 4" to 6" above waterline), apply only as a band treatment. Do not treat trees planted in the bottom of irrigation furrows, nor trees grown under flat flood or basin irrigation, as injury to trees may result. Where complete weed con-

alkalinity, or other causes; do not apply after wheat has reached the "boot" stage of maturity; do not use with surfactants, or nitrogen solution. Do not replant treated areas to any other crop within 1 year after last treatment (except as noted) as injury to subsequent crops may result.

Idaho, Oregon and Washington—East of Cascade Range:

Areas Where Average Annual Rainfall Exceeds 16 Inches: Make a single application of 1 to 1½ lbs. per acre. Fall Treatment: For early fall-planted wheat (seeded before September 10), apply 3 to 6 weeks after planting but before weeds are 3" to 4" tall. Treatment after October 1 has generally given best results. Application should not be made after soil freezes in the fall. Wheat planted in late October should not be treated until the following spring. Spring Treatment: Apply as soon as wheat starts to grow in the spring. Treatment made prior to April 10 will usually give good results provided weed growth is less than 4" tall. Application later than May 1 may give poor results.

Alternatively, make a single application of ½ to 1 lb. "Karmex" plus ¼ lb. bromoxynil per acre as a tank mixture, either in the fall after wheat has emerged but before soil freezes or in the spring as soon as soil thaws; apply before weeds are 2" tall or across.

Areas Where Average Annual Rainfall is 10 to 16 Inches: After wheat is planted in the fall, make a single application of 1 to 1½ lbs. per acre when sufficient moisture is available to germinate wheat seed. Apply before soil freezes and before weeds are 2" tall. Application later than March 1 may give poor results.

Note—If fall-planted wheat fails to grow due to winter kill or adverse growing conditions after fall treatment, only fields treated before November 1 may be replanted to spring wheat. Spring wheat should not be planted before April 1, and only after deep discing and plowing to a depth of 4" to 6" prior to planting. Do not retreat field with a second application during the same crop year as injury to the crop may result.

Oregon and Washington—West of Cascade Range: Make a single application of 1½ to 2 lbs. per acre as soon as possible after planting; if wheat and weeds have emerged, apply before weeds are 3" to 4" tall. Alternatively, apply a tank mixture of "Karmex" plus bromoxynil as detailed above for "East of Cascade Range".

Other Areas: Make a single application in the spring as soon as wheat (fall-planted) starts to grow and before weeds are 2" tall. Application later than May 1 may give poor results.

Central Plains and Midwest: Use 1 to 2 lbs. per acre.

Kansas, Oklahoma and Texas: Use 1½ to 2 lbs. per acre.

Northeast: Use 1 to 1½ lbs. per acre.

○ FRUIT AND NUT CROPS

(See Soil Limitations)

Unless otherwise directed, make a single application per year as a directed spray, avoiding contact of foliage and fruit with spray or drift. Do not graze livestock in treated orchards or groves.

APPLES: Use "Karmex" alone, or apply as a tank mixture with Du Pont "Sinbar" Weed Killer.

"Karmex" Alone—Use only under trees established in the orchard for at least 1 year; do not treat varieties grafted on full-dwarf root stocks. Apply 4 lbs. per acre in the spring (March through May). In the Far West, treatment may be made in winter (December through February), or apply 2 lbs. per acre as a postharvest treatment followed by 2 lbs. in the spring.

"Karmex" + "Sinbar"—Use only under trees established in the orchard for at least 2 years. Apply either in the spring or after harvest in the fall before weeds emerge or during early seedling stage of weed growth.

	Lbs. Product Per Acre	
Soil Texture	1 to 2% Organic Matter "Karmex" + "Sinbar"	More Than 2% Organic Matter "Karmex" + "Sinbar"
Sandy loam	1 + 1	1½ + 1½
Loam, silt loam, silt	1½ + 1½	2 + 2
Clay loam, clay	2 + 2	2 + 2

Where crop is grown under furrow irrigation or under raised-berm flood irrigation (trees 4" to 6" above waterline), apply only as a band treatment. Do not treat trees planted in the bottom of irrigation furrows, nor trees grown under flat flood or basin irrigation, as injury to trees may result. Where complete weed control to harvest is desired, additional weed control measures may be required during the growing season.

BANANAS—New Plantings: To control annual weeds, apply 1½ to 3 lbs. per acre after planting but before plants emerge. Do not apply to loose soil directly over the planting material.

Established Plantings: For control of annuals and for top-kill of perennials such as bermudagrass, birdseed grass and guineagrass, apply 3 to 6 lbs. per acre plus 1 pt. Surfactant WK (or suitable equivalent) per 25 gals. of spray; avoid contact of banana plants with spray or drift as injury may result. When tall, dense weed growth is present, remove weed growth before application. If application is made to soil free of weeds, omit the surfactant from the spray. Repeat treatment as needed, but do not apply more often than 6-week intervals nor more than a total of 12 lbs. per acre (broadcast basis) in a 12-month period.

NOTE: Do not replant treated areas to any crop within 2 years after last application as injury to subsequent crops may result, except that sugarcane or pineapple may be planted one year after last application.

BLUEBERRIES, CANEBERRIES AND GOOSEBERRIES: Use only in fields which have been established for at least 1 year. Do not apply to berries interplanted with fruit trees; do not apply to plants whose roots are exposed as injury may result. Apply as a band treatment at base of canes or bushes; for spring application, apply before germination and growth of annual weeds.

Indiana, Michigan and Ohio—Blueberries: Apply 2 to 4 lbs. per acre in late spring; alternatively, apply 2 lbs. per acre in the fall and repeat at same rate in the spring. Raspberries: Apply 3 lbs. per acre in the spring.

Massachusetts—Blueberries: Apply 2 lbs. per acre in late spring.

trol to harvest is desired, additional weed control measures may be required during the growing season.

PEARS: Use only under trees established in the orchard for at least 1 year; do not treat varieties grafted on full-dwarf root stocks. Apply 4 lbs. per acre in the spring (March through May). In the Far West, treatment may be made in winter (December through February), or apply 2 lbs. per acre as a postharvest treatment followed by 2 lbs. in the spring.

PECANS: Use only under trees established in the grove for at least 3 years. Apply 2 to 4 lbs. per acre in spring or early summer. Do not use on soils with less than ½% organic matter.

PINEAPPLE—Hawaii: Apply 4 to 8 lbs. per acre as a broadcast spray just before or immediately after planting but prior to weed emergence. Use 4 lbs. per acre after harvesting plant crop (for ratoon crop). For plant crop only, a second and third broadcast or interspace application may be made prior to differentiation at the rate of 2 lbs. per acre at intervals of not less than 2 months. Additional applications to plant crop may be made as needed to interspace only using 2 lbs. per acre. Do not apply more than 3 broadcast sprays (maximum 12 lbs. per acre) prior to differentiation nor more than 16 lbs. total per acre per plant crop. Treated areas may be planted to pineapple or sugarcane 1 year after last application.

WALNUTS (English)—California: Use only under trees established in the orchard for at least 1 year. As an initial treatment, apply 3 to 5 lbs. per acre after the orchard has been laid up in final form (nontillage program) in late fall or early winter; retreat annually with 2 to 3 lbs. per acre. Alternatively, apply 2 lbs. per acre in October or November and repeat at same rate in March or April.

● ORNAMENTAL CROPS

(See Soil Limitations)

ORNAMENTAL BULB CROPS (Bulbous Iris, Narcissus, Tulips)—Western Washington: Make a single application of 4 lbs. per acre, except use 3 lbs. per acre for tulips planted in light soils (sandy loam, loam). Apply after planting but no later than 4 weeks prior to bulb emergence (usually late September or October). Do not replant treated areas to any crop within 1 year after last application as injury to subsequent crops may result.

PLUMOSUS FERN—Florida: Hand weed and mow fern; then make a single application of 3 lbs. per acre within 3 to 5 days. Do not cultivate or disturb soil after application as crop injury may result. Treat only established stands at least 1 year old.

TREE PLANTINGS—Colorado, Montana, Nebraska, North Dakota, South Dakota, Wyoming: Use only under established plantings (1 year or older) of American elm, caragana, cottonwood, Douglas fir, green ash, honeysuckle, Ponderosa pine, redcedar, Russian olive and Siberian elm. Use 2½ to 5 lbs. per acre; apply as a band 4 ft. wide in the tree row (2 ft. on each side of row). For example, 1 oz. "Karmex" (4 level tablespoonfuls) treats 135 ft. of tree row (2 ft. on each side of row) at the rate of 5 lbs. per acre. Apply as a directed spray in early spring before weeds emerge and before trees leaf out. Do not apply to foliage of trees, nor under trees growing in low areas as injury to the trees may result.

NON-CROP WEED CONTROL

"Karmex" is an effective herbicide for the control of many annual and perennial grasses and herbaceous weeds on non-cropland areas where bare ground is desired. The degree of control and duration of effect will vary with the amount of chemical applied, soil texture, rainfall and other conditions.

"Karmex" may be used as a preemergence treatment at any time of the year except when ground is frozen, provided adequate moisture is supplied by rainfall or artificial means to activate the herbicide. Best results are obtained if application is made to the soil shortly before weed growth begins. If dense growth is present, remove tops and spray the ground.

Increased contact activity on established weeds may be obtained by the addition of Du Pont Surfactant WK at the rate of 2 qts. per 100 gals. of spray mixture. Apply as a drenching spray to actively growing weeds during warm weather when daily temperature will exceed 70°F.

Except for small areas, use a fixed-boom power sprayer properly calibrated to insure a constant rate of application. Mix proper amount of "Karmex" into volume of water necessary to obtain uniform coverage; if Surfactant WK is used, dilute with 10 parts of water and add as last ingredient to nearly full tank. Material must be kept in suspension at all times. Agitate by mechanical or hydraulic means in the spray tank; if bypass or return line is used, it should terminate at bottom of tank to minimize foaming. Openings in screens should be equal to or larger than 50 mesh.

General Weed Control: To control most weeds for an extended period of time on non-cropland such as utility, highway, pipeline and railroad right of ways, petroleum tank farms, lumberyards, storage areas, industrial plant sites, and around farm buildings—apply 5 to 20 lbs. per acre to control most annual weeds. Use 20 to 60 lbs. per acre for perennial weeds; additional treatment may be required where a longer period of control is desired or when hard-to-kill, deep-rooted perennial weeds such as johnsongrass are present. In low rainfall areas, "Karmex" may not provide satisfactory control of deep-rooted perennial weeds.

For weed control on small areas, use one-half cupful of "Karmex" per 100 sq. ft. for a dosage of approximately 50 lbs. per acre.

Irrigation and Drainage Ditches: Apply 5 to 20 lbs. per acre to control most annual weeds; use 20 to 60 lbs. per acre to control both annual and perennial weeds. Apply only when water is not in the ditch. For irrigation ditches, apply during the non-crop season, and when ditch is not in use. To minimize movement of "Karmex" with irrigation water (to avoid possible crop injury), it is essential that the herbicide be fixed in the soil by moisture. Apply before expected seasonal rainfall (if possible when soil in the ditch is still moist). Following treatment, if rainfall has not totaled at least 4 inches, fill ditch with water and allow to stand for 72 hours; drain off and waste remaining water before using ditch. Do not treat any ditch into which roots of trees or other desirable plants may [illegible]