

PLATES

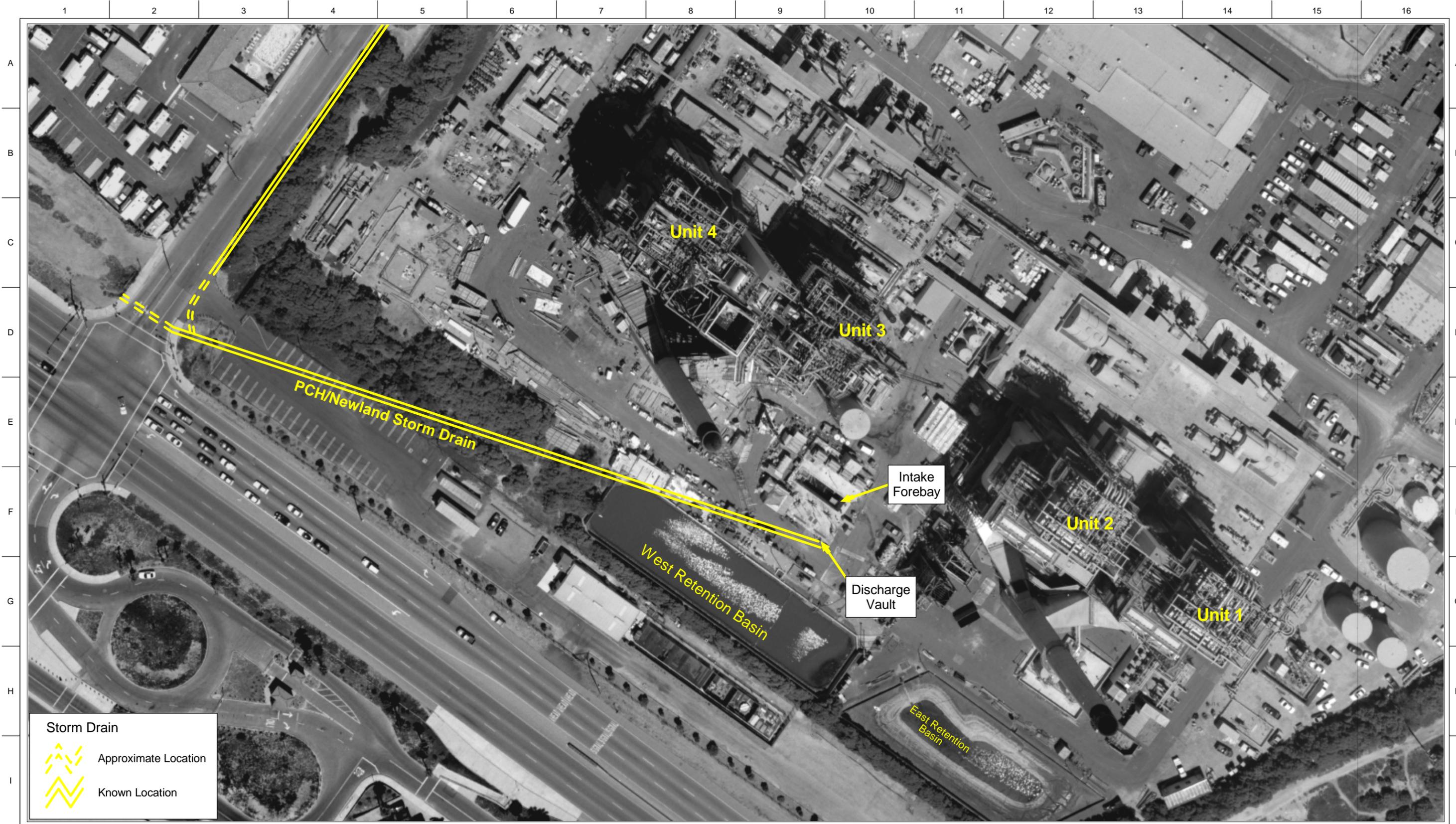


100 0 100 200 Feet



Client: California Energy Commission	
Project/Site: HBGS - AES Powerplant	Date: April 2003
	Project No: 225-001
Title: Site Map	Plate No: 1-1

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16



Storm Drain

-  Approximate Location
-  Known Location

40 0 40 80 Feet

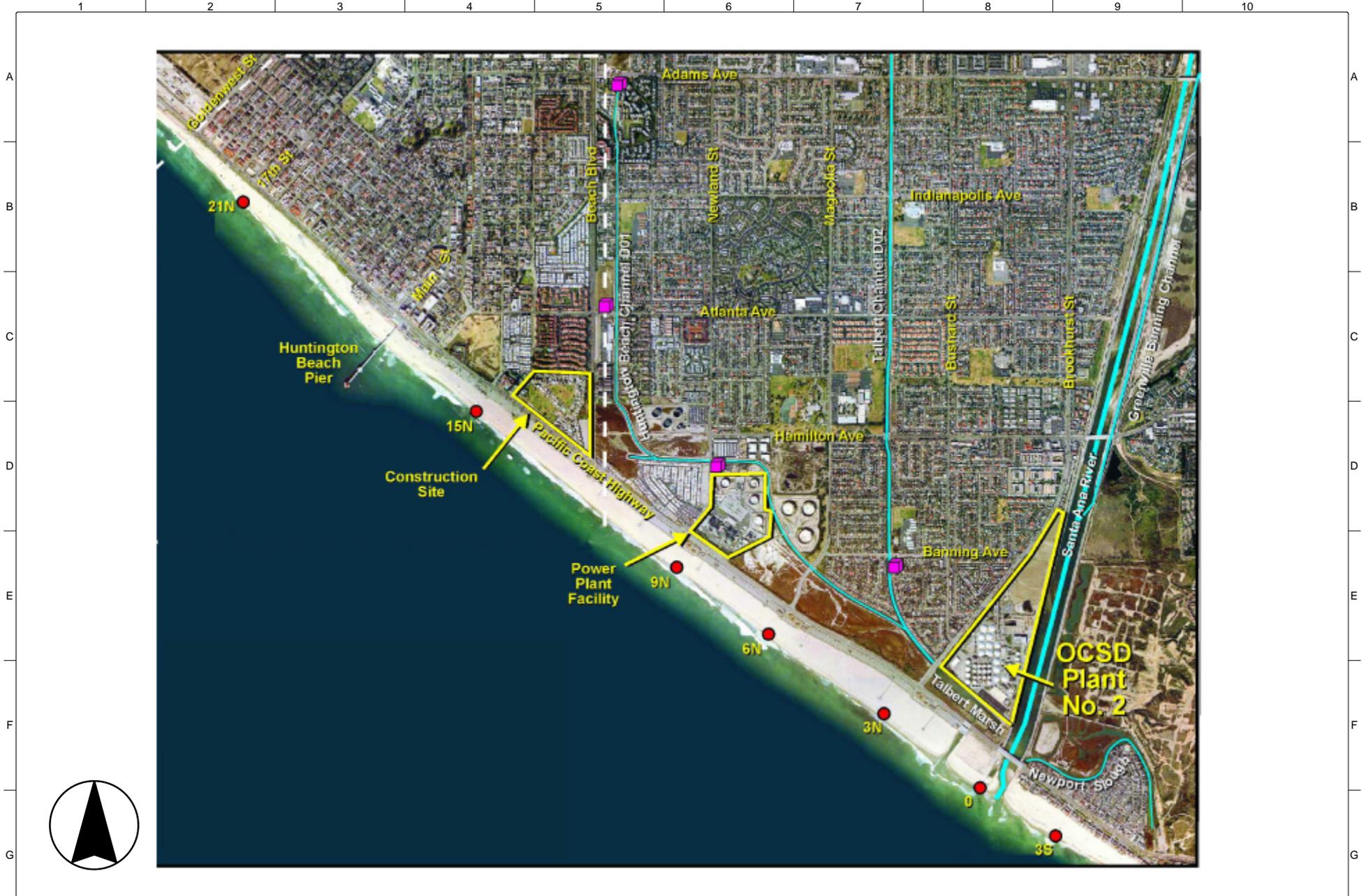


Note:
Locations are approximate.



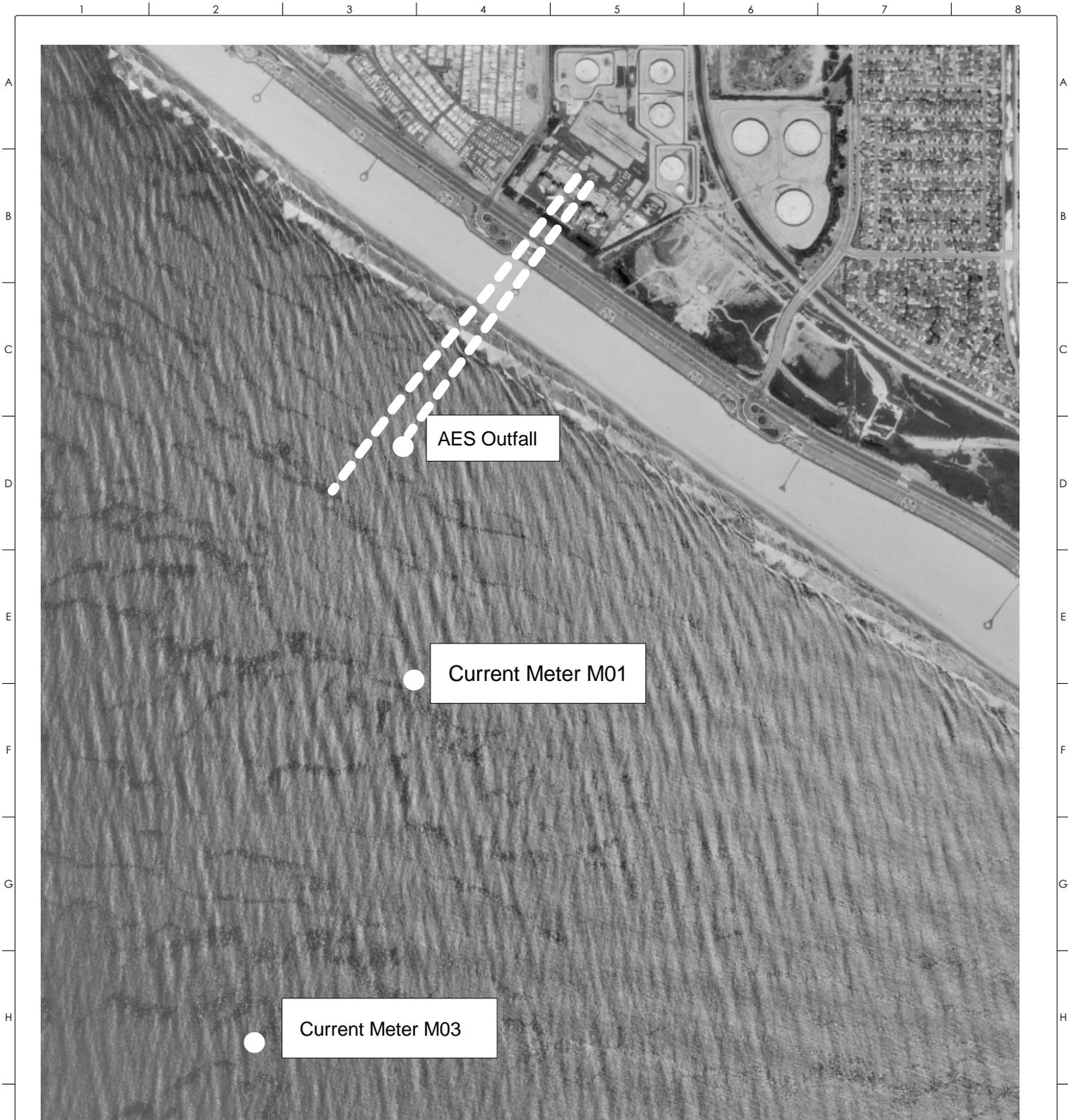
PREPARED SOLELY FOR THE USE OF OUR CLIENT AND NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH KOMEX HAS NOT ENTERED INTO A CONTRACT.

Client: California Energy Commission	
Project/Site: HBGS - AES Powerplant	Date: April 2003
	Project No: 225-001
Title: Schematic Site Plan	Plate No: 1-2



PREPARED SOLELY FOR THE USE OF OUR CLIENT AND NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH KOMEX HAS NOT ENTERED INTO A CONTRACT.

Client:	California Energy Commission	Date:	April 2003
Project/Site:	HBGS - AES Powerplant	Project No:	225-001
Title:	Huntington State Beach	Plate No:	1-3

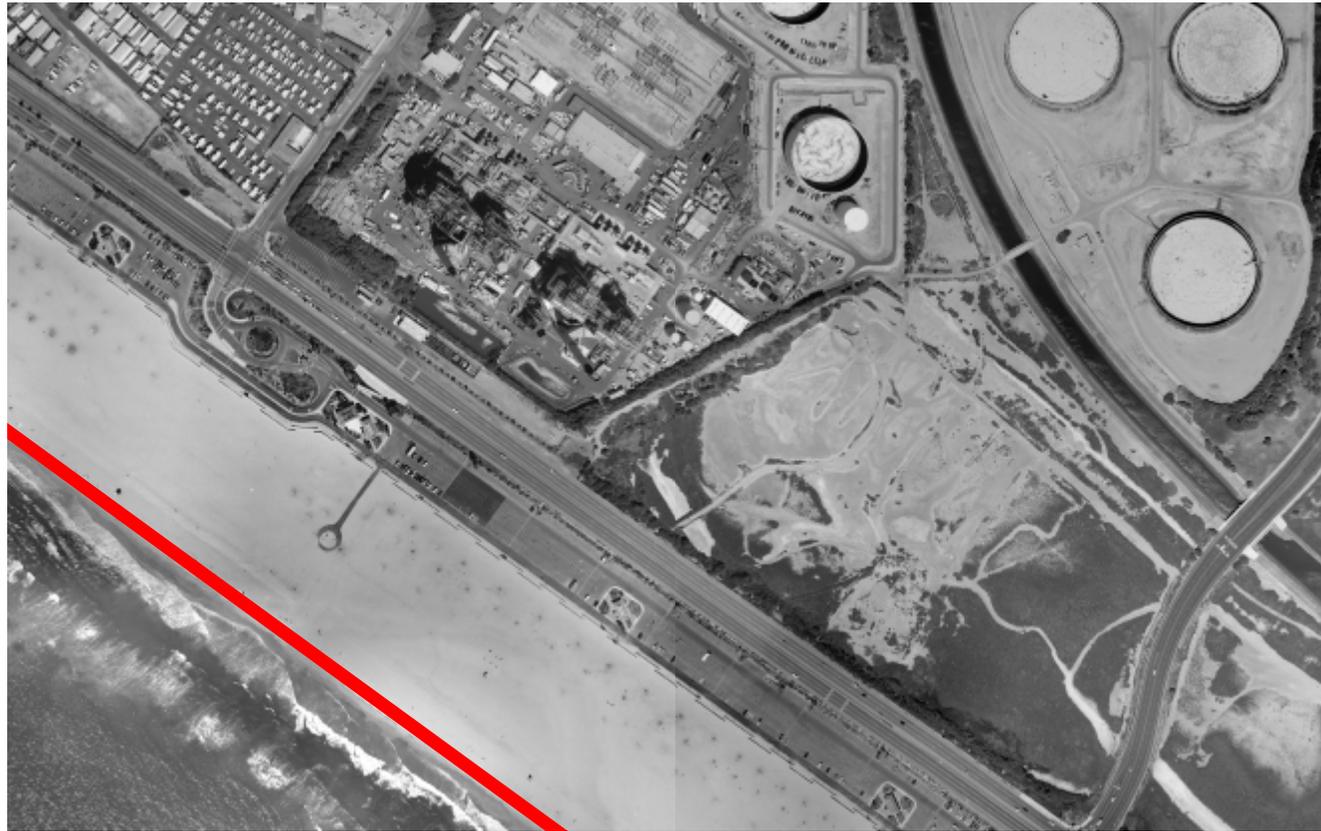


1000 0 1000 Feet



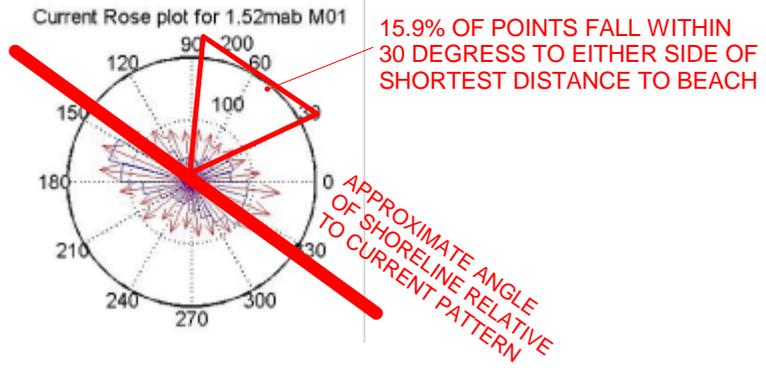
PREPARED SOLELY FOR THE USE OF OUR CLIENT AND NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH KOMEX HAS NOT ENTERED INTO A CONTRACT.

Client:	California Energy Commission	Date:	April 2003
Project/Site:	HBGS - AES Powerplant	Project No:	225-001
Title:	Intake, Outfall, and USC Current Meter Locations	Plate No:	1-4



Mean Current Data for
1.52 mab

angle(deg)	# of pts	mean spd (cm/s)
-172.5	84	4.693
-157.5	52	4.038
-142.5	45	3.580
-127.5	30	3.227
-112.5	31	3.025
-97.5	30	3.280
-82.5	34	2.932
-67.5	49	3.108
-52.5	58	3.668
-37.5	88	4.077
-22.5	98	5.074
-7.5	100	5.240
7.5	67	4.587
22.5	64	3.435
37.5	46	2.940
52.5	40	2.767
67.5	36	2.707
82.5	51	2.946
97.5	46	3.192
112.5	52	2.727
127.5	67	3.496
142.5	96	4.468
157.5	104	5.670
172.5	125	5.499



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Client:

California Energy Commission

Project/Site:

HBGS - AES Powerplant

Title:

USC Mean Current Data

Date: April 2003

Project No: 225-001

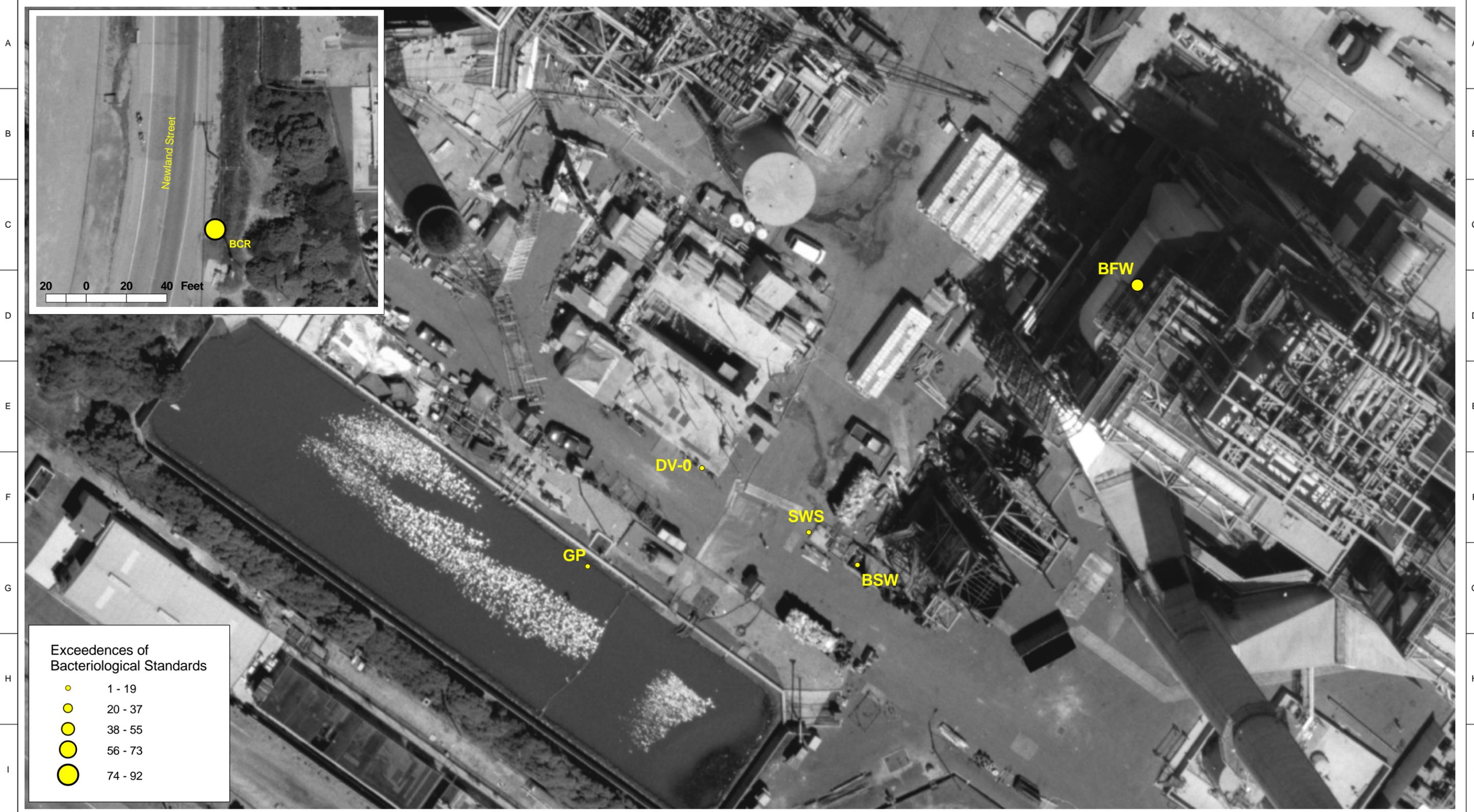
Plate No:

1-5



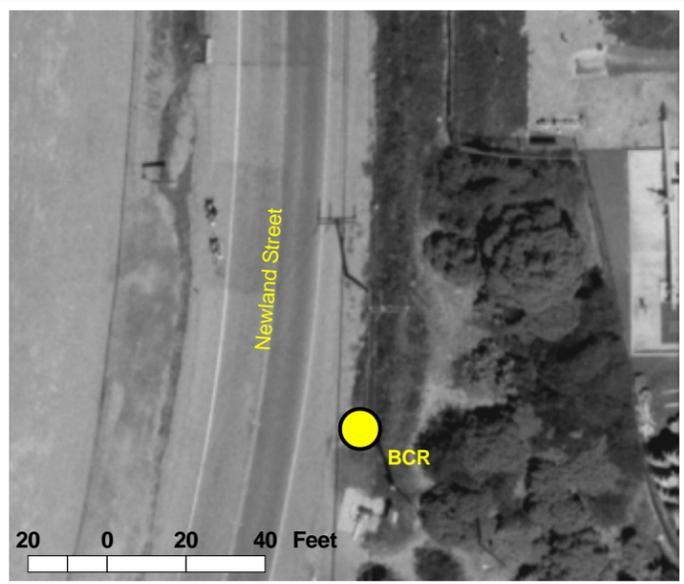
KOMETEK CORPORATION OF CALIFORNIA
 10000 WILSON AVENUE, SUITE 100, WESTLAKE, CALIFORNIA 91391
 TEL: 818.898.7100 FAX: 818.898.7101

Client:	California Energy Commission	Date:	April 2003
Project/Site:	HBGS - AES Powerplant	Project No.:	April 2003
Title:	Offshore Mooring Locations	Figure No.:	3-1



A
B
C
D
E
F
G
H
I
J

A
B
C
D
E
F
G
H
I
J



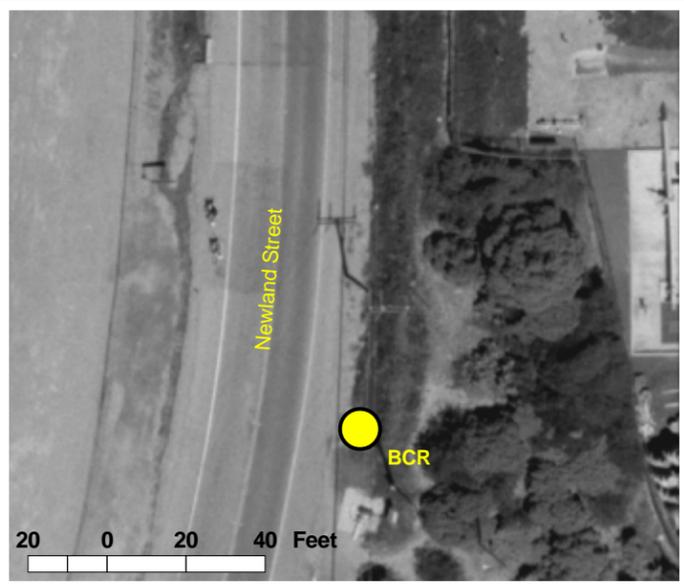
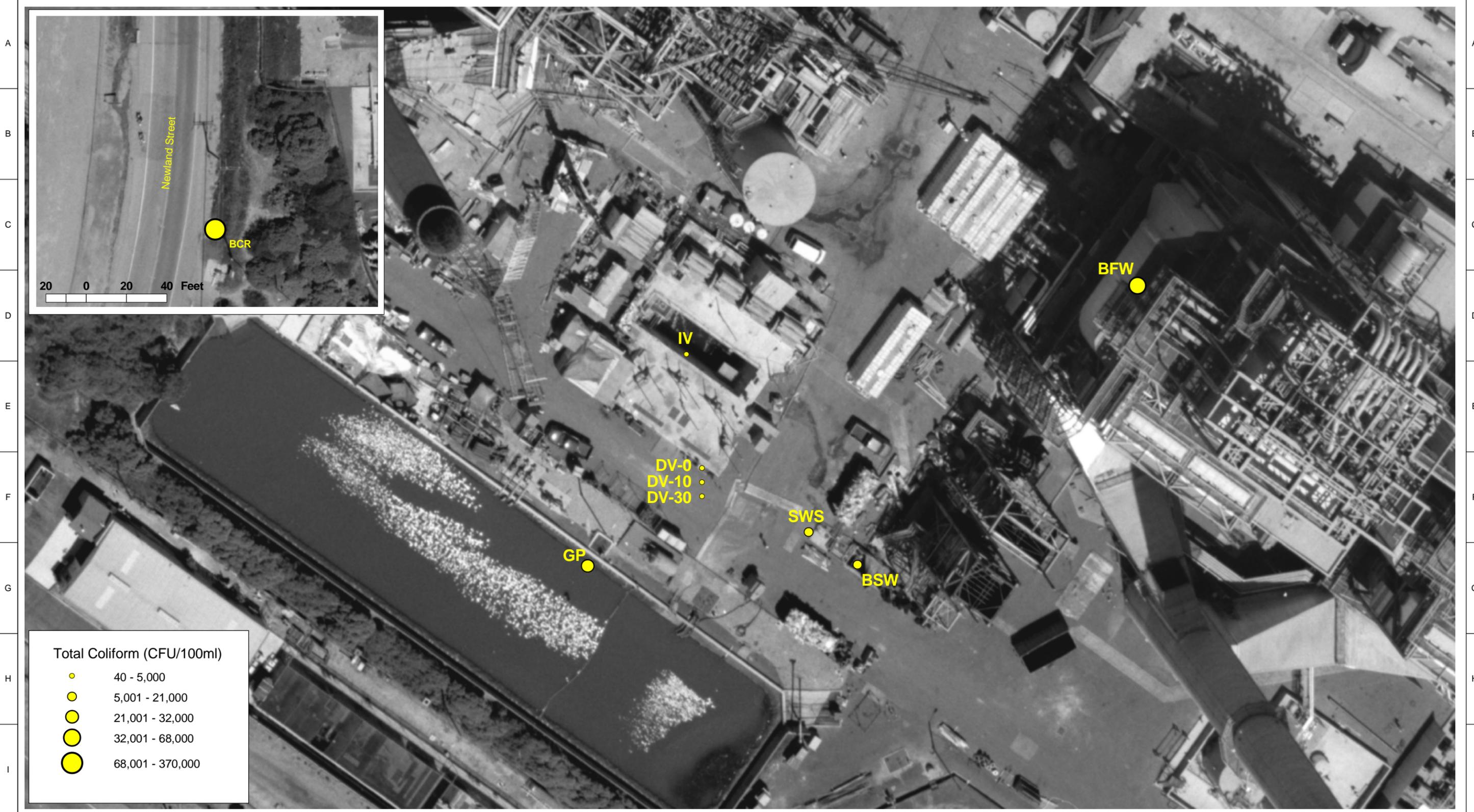
Exceedences of Bacteriological Standards

- 1 - 19
- 20 - 37
- 38 - 55
- 56 - 73
- 74 - 92

20 0 20 40 Feet

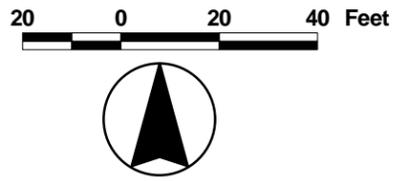
PREPARED SOLELY FOR THE USE OF OUR CLIENT AND NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH KOMEX HAS NOT ENTERED INTO A CONTRACT.

Client: California Energy Commission	
Project/Site: HBGS - AES Powerplant	Date: April 2003
	Project No: 225-001
Title: Total Coliform: Exceedences of Bacteriological Standards at Each Sample Point	Plate No: 4-1

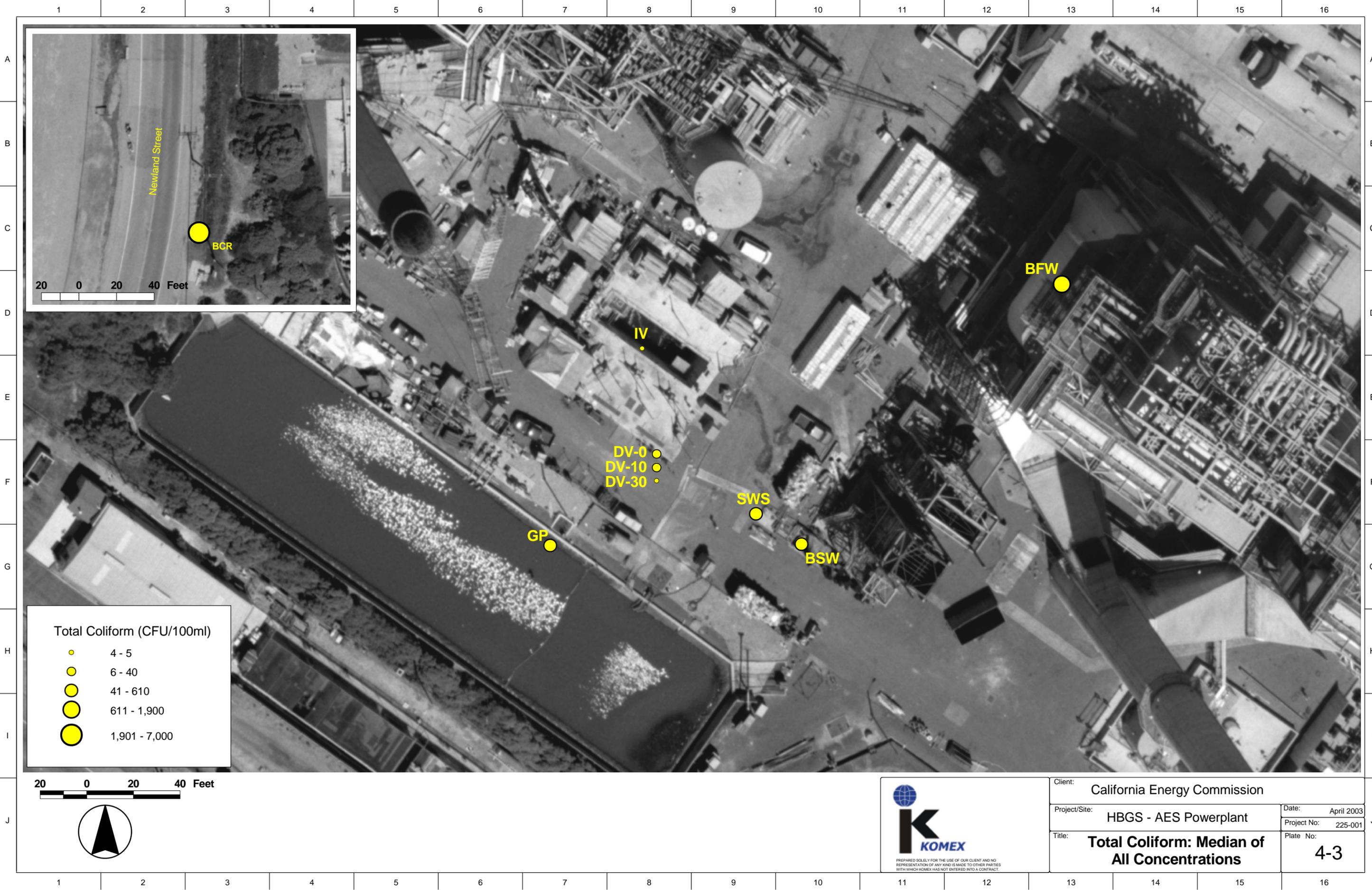


Total Coliform (CFU/100ml)

	40 - 5,000
	5,001 - 21,000
	21,001 - 32,000
	32,001 - 68,000
	68,001 - 370,000



Client: California Energy Commission	
Project/Site: HBGS - AES Powerplant	Date: April 2003
	Project No: 225-001
Title: Total Coliform: Maximum Concentrations	Plate No: 4-2



Total Coliform (CFU/100ml)

	4 - 5
	6 - 40
	41 - 610
	611 - 1,900
	1,901 - 7,000

Client: California Energy Commission	
Project/Site: HBGS - AES Powerplant	Date: April 2003
	Project No: 225-001
Title: Total Coliform: Median of All Concentrations	Plate No: 4-3

PREPARED SOLELY FOR THE USE OF OUR CLIENT AND NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH KOMEX HAS NOT ENTERED INTO A CONTRACT.

20 0 20 40 Feet

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

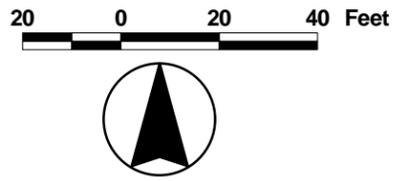
A B C D E F G H I J

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

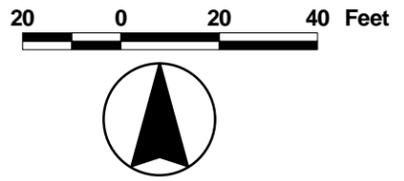
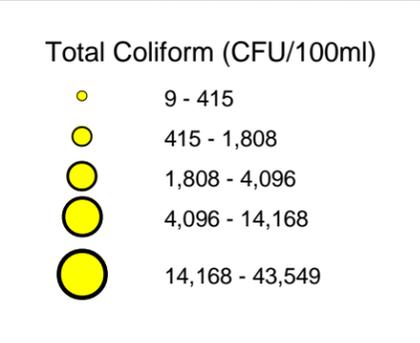
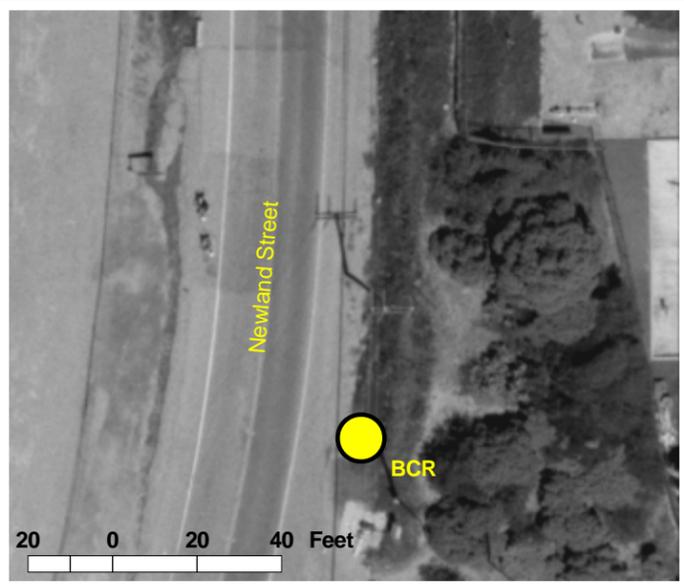
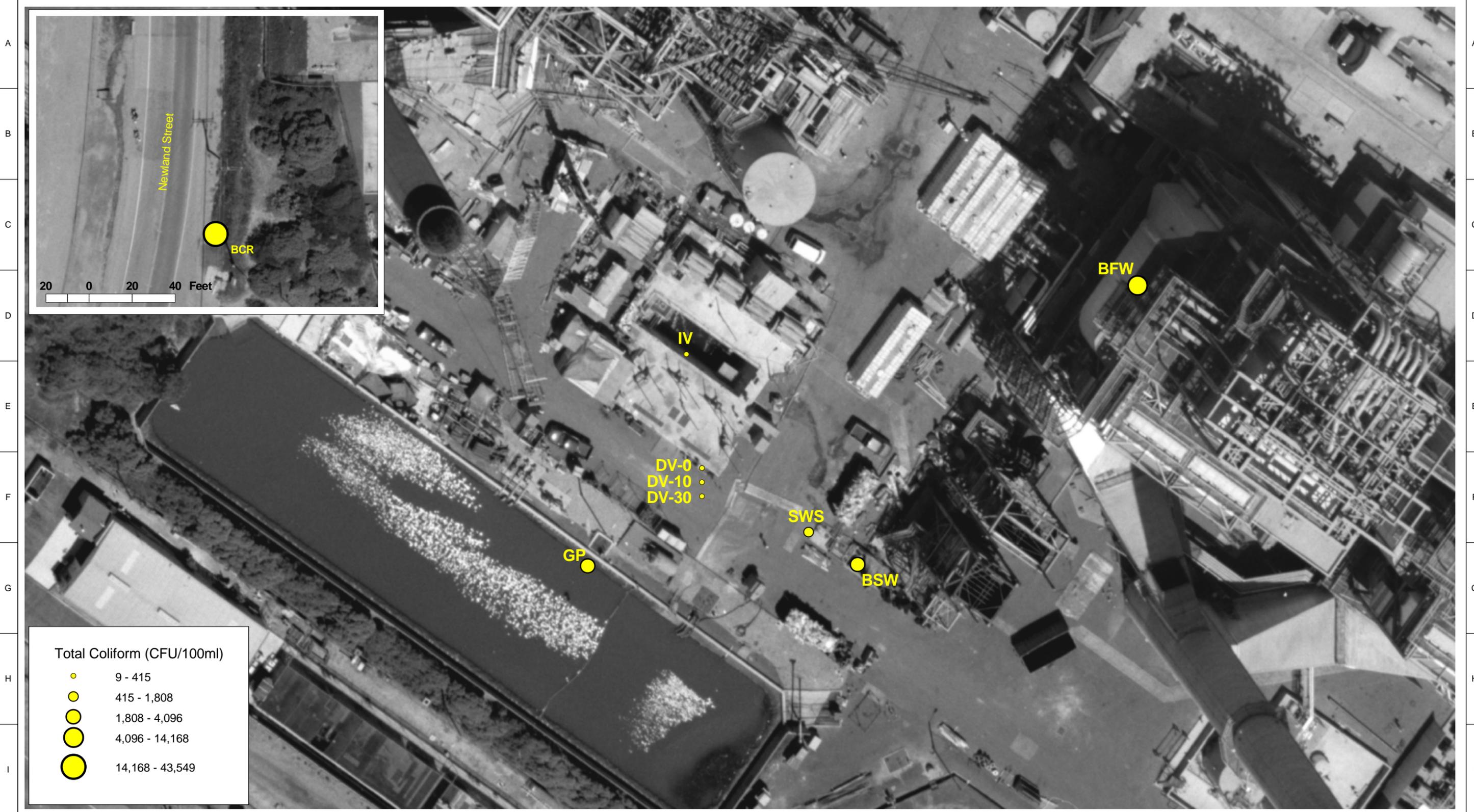


Total Coliform (CFU/100ml)

	9 - 13
	13 - 145
	145 - 2,071
	2,071 - 8,026
	8,026 - 17,707



Client: California Energy Commission	
Project/Site: HBGS - AES Powerplant	Date: April 2003
	Project No: 225-001
Title: Total Coliform: Average Concentrations	Plate No: 4-4

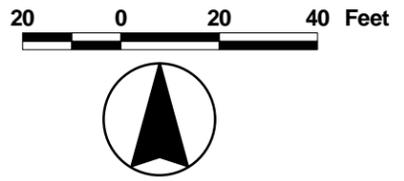


Client: California Energy Commission	
Project/Site: HBGS - AES Powerplant	Date: April 2003
	Project No: 225-001
Title: Total Coliform: Standard Deviation of All Concentrations	Plate No: 4-5



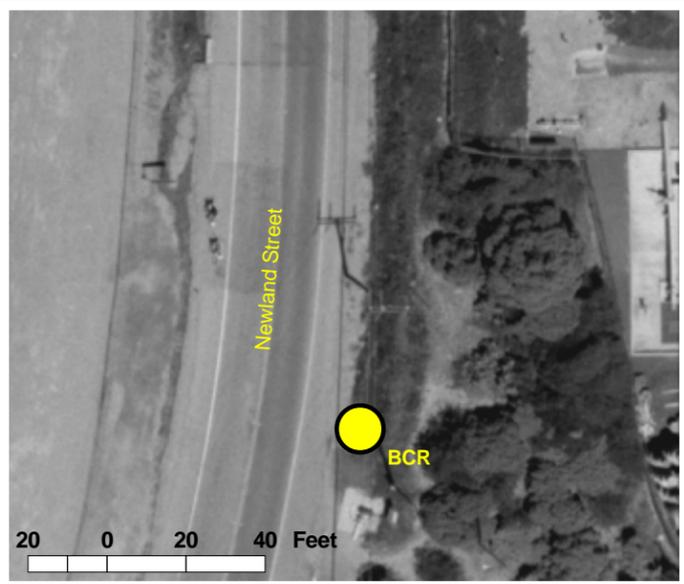
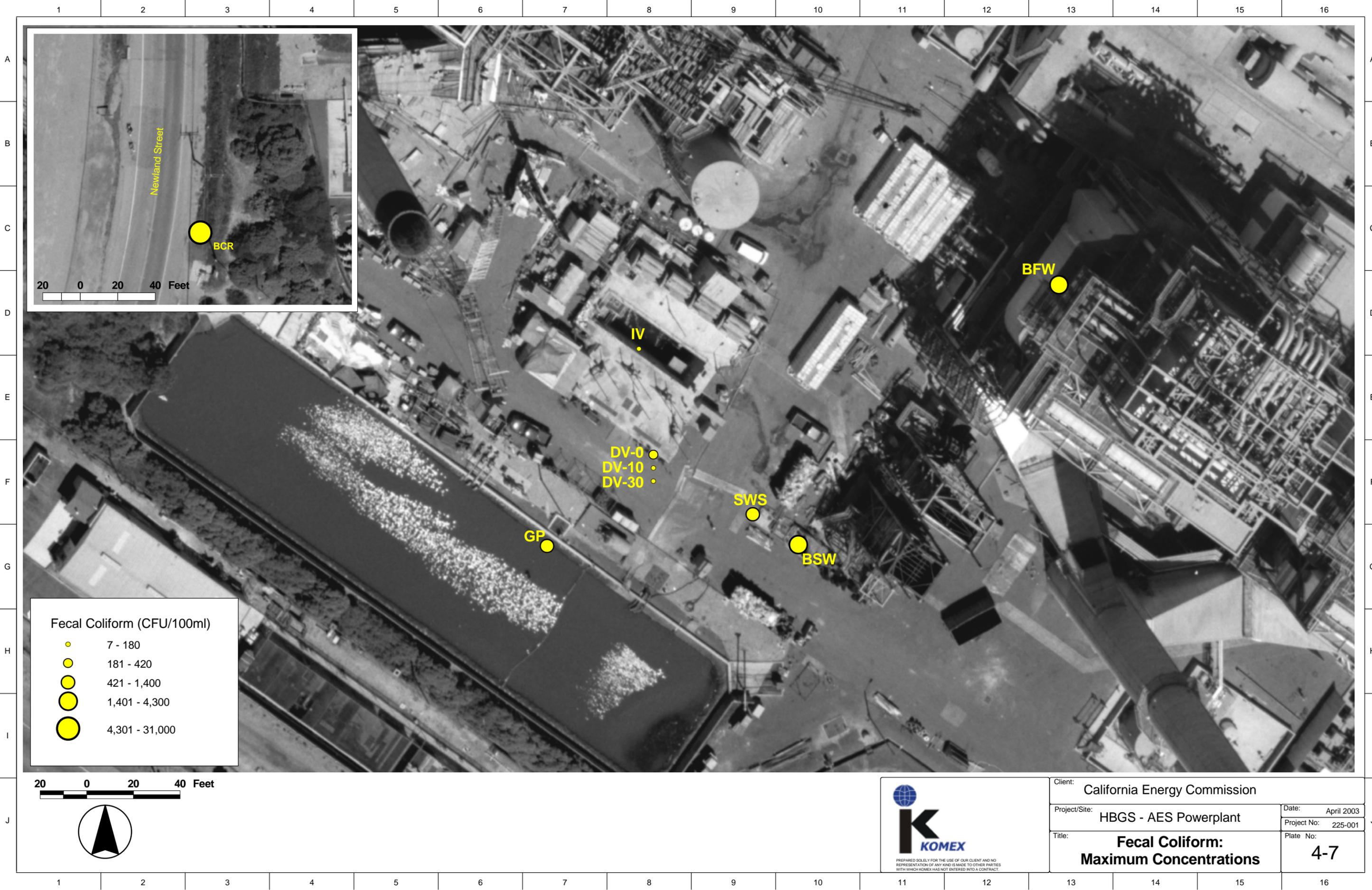
Exceedences of Bacteriological Standards

	1 - 22
	23 - 43
	44 - 64
	65 - 85
	86 - 107

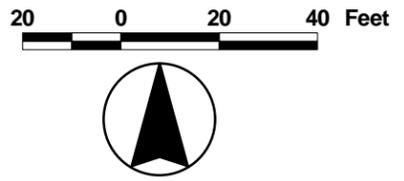


Client: California Energy Commission	
Project/Site: HBGS - AES Powerplant	Date: April 2003
	Project No: 225-001
Title: Fecal Coliform: Exceedences of Bacteriological Standards at Each Sample Point	Plate No: 4-6

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Fecal Coliform (CFU/100ml)	
	7 - 180
	181 - 420
	421 - 1,400
	1,401 - 4,300
	4,301 - 31,000



Client: California Energy Commission	
Project/Site: HBGS - AES Powerplant	Date: April 2003
	Project No: 225-001
Title: Fecal Coliform: Maximum Concentrations	Plate No: 4-7

IV

DV-0

DV-10

DV-30

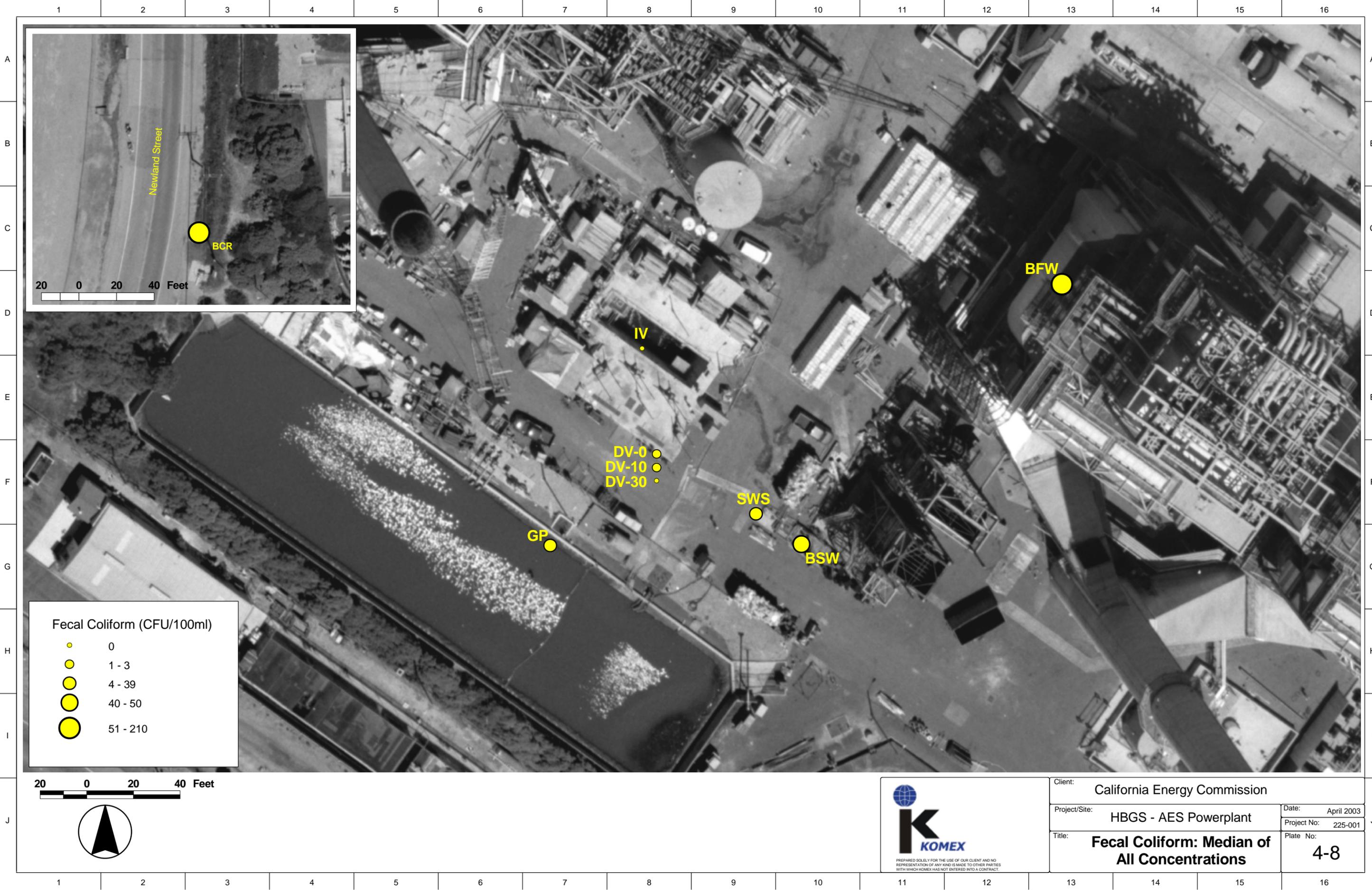
SWS

GP

BSW

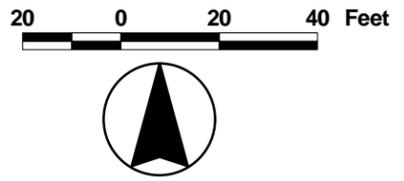
BFW

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Fecal Coliform (CFU/100ml)

	0
	1 - 3
	4 - 39
	40 - 50
	51 - 210

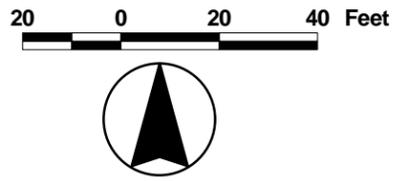


Client: California Energy Commission	
Project/Site: HBGS - AES Powerplant	Date: April 2003
	Project No: 225-001
Title: Fecal Coliform: Median of All Concentrations	Plate No: 4-8



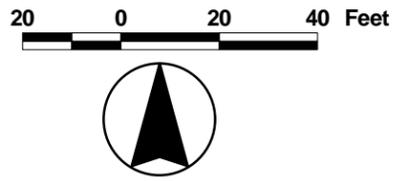
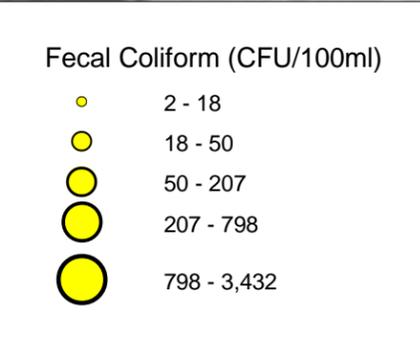
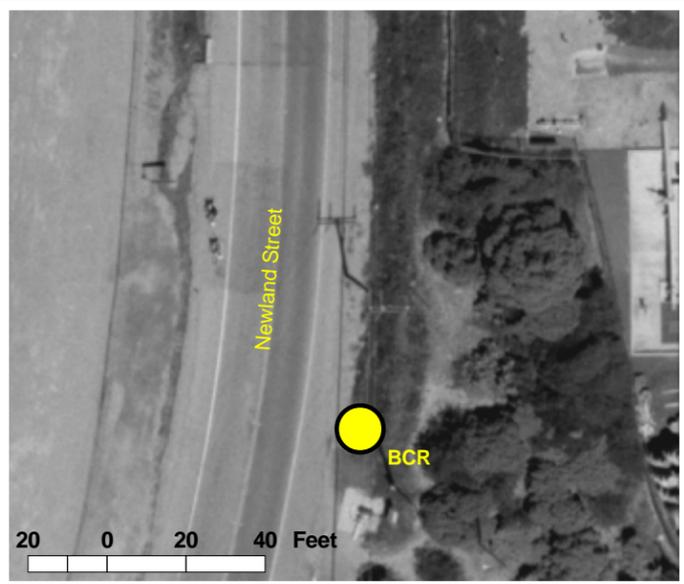
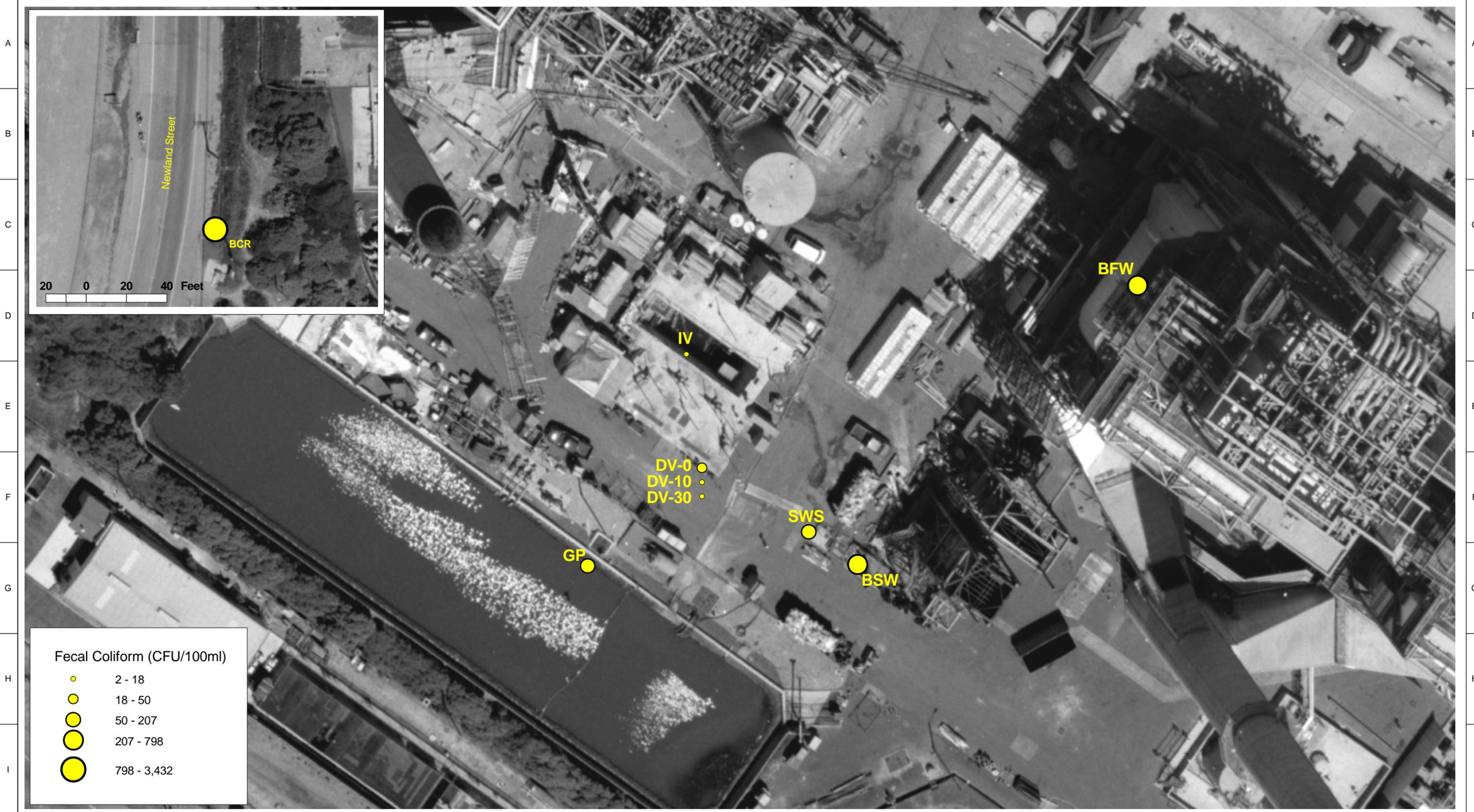
Fecal Coliform (CFU/100ml)

	2 - 6
	6 - 15
	15 - 101
	101 - 226
	226 - 837



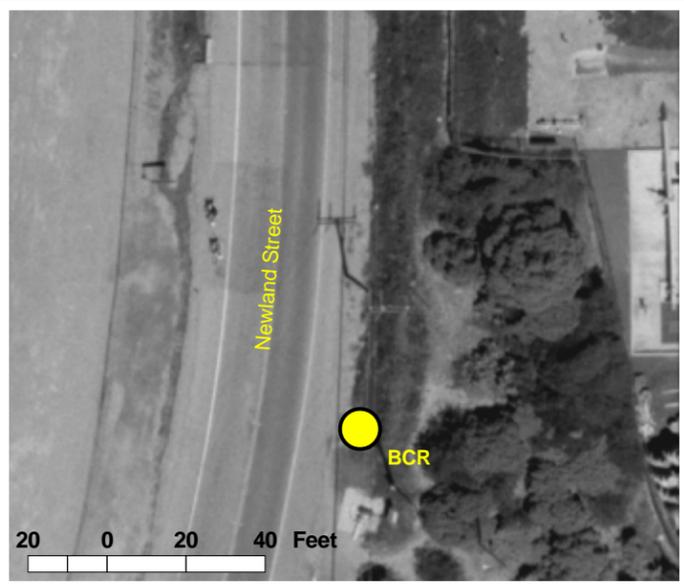
Client: California Energy Commission	
Project/Site: HBGS - AES Powerplant	Date: April 2003
	Project No: 225-001
Title: Fecal Coliform: Average Concentrations	Plate No: 4-9

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16



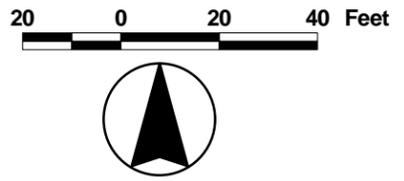
Client: California Energy Commission	
Project/Site: HBGS - AES Powerplant	Date: April 2003
	Project No: 225-001
Title: Fecal Coliform: Standard Deviation of All Concentrations	Plate No: 4-10

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16

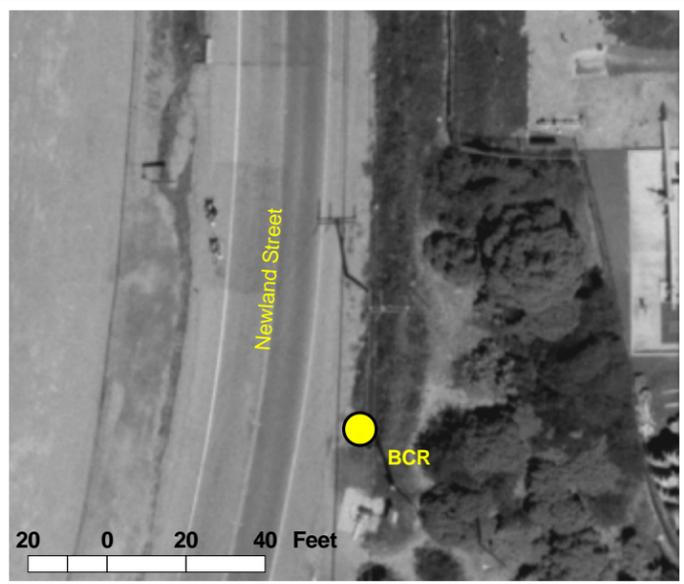


Exceedences of Bacteriological Standards

	1 - 23
	24 - 45
	46 - 68
	69 - 90
	91 - 113

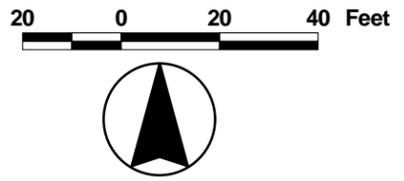


Client: California Energy Commission	
Project/Site: HBGS - AES Powerplant	Date: April 2003
	Project No: 225-001
Title: Enterococcus: Exceedences of Bacteriological Standards at Each Sample Point	Plate No: 4-11

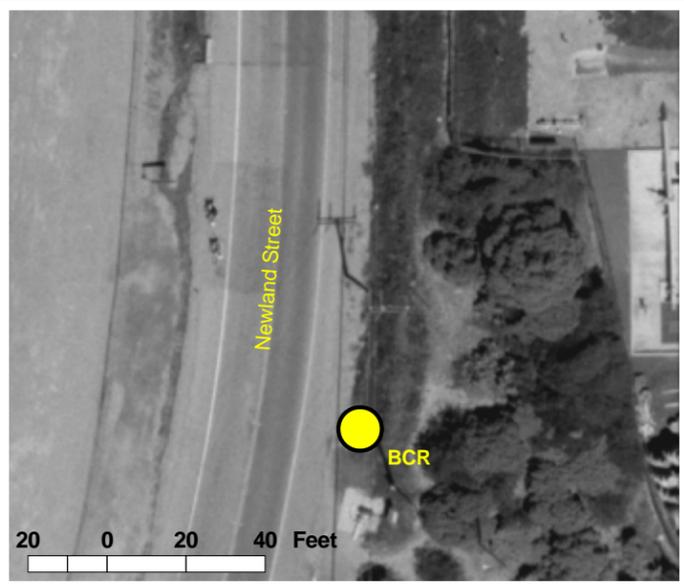
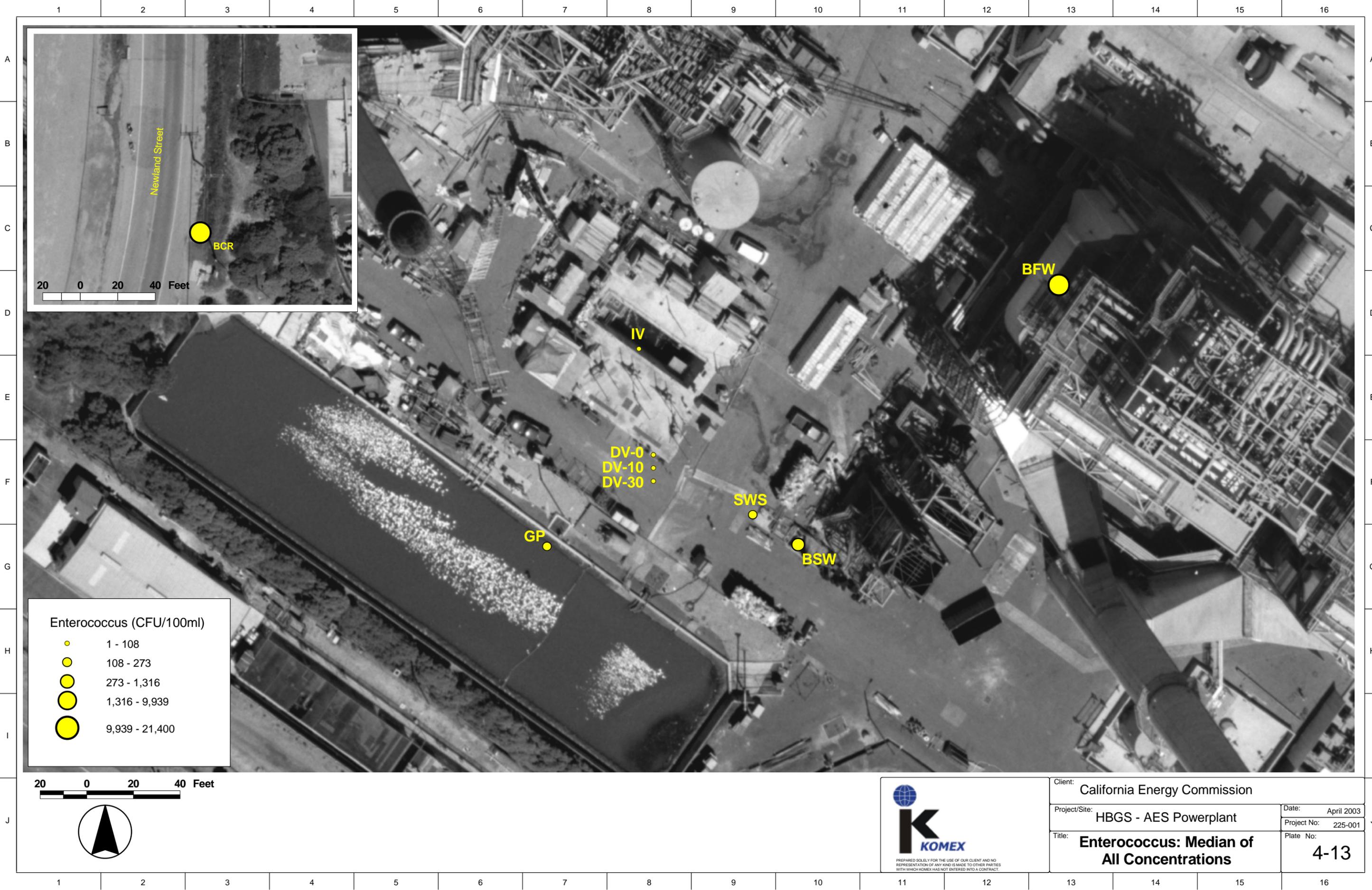


Enterococcus (CFU/100ml)

	5
	6 - 2,200
	2,201 - 11,000
	11,001 - 62,000
	62,001 - 160,000

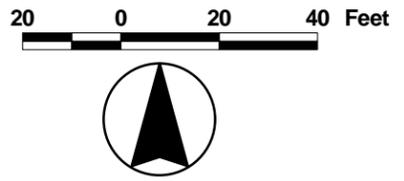


Client: California Energy Commission	
Project/Site: HBGS - AES Powerplant	Date: April 2003
	Project No: 225-001
Title: Enterococcus: Maximum Concentration	Plate No: 4-12

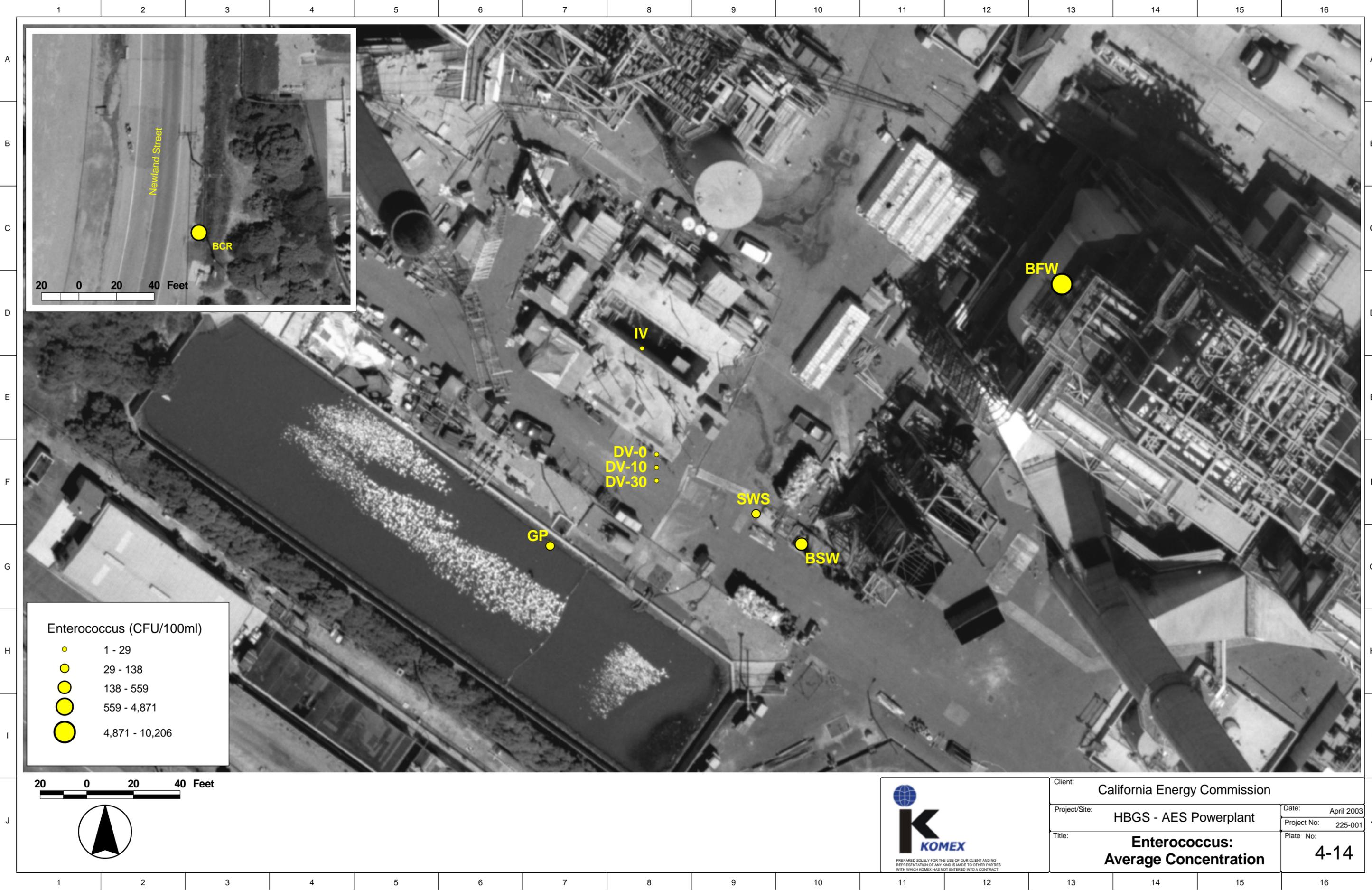


Enterococcus (CFU/100ml)

	1 - 108
	108 - 273
	273 - 1,316
	1,316 - 9,939
	9,939 - 21,400

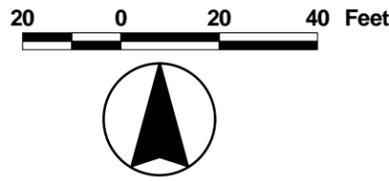


Client: California Energy Commission	
Project/Site: HBGS - AES Powerplant	Date: April 2003
	Project No: 225-001
Title: Enterococcus: Median of All Concentrations	Plate No: 4-13

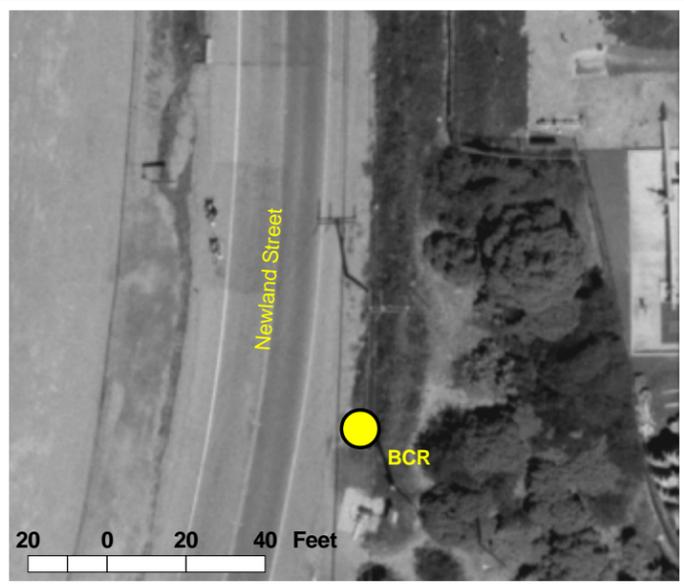


Enterococcus (CFU/100ml)

	1 - 29
	29 - 138
	138 - 559
	559 - 4,871
	4,871 - 10,206

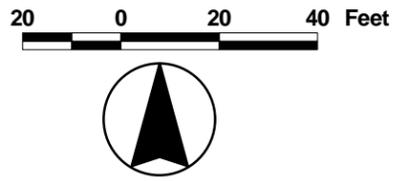


Client: California Energy Commission	
Project/Site: HBGS - AES Powerplant	Date: April 2003
	Project No: 225-001
Title: Enterococcus: Average Concentration	Plate No: 4-14



Enterococcus (CFU/100ml)

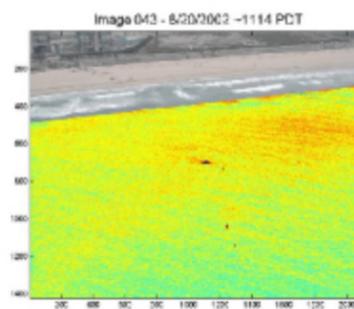
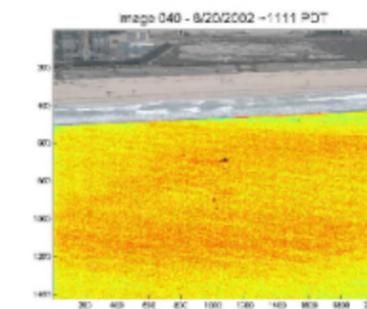
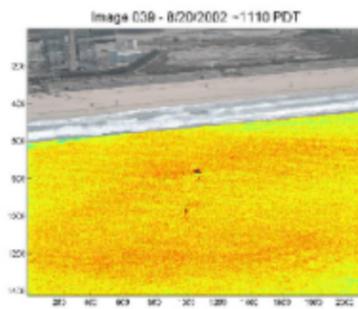
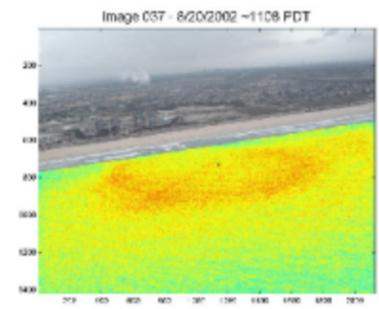
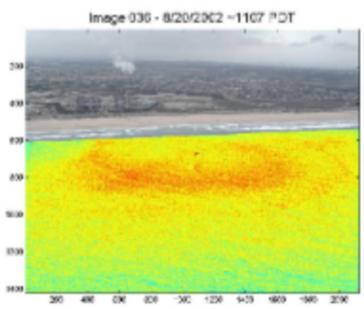
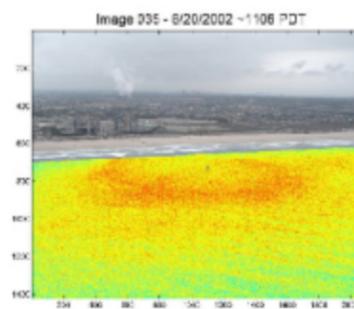
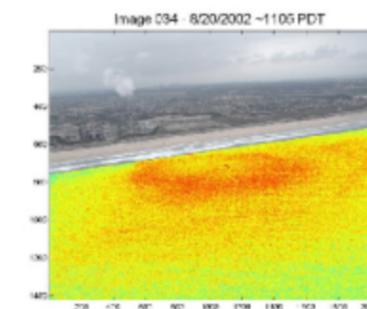
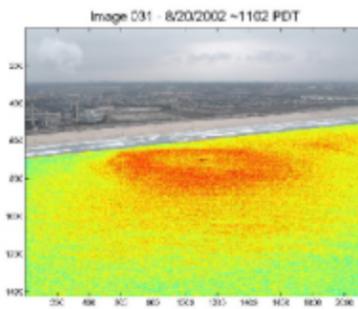
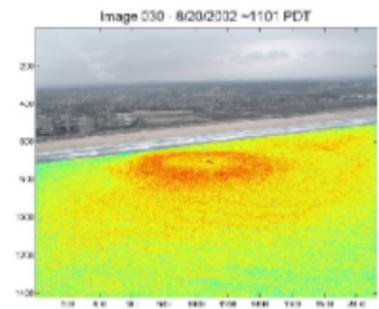
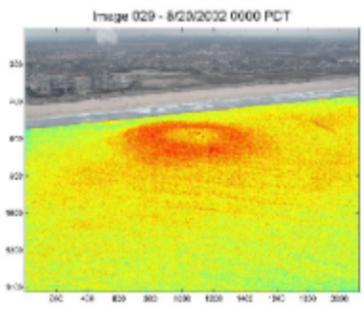
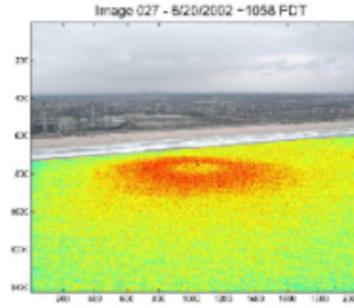
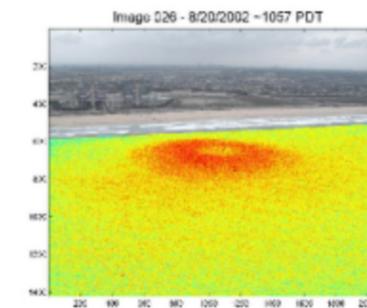
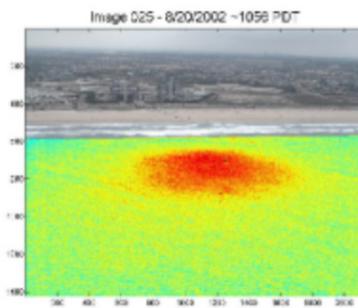
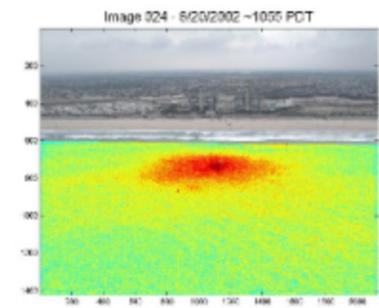
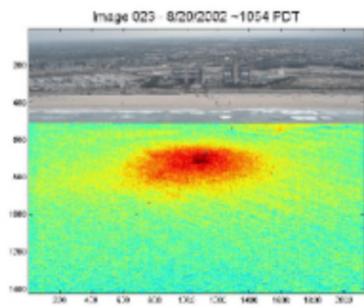
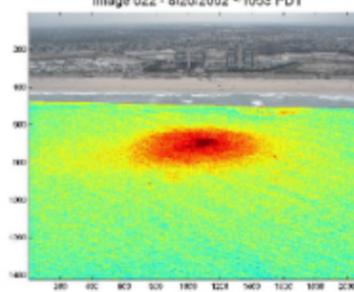
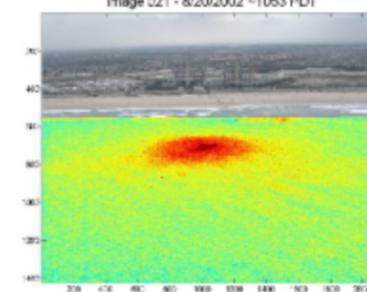
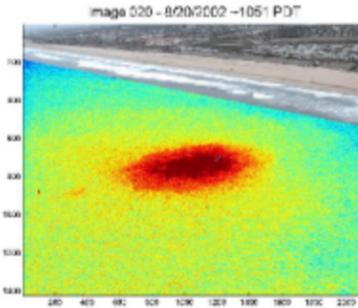
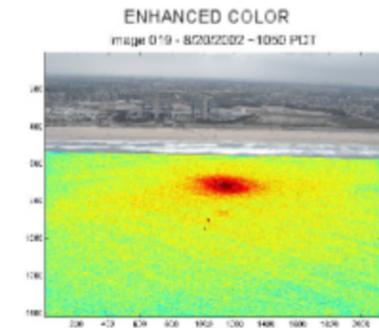
	1 - 108
	108 - 273
	273 - 1,316
	1,316 - 9,939
	9,939 - 21,400



Client: California Energy Commission	
Project/Site: HBGS - AES Powerplant	Date: April 2003
	Project No: 225-001
Title: Enterococcus: Standard Deviation of All Concentrations	Plate No: 4-15

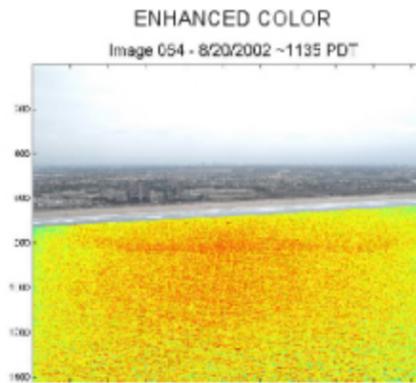
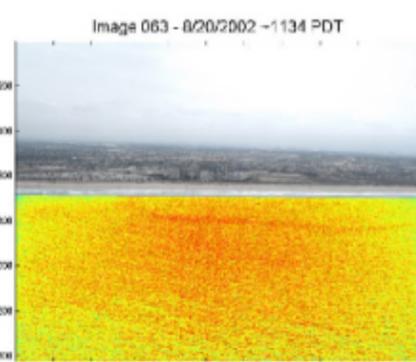
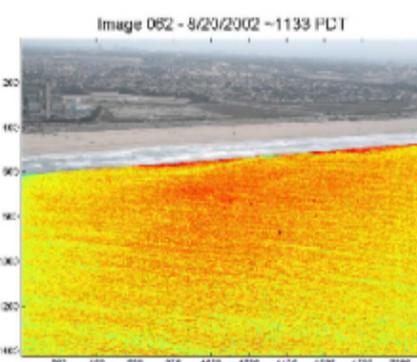
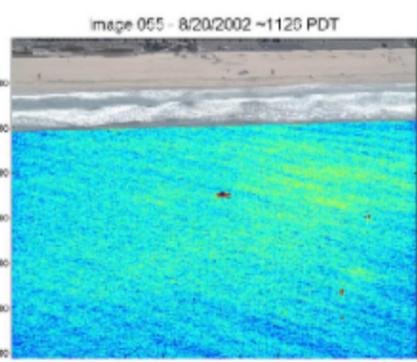
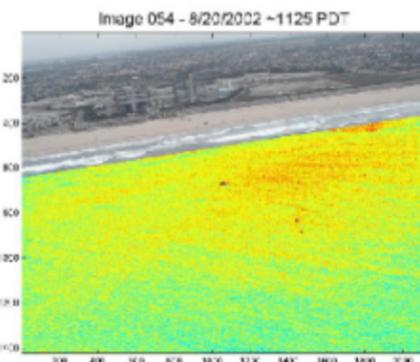
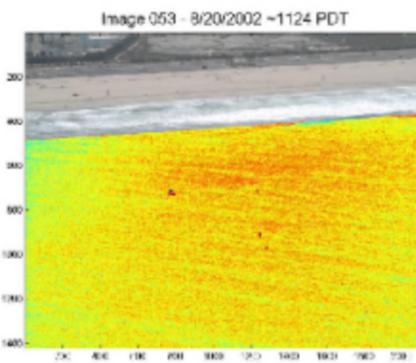
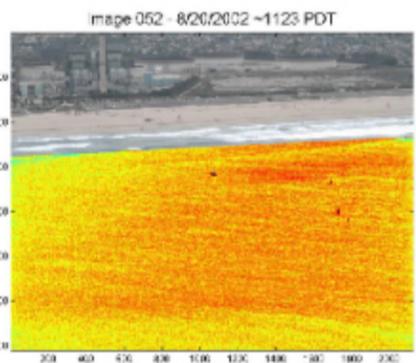
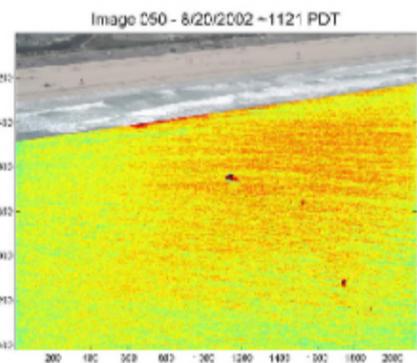
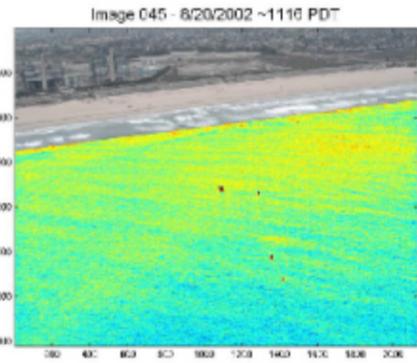
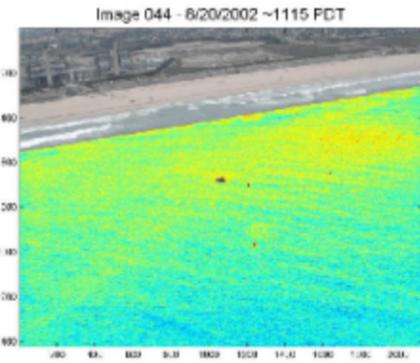
PREPARED SOLELY FOR THE USE OF OUR CLIENT AND NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH KOMEX HAS NOT ENTERED INTO A CONTRACT.

TUESDAY, AUGUST 20, 2002 - DYE INJECTION #1 (10:35 to 10:45) - TIME-SERIES DYE IMAGES FROM 10:50 to 11:35



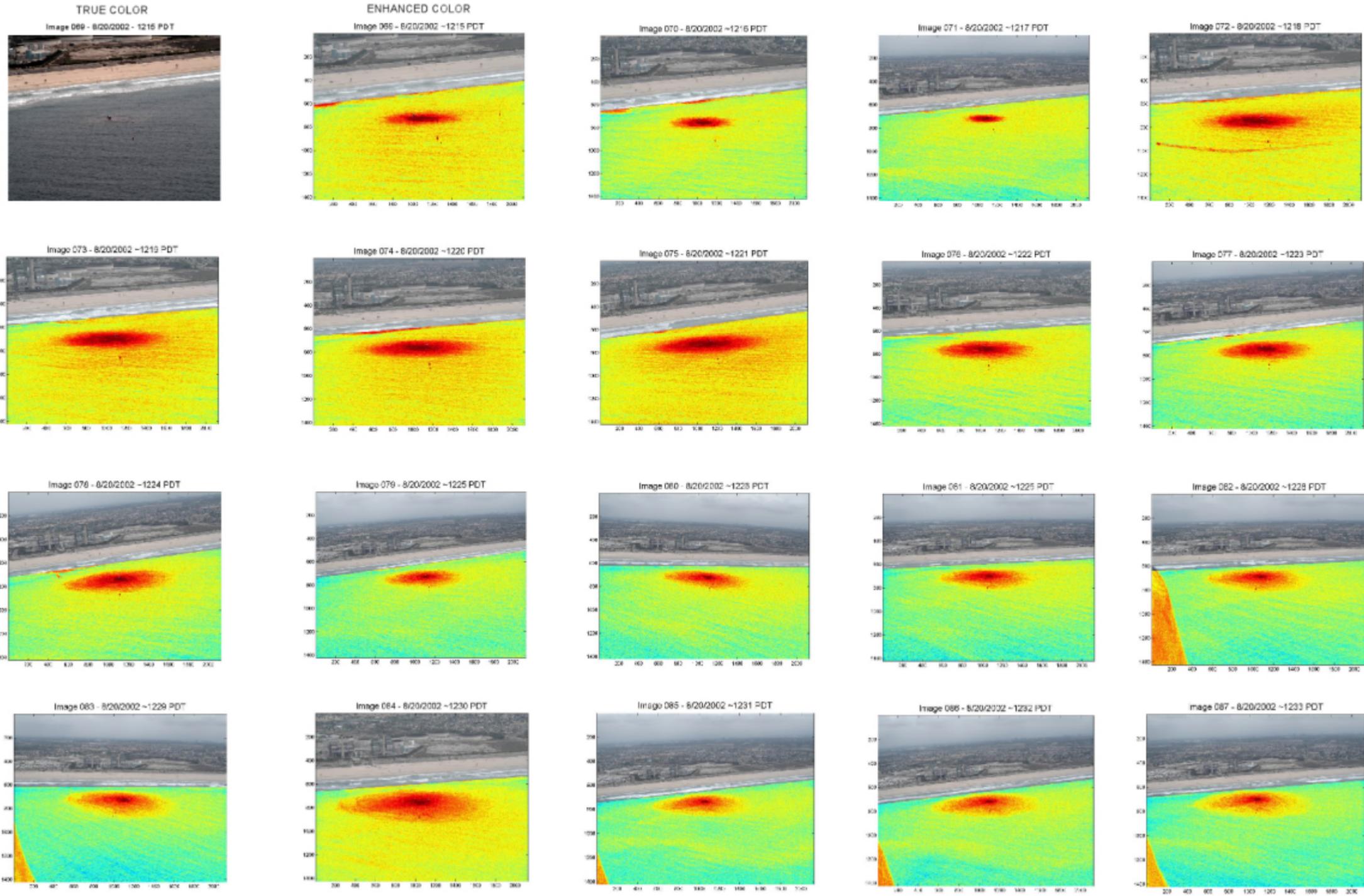
Client:	California Energy Commission	
Project/Site:	HBGS - AES Powerplant	Date: April 2003
		Project No: 225-001
Title:	Time Series Dye Releases: Dye Release No. 1, Part 1	Figure No: 4-16a

TUESDAY, AUGUST 20, 2002 - DYE INJECTION #1 (10:35 to 10:45) - TIME-SERIES DYE IMAGES FROM 10:50 to 11:35



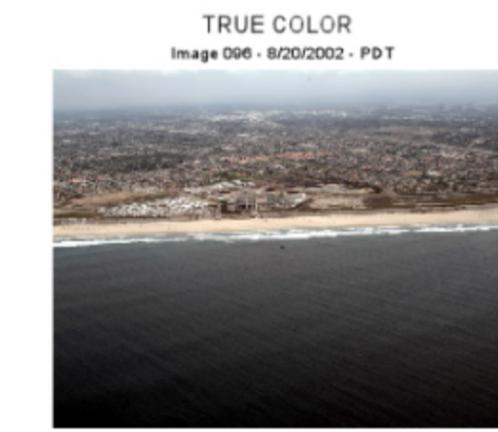
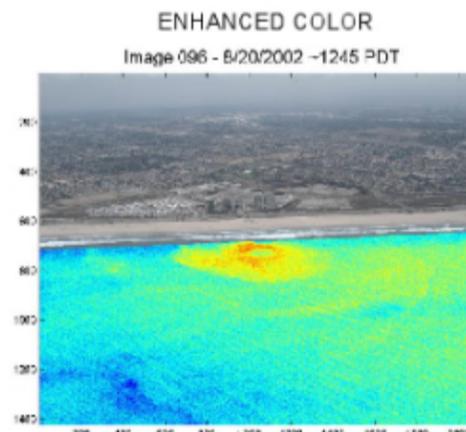
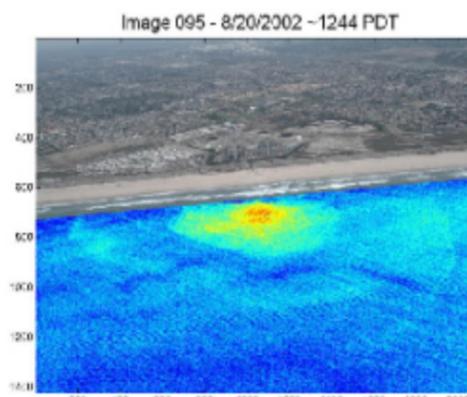
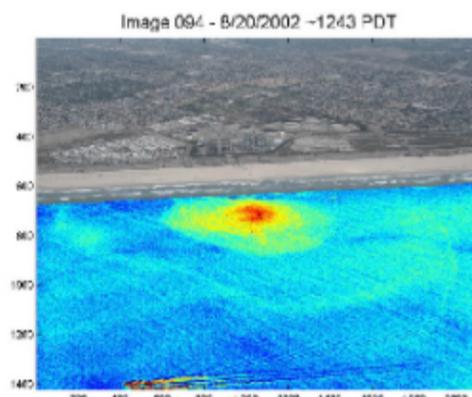
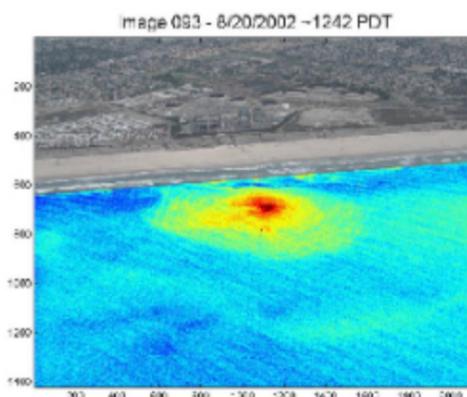
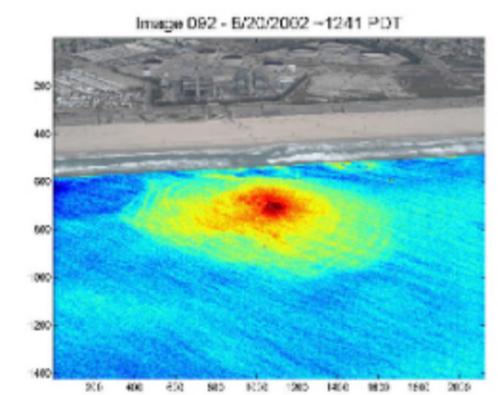
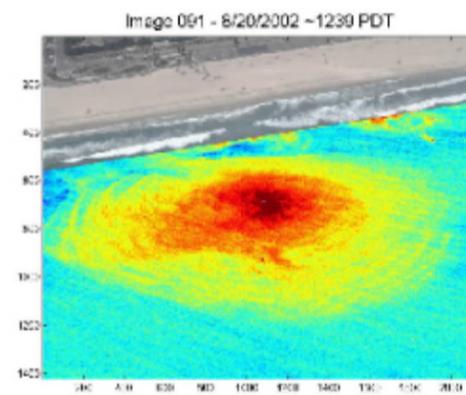
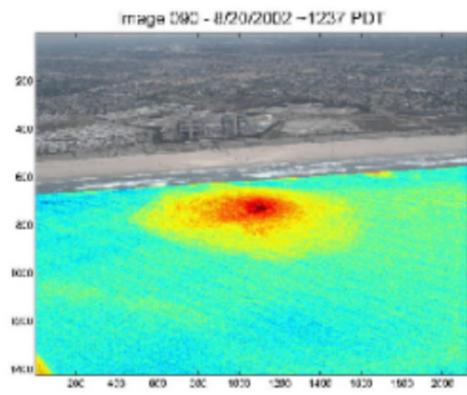
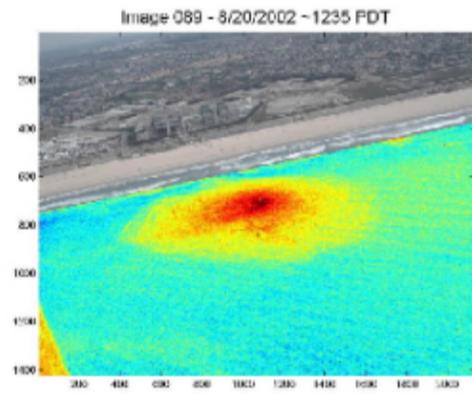
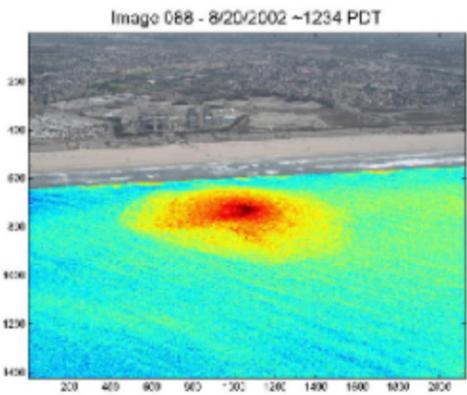
Client: California Energy Commission	
Project/Site: HBGS - AES Powerplant	Date: April 2003
	Project No: 225-001
Title: Time Series Dye Releases: Dye Release No. 1, Part 2	Figure No: 4-16b

TUESDAY, AUGUST 20, 2002 - DYE INJECTION #2 (12:01 to 12:31) - TIME-SERIES DYE IMAGES FROM 12:15 to 12:45



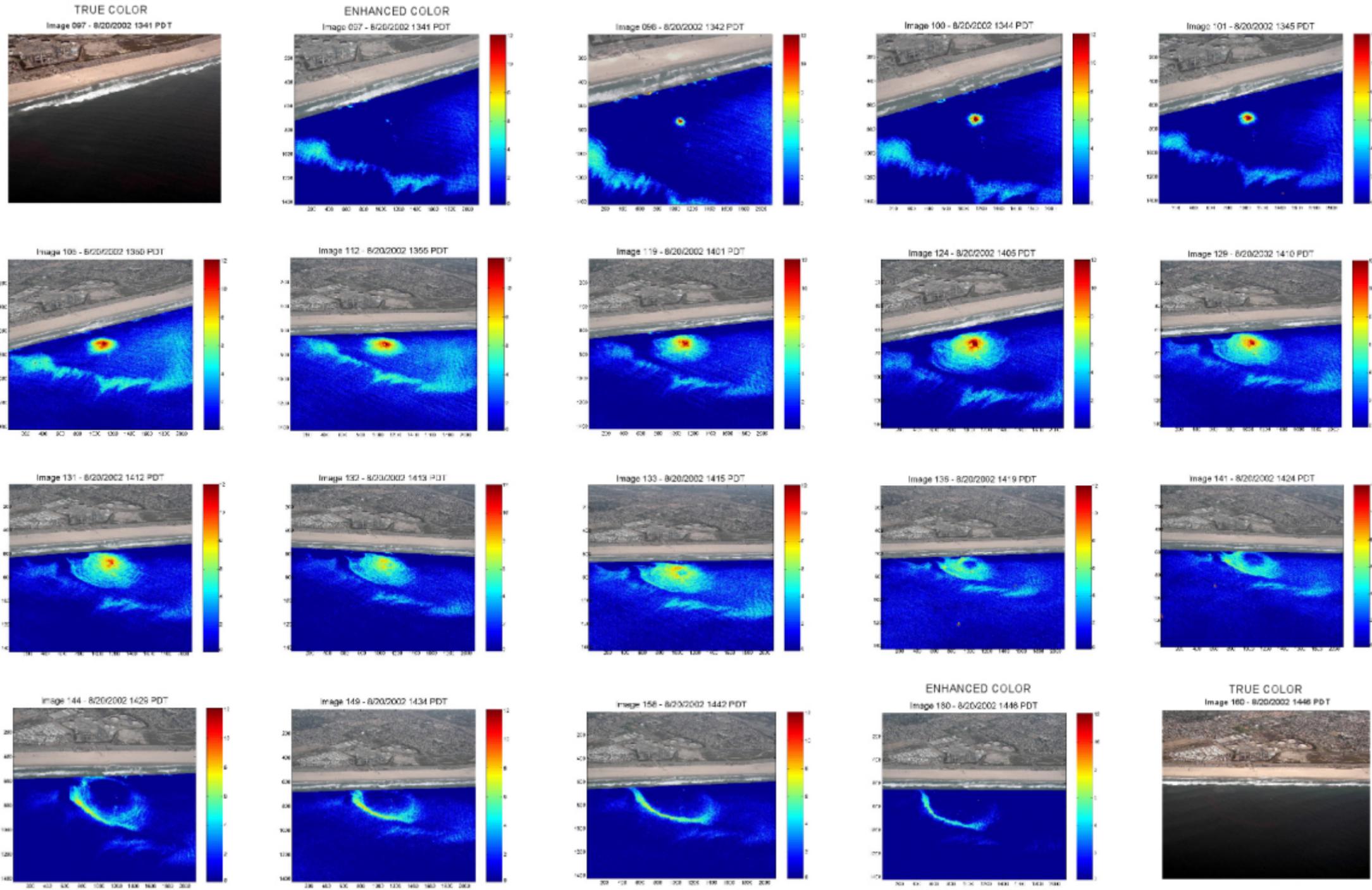
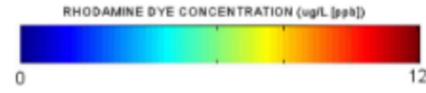
Client: California Energy Commission	
Project/Site: HBGS - AES Powerplant	Date: April 2003
Project No: 225-001	
Title: Time Series Dye Releases: Dye Release No. 2, Part 1	Figure No: 4-17a

TUESDAY, AUGUST 20, 2002 - DYE INJECTION #2 (12:01 to 12:31) - TIME-SERIES DYE IMAGES FROM 12:15 to 12:45



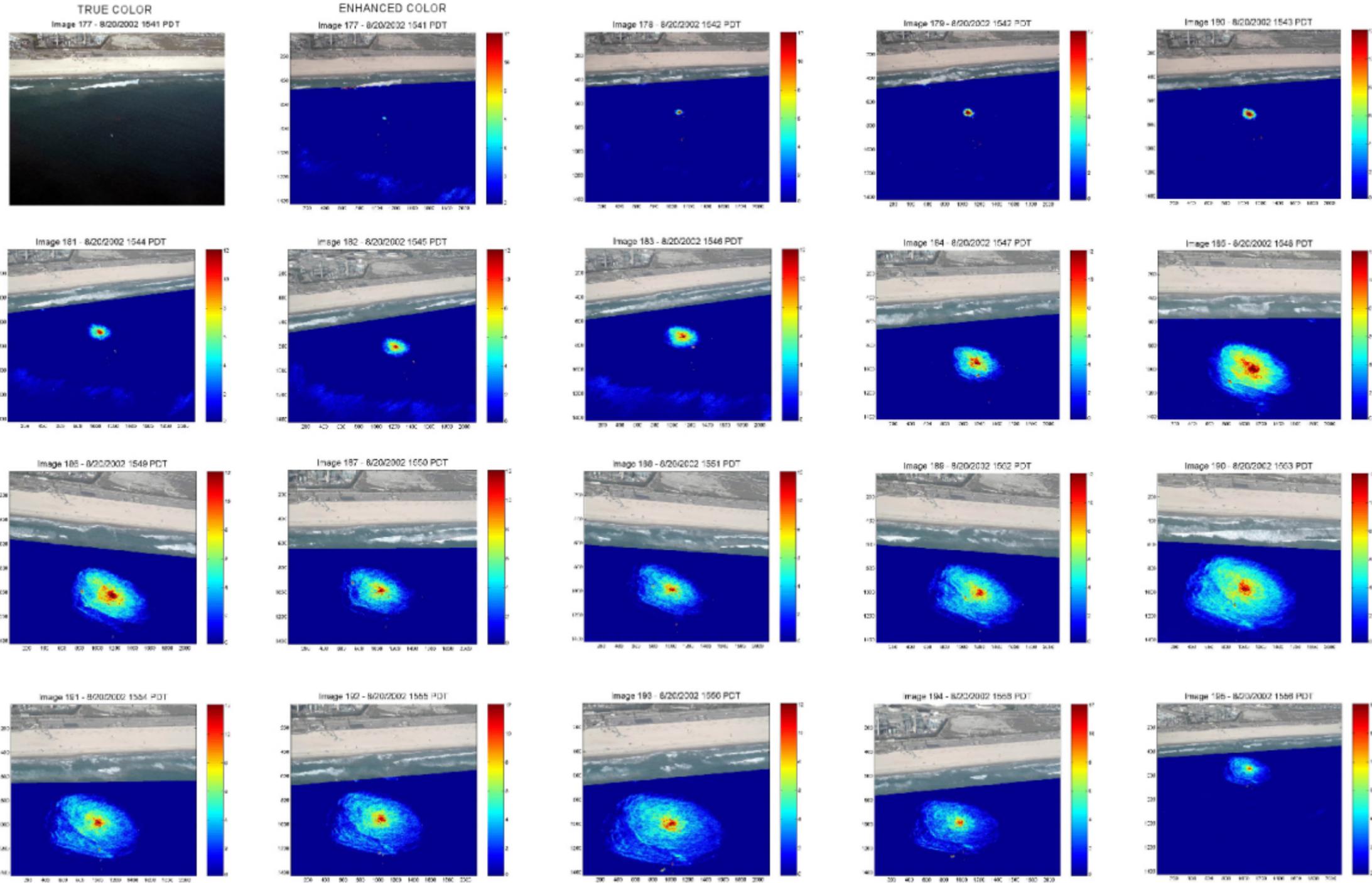
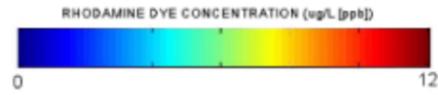
Client:	California Energy Commission	
Project/Site:	HBGS - AES Powerplant	Date: April 2003
		Project No: 225-001
Title:	Time Series Dye Releases: Dye Release No. 2, Part 2	Figure No: 4-17b

TUESDAY, AUGUST 20, 2002 - DYE INJECTION #3 (13:30 to 14:00) - TIME-SERIES DYE IMAGES FROM 13:41 to 14:46



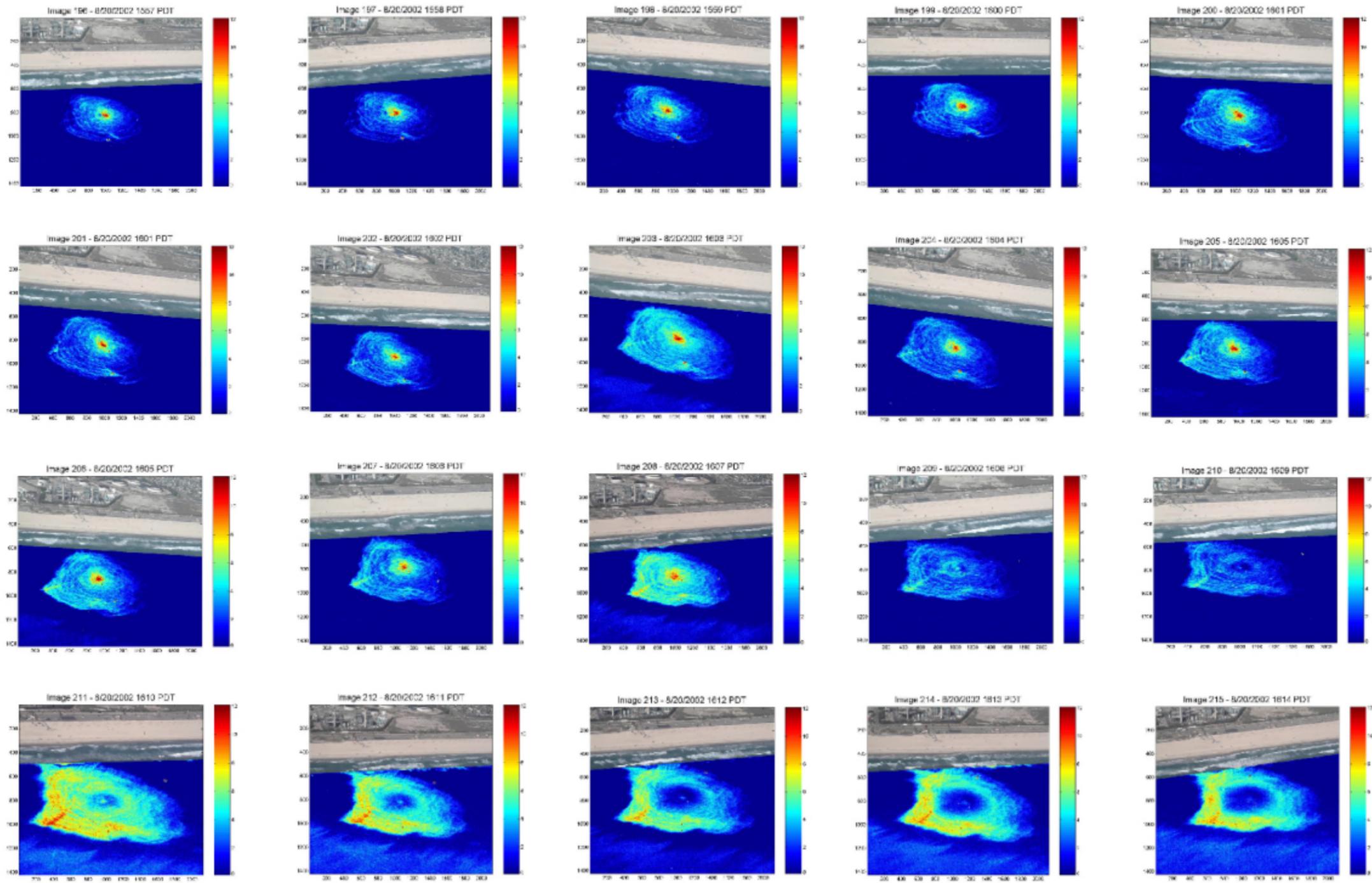
Client:	California Energy Commission	
Project/Site:	HBGS - AES Powerplant	Date: April 2003
		Project No: 225-001
Title:	Time Series Dye Releases: Dye Release No.3	Figure No: 4-18

TUESDAY, AUGUST 20, 2002 - DYE INJECTION #4 (15:30 to 15:56) - TIME-SERIES DYE IMAGES FROM 15:41 to 16:46



Client:	California Energy Commission	
Project/Site:	HBGS - AES Powerplant	Date: April 2003
		Project No: 225-001
Title:	Time Series Dy Releases: Dye Release No. 4, Part 1	Figure No: 4-19a

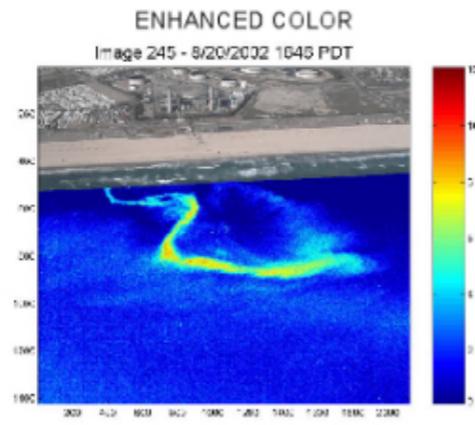
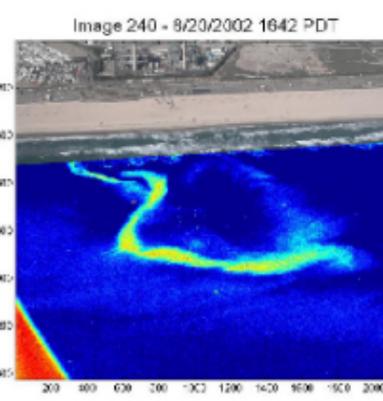
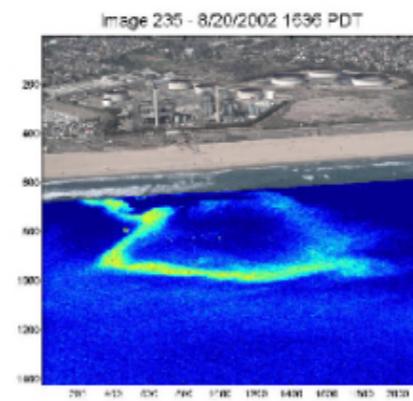
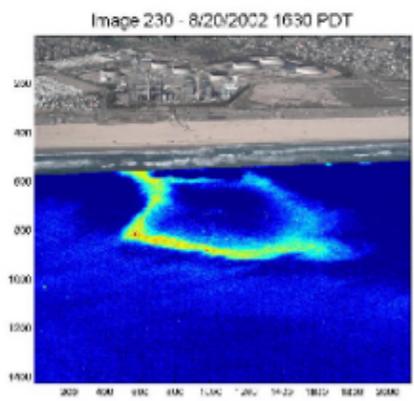
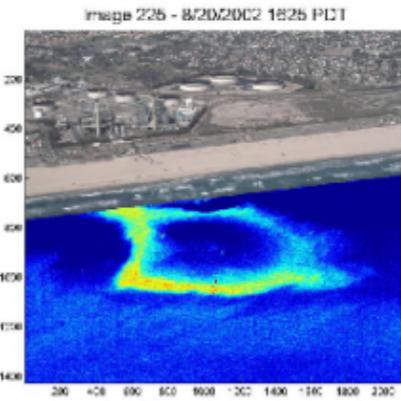
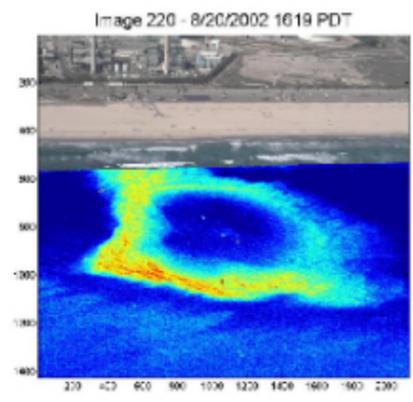
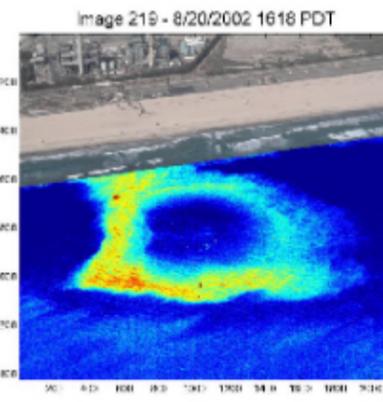
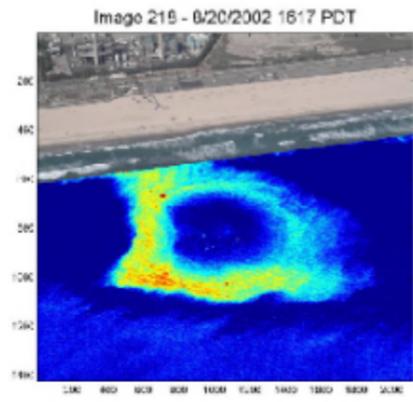
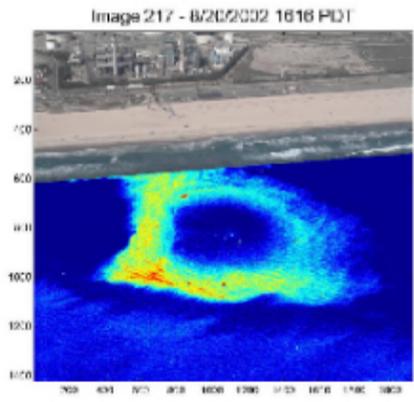
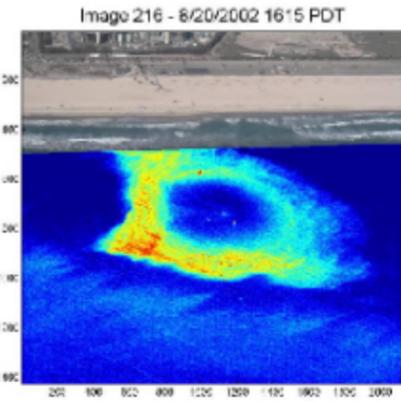
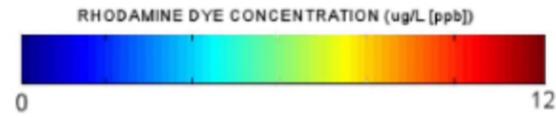
TUESDAY, AUGUST 20, 2002 - DYE INJECTION #4 (15:30 to 15:56) - TIME-SERIES DYE IMAGES FROM 15:41 to 16:46



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Client:	California Energy Commission	
Project/Site:	HBGS - AES Powerplant	Date: April 2003
		Project No: 225-001
Title:	Time Series Dye Releases: Dye Release No. 4 Part 1	Figure No: 4-19b

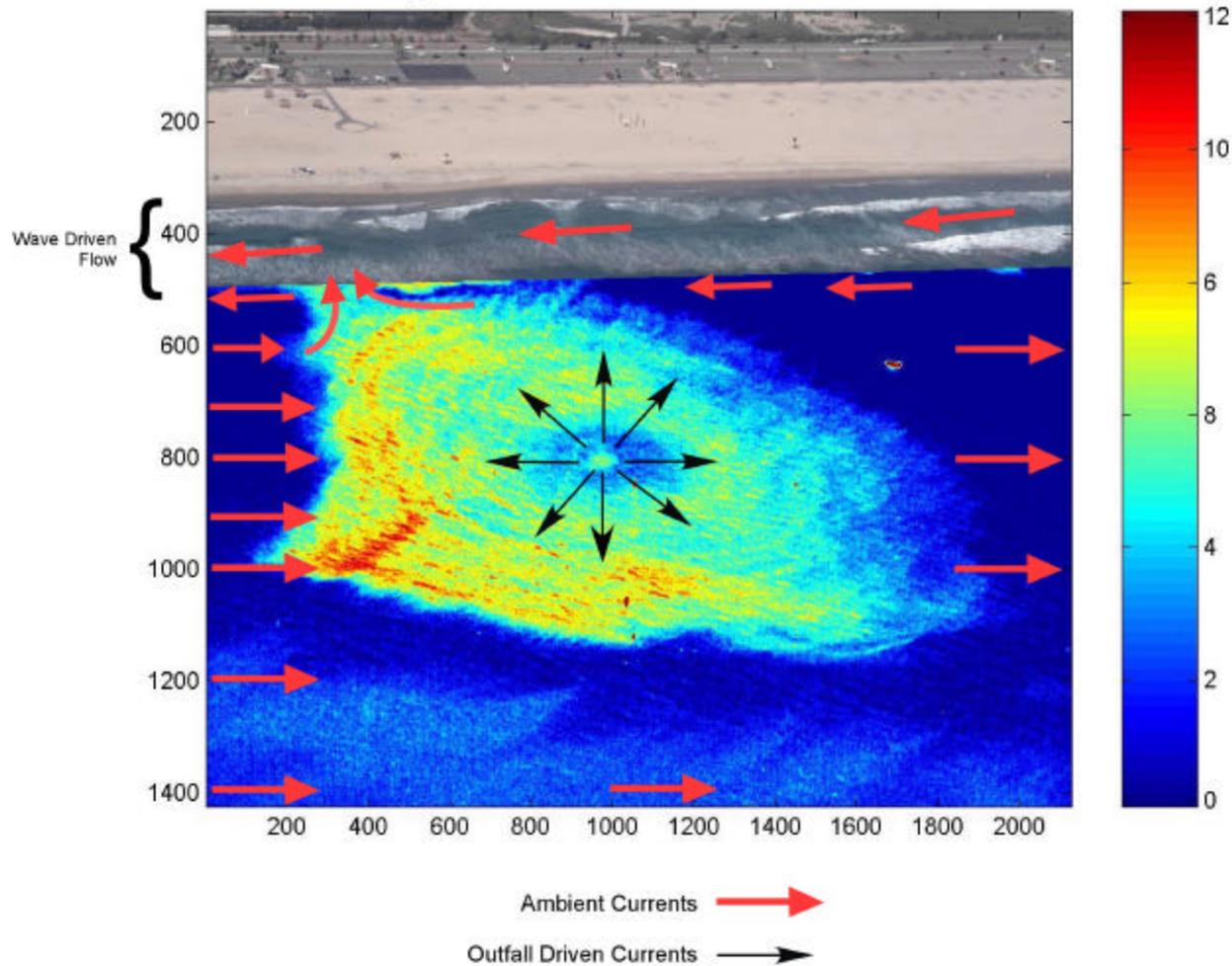
TUESDAY, AUGUST 20, 2002 - DYE INJECTION #4 (15:30 to 15:56) - TIME-SERIES DYE IMAGES FROM 15:41 to 16:46



Client:	California Energy Commission	
Project/Site:	HBGS - AES Powerplant	Date: April 2003
		Project No: 225-001
Title:	Time Series Dye Releases: Dye Release No. 4, Part 3	Figure No: 4-19c

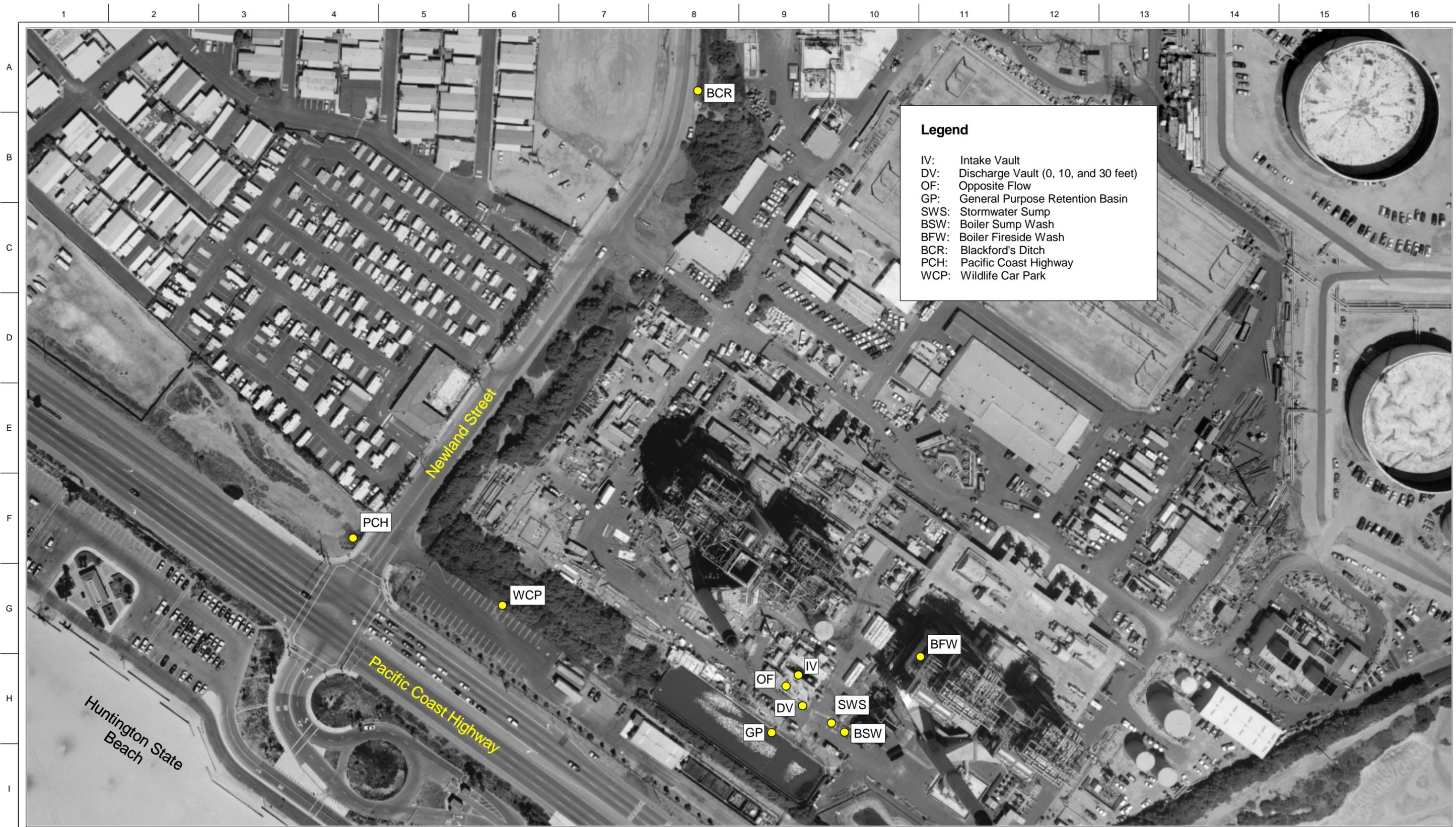
Current Patterns Inferred From Dye Dispersion

Image 211 - 8/20/2002 1610 PDT



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Client:	California Energy Commission	Date:	April 2003
Project/Site:	HBGS - AES Powerplant	Project No:	225-001
Title:	Inferred Current Patterns From Dye Dispersion		5-1



Legend

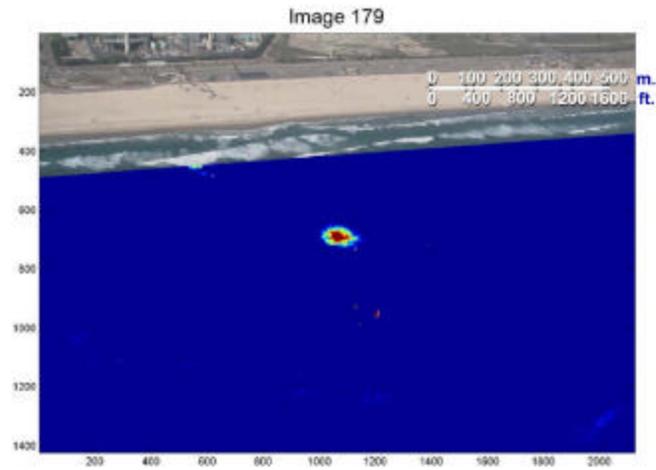
- IV: Intake Vault
- DV: Discharge Vault (0, 10, and 30 feet)
- OF: Opposite Flow
- GP: General Purpose Retention Basin
- SWS: Stormwater Sump
- BSW: Boiler Sump Wash
- BFW: Boiler Fireside Wash
- BCR: Blackford's Ditch
- PCH: Pacific Coast Highway
- WCP: Wildlife Car Park

100 0 100 Feet

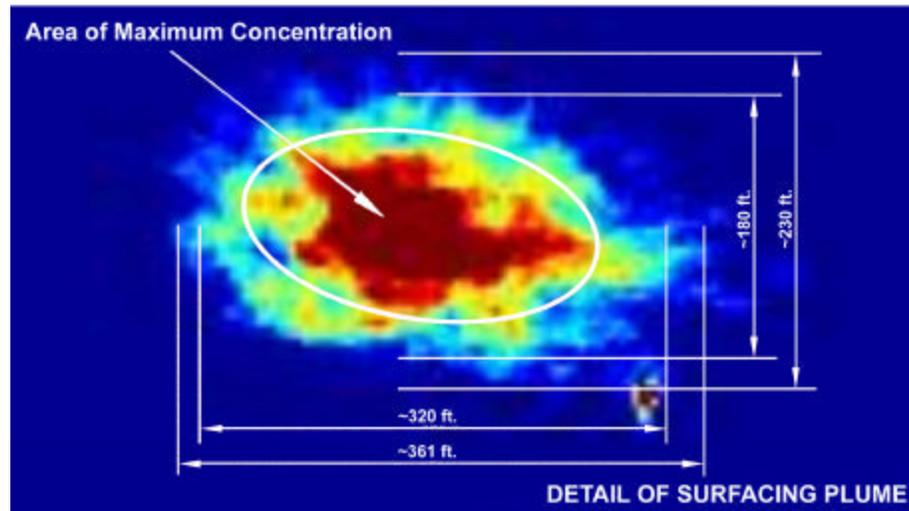


PREPARED SOLELY FOR THE USE OF OUR CLIENT AND NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH KOMEX HAS NOT ENTERED INTO A CONTRACT.

Client: California Energy Commission		Date: April 2003
Project/Site: HBGS - AES Powerplant		Project No: 225-001
Title: Sampling Point Locations		Plate No: A-1



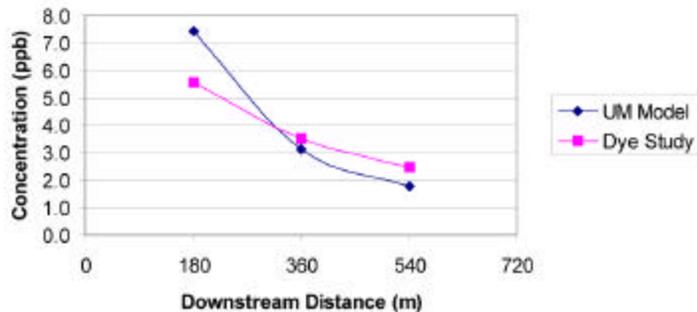
LOCATION MAP



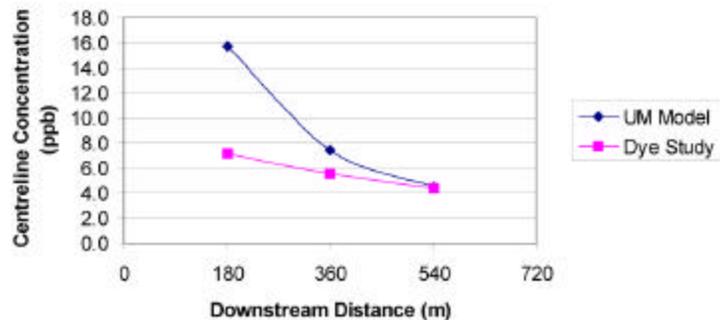
PREPARED SOLELY FOR THE USE OF OUR CLIENT AND NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH KOMEX HAS ENTERED INTO A CONTRACT.

Client:	California Energy Commission	Date:	April 2003
Project/Site:	HBGS - AES Powerplant	Project No:	225-001
Title:	Calibrated Images of Enhanced Dye Discharge		A-2

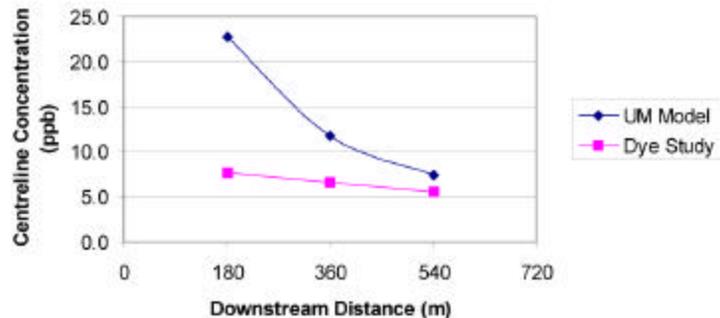
Centreline Concentration (v=0.05 m/s)



Centreline Concentration (v=0.10 m/s)



Centreline Concentration (v=0.15 m/s)



PREPARED SOLELY FOR THE USE OF OUR CLIENT AND NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH KOMEX HAS ENTERED INTO A CONTRACT.

Client:

California Energy Commission

Project/Site:

HBGS - AES Powerplant

Title:

Modeled Centerline Concentrations

Date:

April 2003

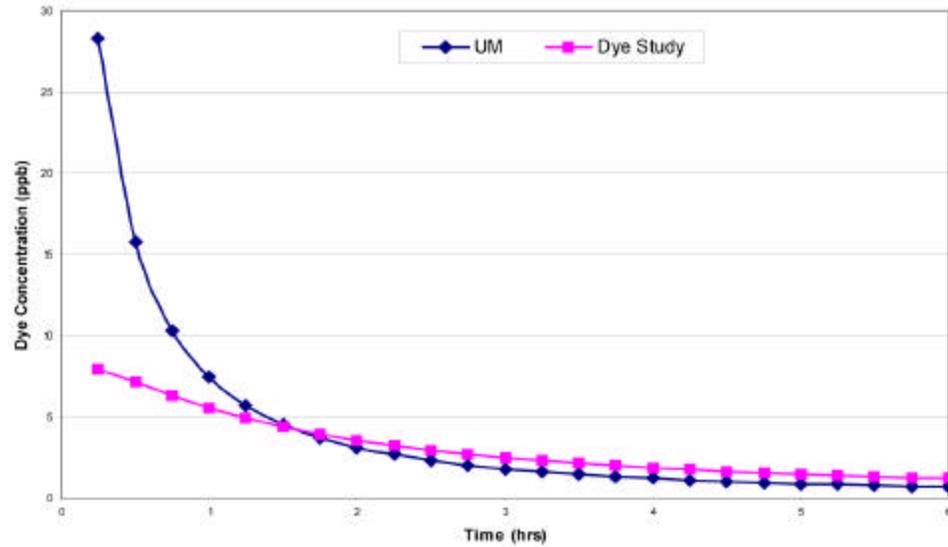
Project No:

225-001

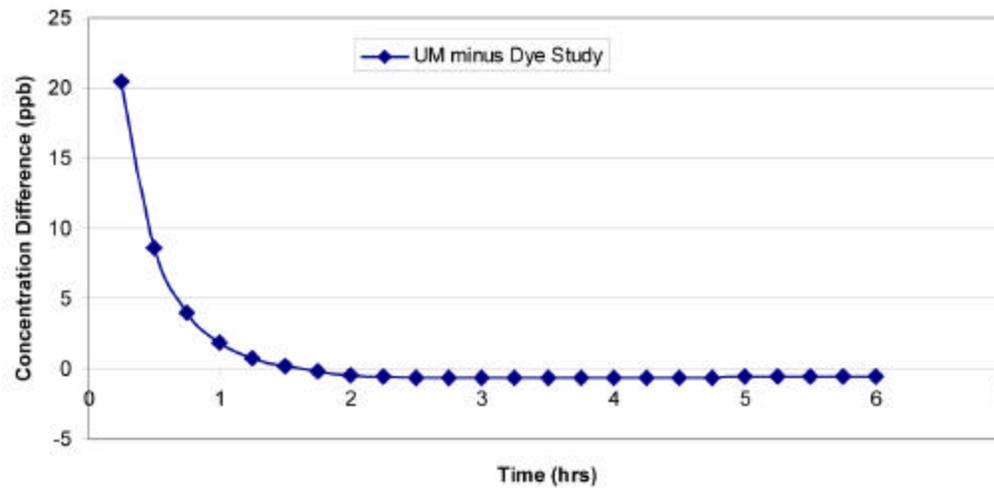
Plate No:

A-3

Far-Field Dye Concentration Model



Difference Plot: UM minus Dye Study



PREPARED SOLELY FOR THE USE OF OUR CLIENT AND NO REPRESENTATION OF ANY KIND IS MADE TO OTHER PARTIES WITH WHICH KOMEX HAS ENTERED INTO A CONTRACT.

Client:	California Energy Commission	Date:	April 2003
Project/Site:	HBGS - AES Powerplant	Project No:	225-001
Title:	Far-Field Dye Concentration Model	Plate No:	A-4

Qualitative Bird Survey

From The Santa Ana River
To The Huntington Beach Pier

August 17 - 21, 2002



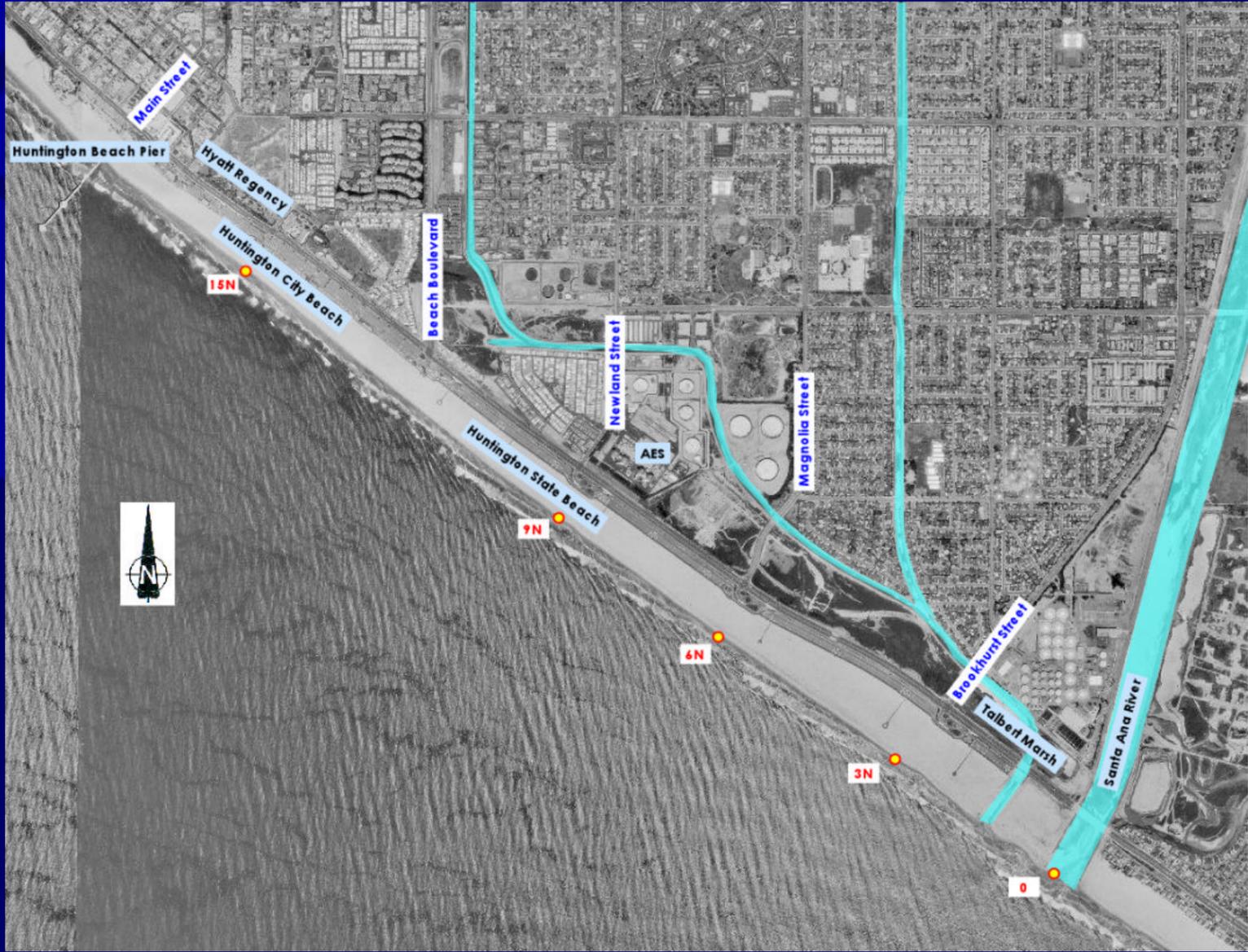
Introduction

- Numerous birds have been observed along the beaches, in watercourses and wetlands around Huntington Beach and the coast
- Do birds have an impact on beach water quality?
 - How many?
 - Where?
 - When?
 - Why?

Introduction

- Komex conducted a preliminary qualitative bird survey from August 17 through 21, 2002
- Attempted to answer some of those questions related to beach water quality impacts

Study Area

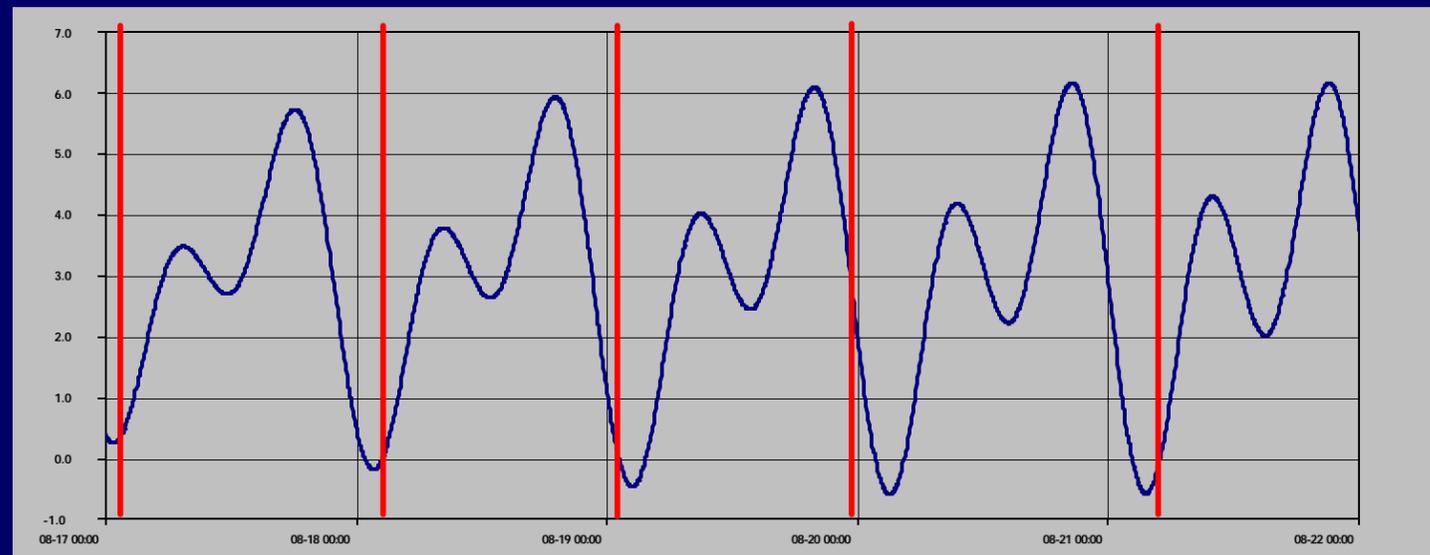


Methodology

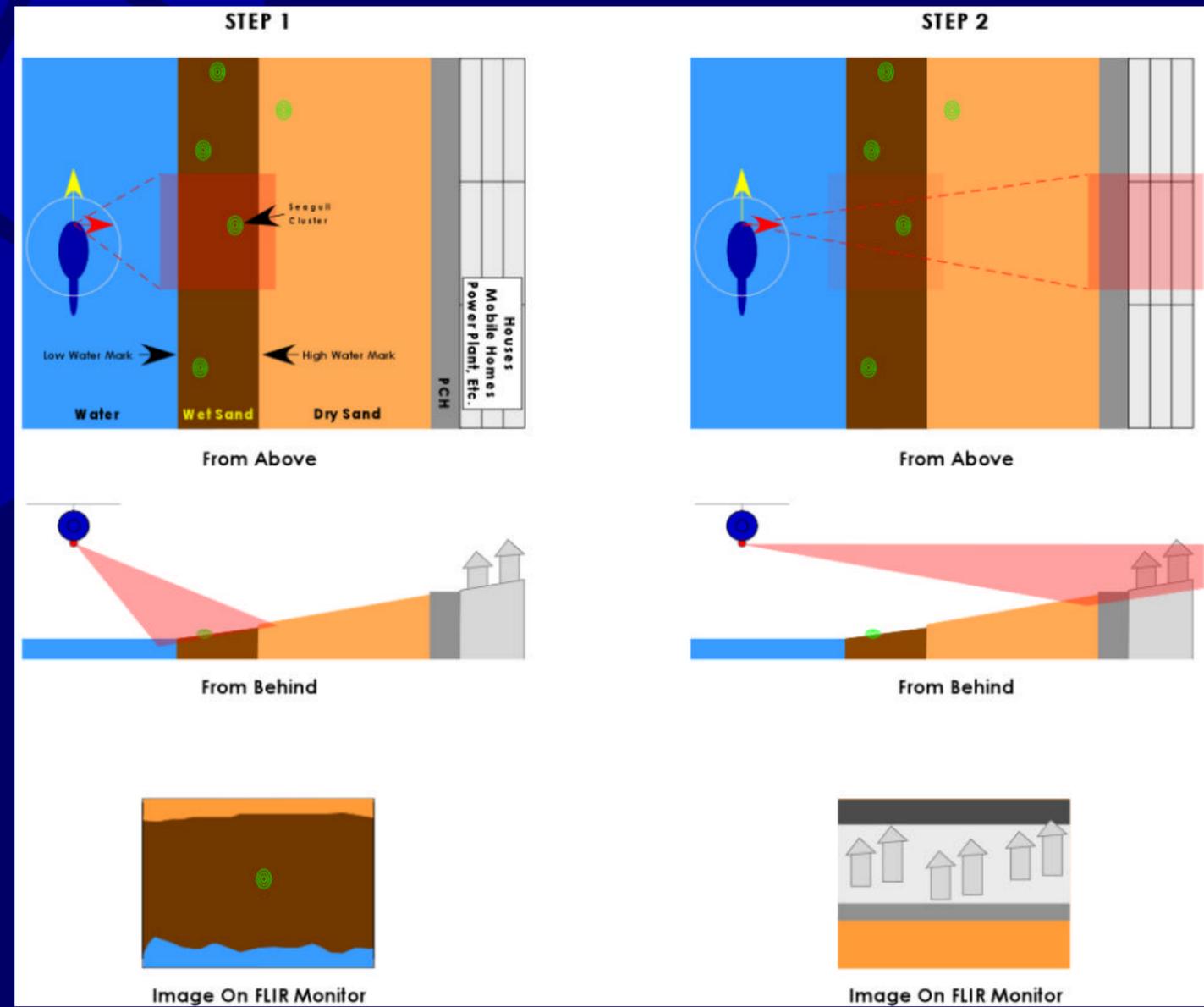
- **Observed bird populations in inter-tidal zone**
 - Over a period of several days in the summer, at night, during a spring tide
- **Utilized the infra-red camera capabilities of the City of Huntington Beach Police Helicopter**
- **Obtained water samples from the surf zone at target locations the following morning**
 - Bacterial indicators
 - Microbial source tracking

Dates & Times

- 5 flights were conducted in August 2002
 - Saturday, August 17 00:15 to 00:35
 - Sunday, August 18 01:55 to 02:30
 - Sunday, August 18 23:35 to 00:10
 - Monday, August 19 22:00 to 22:35
 - Wednesday, August 21 02:25 to 02:45



Infra-Red Camera



Water Samples

- 10 water samples were collected
- All were analyzed for bacterial indicators
 - Total coliform (TC)
 - Fecal coliform (FC)
 - Enterococci (ENT)
- Microbial Source Tracking for 6 water samples
 - Bacteroides / Prevotella
 - Enteroviruses

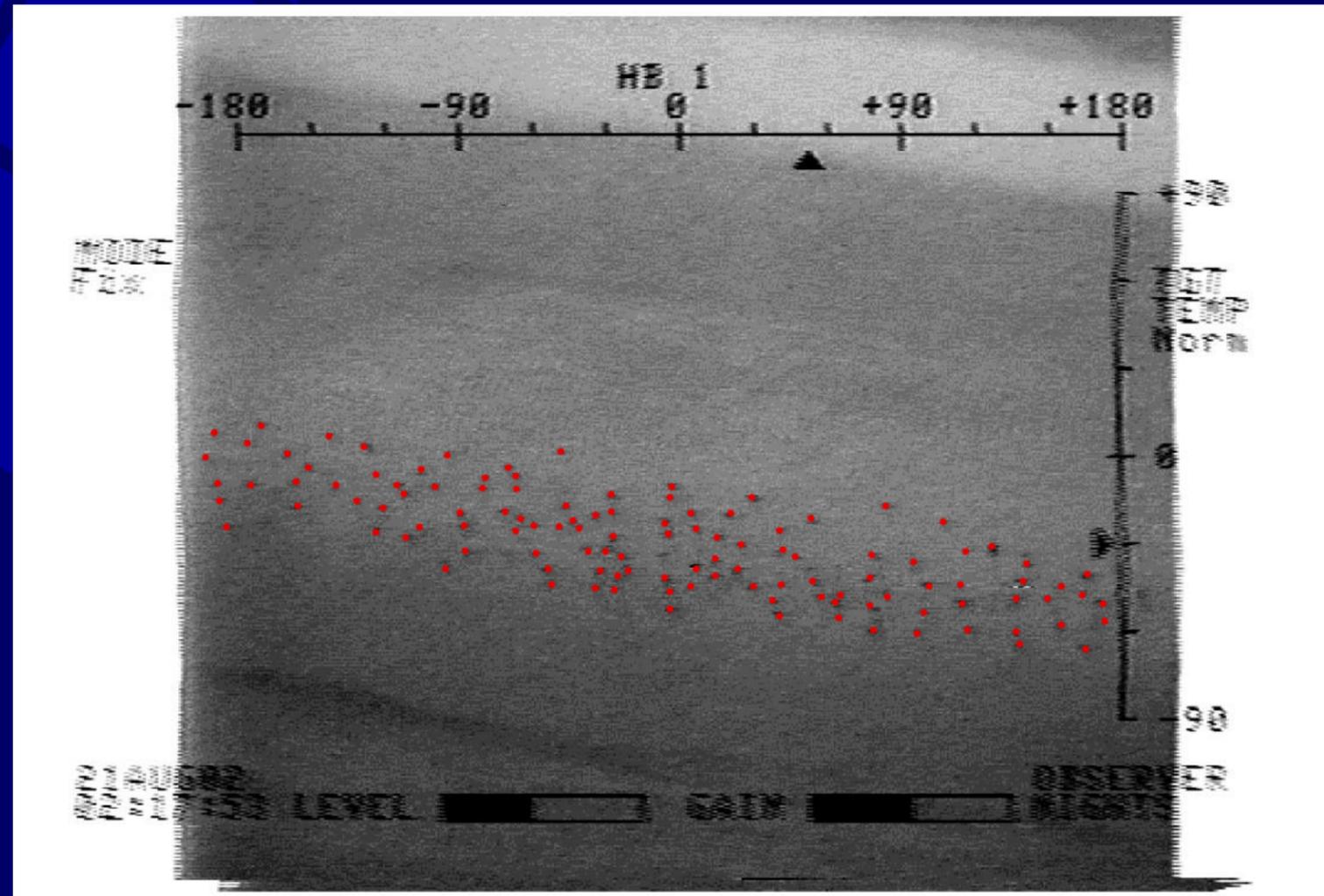
Video

- Video was collected using infra-red camera
- Object appearance varies with temperature
 - Cold Black
 - Warm Gray
 - Hot White
 - Very Hot Bright White
- Video timeline shows
 - AES, fluid levels, TM & SAR, inter-tidal zone
 - Spot observations
 - Continuous from SAR to Huntington Beach Pier

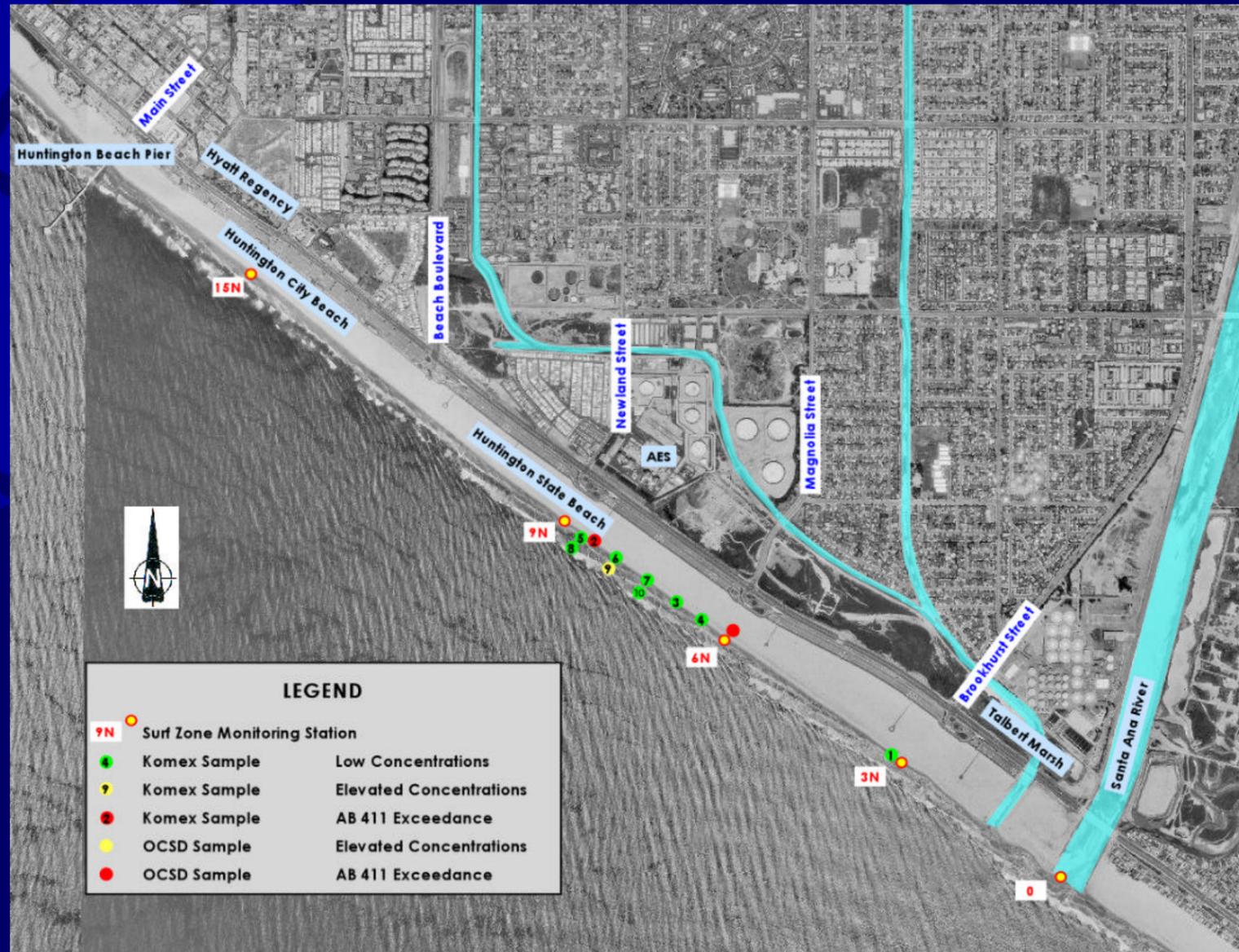
Results - Observations

- Large clusters of seagulls observed along Huntington State Beach
 - From near Brookhurst Street to Beach Boulevard
- Some seagull clusters observed along Huntington City Beach
 - Near Hyatt Regency
 - South of the pier
- Clusters were observed in inter-tidal zone
 - Single frame of video shows 120 seagulls

Results – Frame Grab



Water Sample Locations



Results - Water Samples

Sample #	Station	Date	Time	TC (CFU/100 mL)	FC (CFU/100 mL)	ENT (CFU/100 mL)	MST
1	3N	18-Aug-02	08:35	22	3	22	-
2	8.5N	18-Aug-02	07:55	51	24	120	-
3	7N	19-Aug-02	07:30	43	24	13	-
4	6.5N	19-Aug-02	07:50	51	32	15	-
5	8.5N	20-Aug-02	07:40	50	28	6	Negative
6	8N	20-Aug-02	07:50	60	13	1	Negative
7	7.5N	20-Aug-02	07:50	30	11	2	Negative
8	8.5N	21-Aug-02	07:50	60	42	23	Negative
9	8N	21-Aug-02	07:59	190	140	60	Negative
10	7.5N	21-Aug-02	07:59	130	100	30	Negative

Date	Indicator	Station				
		15N	9N	6N	3N	0
17-Aug-02	TC	<20	<20	20	<20	70
	FC	<20	<20	20	<20	70
	ENT	<2	6	14	<2	8
18-Aug-02	TC	-	-	-	-	-
	FC	-	-	-	-	-
	ENT	-	-	-	-	-
19-Aug-02	TC	130	20	500	80	40
	FC	130	20	500	80	40
	ENT	38	42	162	20	4
20-Aug-02	TC	<20	40	20	40	40
	FC	<20	40	20	40	40
	ENT	8	4	2	4	12
21-Aug-02	TC	80	40	40	40	20
	FC	80	40	40	20	20
	ENT	20	34	8	22	2



Conclusions

- Large seagull clusters were observed along Huntington State Beach in the inter-tidal zone
- Komex water samples showed:
 - 1 exceedance of ENT 8.5N August 18
 - Elevated ENT 8N August 21
 - MST data was negative for Bacteroides / Prevotella
 - MST data was negative for enterovirus
 - Indicates that the source is non-human

Conclusions

- **OCSD water samples showed:**
 - 1 exceedance of FC and ENT 6N August 19
- **Large clusters of seagulls were observed. Some water samples had elevated concentrations or exceedances, but a clear, continuous linkage between population, location and water quality was not established**

More Questions

- **Why are seagulls gathering in large clusters on Huntington State Beach?**
 - Warm water from Santa Ana River & Talbert Marsh?
 - Closer to wetland areas of Talbert Marsh?
 - Warm water from AES power plant discharge?
 - Marine organisms (food) in area?
 - Other reasons?
- **Why are there significantly fewer seagull clusters north of Beach Boulevard?**
 - Opposite to bullets above?
 - Differences in beach maintenance practices?

Caveats

- **These are qualitative observations**
 - Short time period (30 minutes per night for 5 nights)
 - Few water samples collected and analyzed
- **This issue may or may not be a big piece of the water quality puzzle**
 - Water quality impact hasn't been quantified
 - Cause & Effect has not been established

Recommendations

- **Additional infra-red video observation**
 - During different tidal ranges and times of the year
 - Gathering higher resolution data for quantification
- **Additional water quality samples tied to those observational locations**
 - Microbial indicators
 - MST
- **To establish if a linkage exists (or does not exist) between these bird clusters and beach water quality in the area**

Acknowledgements

- **The City of Huntington Beach**
- **Huntington Beach Police Department**
- **Police Department Aero Bureau**
 - Officer Dan Catalano and all the other pilots and observers who provided assistance
- **Dr. Jed Fuhrman of USC**
- **Sierra Analytical Laboratories**