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1 not have been required had the contamination not been present under the Watson  
2 Center.

3 50. Since the discovery of contamination beneath Building 165,  
4 Watson has also attempted to lease other buildings on the Watson Center. As a  
5 result of the disclosure of the contamination, Watson has been unable to enter into  
6 any new leases without providing significant concessions to the tenants as a result  
7 of the contamination and Watson has been further damaged in that the average  
8 length of time in which Watson was previously able to lease buildings at the  
9 Watson Center upon the expiration of a previous lease term has now increased  
10 due to the presence of the contamination.

11 51. In addition to leasing the buildings on the Watson Center,  
12 Watson utilizes the Watson Center as collateral for the purposes of obtaining  
13 operating capital. As a result of the discovery of contamination beneath the  
14 Watson Center, the value of the Watson Center has been diminished, which in  
15 turn, has adversely impacted Watson's ability to obtain operating capital, and has  
16 and will continue to cause the loss of profits and increase costs to Watson,  
17 including, but not limited to, increased costs of financing.

18 52. In addition, ARCO's failure to disclose all of the information  
19 known to ARCO about the contamination under the Watson Center prevented  
20 Watson from earlier asserting its rights and initiating a cleanup of the  
21 contamination to levels that would permit the Watson Center to be leased without  
22 all of the substantial concessions required by tenants as a result of the current  
23 presence of the contamination. In addition, because groundwater contamination  
24 migrates over time, the extent of the contamination under the Watson Center has  
25 been increasing throughout the period of time during which ARCO has concealed  
26 the existence of such contamination thereby increasing both the time and costs of  
27 remediating the same. As long as contamination exists in the soil and/or  
28 groundwater under the Watson Center the value of the Watson Center will be

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1 diminished and the ability to lease, finance or sell the Watson Center will be  
2 adversely affected.

3 FIRST CAUSE OF ACTION

4 (Permanent Trespass Against All Defendants)

5 53. Watson incorporates by reference the allegations of  
6 Paragraphs 1 through 52 above, inclusive, as though set forth here in full.

7 54. Defendants, and each of them, unlawfully caused or  
8 permitted environmental contaminants to be released, discharged or left to  
9 migrate through or into the soil or groundwater under the Watson Center, all of  
10 which continue to migrate through and under the Watson Center. Watson is  
11 informed and believes, and thereon alleges, that by virtue of law, defendants did  
12 not have the right to release or discharge such contamination when the  
13 discharges occurred. Watson is further informed and believes, and thereon  
14 alleges, that it was unlawful to leave such contamination in the ground and the  
15 groundwater beneath the Watson Center. At no time did Watson consent to the  
16 placement of contamination on or in the soil or groundwater under the Watson  
17 Center. The creation of this contamination by the defendants in the soil and  
18 groundwater under the Watson Center violated and continues to violate Watson's  
19 exclusive right of possession to the Watson Center and interferes with Watson's  
20 use and enjoyment of the Watson Center.

21 55. Watson is informed and believes, and thereon alleges, that the  
22 trespass created by this environmental contamination of the Watson Center is  
23 permanent in nature in that it either cannot be completely abated or will take so  
24 many years to abate as to affect a permanent diminution in the property value of  
25 the Watson Center. As a result, defendants, and each of them, have created or are  
26 responsible for a condition on the Watson Center that constitutes a permanent  
27 trespass.

28

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1           56. Watson has been damaged by this permanent trespass in an  
2 amount in excess of the jurisdiction of this Court. The value of the property has  
3 been permanently diminished, the reasonable rental value for depositing such  
4 contamination on the Watson Center has been lost, past and prospective profits  
5 have and will be lost, operating expenses for the Watson Center will be increased,  
6 costs will be incurred to minimize future damages, and significant testing costs  
7 will be incurred in connection with prospective leasing of the Watson Center.  
8 Watson is further entitled to recover the value of the wrongful occupation to each  
9 defendant, and any other damages permitted by law, all in an amount to be proven  
10 at trial.

11           57. Watson is informed and believes, and thereon alleges, that  
12 defendants, and each of them, knew that unlawful discharges of environmental  
13 contaminants had occurred which would likely damage the Watson Center and  
14 the groundwater beneath the Watson Center, knew that readily available methods  
15 existed to remedy, terminate and/or mitigate such discharges, knew that if such  
16 discharges were not remediated additional damage would occur as a result of  
17 continued migration of environmental contamination through the soil and  
18 groundwater beneath the Watson Center, but nonetheless failed to remediate,  
19 terminate or mitigate such environmental contamination. Watson is informed  
20 and believes, and thereon alleges, that defendants, and each of them, knew or had  
21 reason to know that the operations which they conducted at their respective  
22 businesses in the vicinity of the Watson Center were causing environmental  
23 contamination which would likely damage the Watson Center and that such  
24 action nevertheless continued in willful and conscious disregard of the law, the  
25 rights of Watson and the safety of the waters of the State and all persons on or  
26 using water from beneath the Watson Center. As a result, Watson is entitled to  
27 recover punitive damages from defendants, and each of them, in an amount to be  
28 proven at trial.

1 SECOND CAUSE OF ACTION

2 (Continuing Trespass Against All Defendants)

3 58. Watson incorporates by reference the allegations of  
4 Paragraphs 1 through 52 above, inclusive, as though set forth here in full.

5 59. Defendants, and each of them, unlawfully caused or  
6 permitted environmental contaminants to be released, discharged or left to  
7 migrate through or into the soil or groundwater under the Watson Center, all of  
8 which continue to migrate through and under the Watson Center. Watson is  
9 informed and believes, and thereon alleges, that by virtue of law, defendants did  
10 not have the right to release or discharge such contamination when the  
11 discharges occurred. Watson is further informed and believes, and thereon  
12 alleges, that it was unlawful to leave such contamination in the ground and the  
13 groundwater beneath the Watson Center. At no time did Watson consent to the  
14 placement of contamination on or in the soil or groundwater under the Watson  
15 Center. The creation of this contamination by the defendants in the soil and  
16 groundwater under the Watson Center violated and continues to violate Watson's  
17 exclusive right of possession to the Watson Center and interferes with Watson's  
18 use and enjoyment of the Watson Center.

19 60. Watson is informed and believes, and thereon alleges, that the  
20 above described contamination constitutes a trespass which is continuing in  
21 nature in that the contamination is abatable and can be remediated using existing  
22 technology and customary environmental practices undertaken at a reasonable  
23 cost.

24 61. Watson has been damaged by this continuing trespass in an  
25 amount in excess of the jurisdiction of this Court in costs to assess, evaluate and  
26 test the conditions resulting from the trespass and Watson will continue to incur  
27 expenses to assess, evaluate, test, and to repair, remediate and restore the Watson  
28 Center to its original condition. Watson has been further damaged in that the

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1 reasonable rental value for depositing such contamination on the Watson Center  
2 has been lost, past and prospective profits have and will be lost, operating  
3 expenses for the Watson Center will be increased, costs will be incurred to  
4 minimize future damages, and significant testing costs will be incurred in  
5 connection with prospective leasing of the Watson Center. Watson is further  
6 entitled to recover the value of the wrongful occupation to each defendant, and any  
7 other damages permitted by law, all in an amount to be proven at trial.

8           62. Watson is informed and believes, and thereon alleges, that  
9 defendants, and each of them, knew that unlawful discharges of environmental  
10 contaminants had occurred which would likely damage the Watson Center and  
11 the groundwater beneath the Watson Center, knew that readily available methods  
12 existed to remedy, terminate and/or mitigate such discharges, knew that if such  
13 discharges were not remediated additional damage would occur as a result of  
14 continued migration of environmental contamination through the soil and  
15 groundwater beneath the Watson Center, but nonetheless failed to remediate,  
16 terminate or mitigate such environmental contamination. Watson is informed  
17 and believes, and thereon alleges, that defendants, and each of them, knew or had  
18 reason to know that the operations which they conducted at their respective  
19 businesses in the vicinity of the Watson Center were causing environmental  
20 contamination which would likely damage the Watson Center and that such  
21 action nevertheless continued in willful and conscious disregard of the law, the  
22 rights of Watson and the safety of the waters of the State and all persons on or  
23 using water from beneath the Watson Center. As a result, Watson is entitled to  
24 recover punitive damages from defendants, and each of them, in an amount to be  
25 proven at trial.

THIRD CAUSE OF ACTION

(Permanent Private Nuisance Against All Defendants)

63. Watson incorporates by reference the allegations of Paragraphs 1 through 52 above, inclusive, as though set forth here in full.

64. Defendants, and each of them, unlawfully caused or permitted environmental contaminants to be released, discharged or left to migrate through or into the soil or groundwater under the Watson Center, all of which continue to migrate through and under the Watson Center. Watson is informed and believes, and thereon alleges, that by virtue of law, defendants did not have the right to release or discharge such contamination when the discharges occurred. Watson is further informed and believes, and thereon alleges, that it was unlawful to leave such contamination in the ground and the groundwater beneath the Watson Center. At no time did Watson consent to the placement of contamination on or in the soil or groundwater under the Watson Center. The creation of this contamination by the defendants in the soil and groundwater under the Watson Center violated and continues to violate Watson's exclusive right of possession to the Watson Center and interferes with Watson's use and enjoyment of the Watson Center.

65. Watson is informed and believes, and thereon alleges, that the nuisance created by this environmental contamination of the Watson Center is permanent in nature in that it either cannot be completely abated or will take so many years to abate as to affect a permanent diminution in the property value of the Watson Center. As a result, defendants, and each of them, have created or are responsible for a condition on the Watson Center that constitutes a permanent nuisance.

66. Watson has been damaged by this permanent trespass in an amount in excess of the jurisdiction of this Court. The value of the property has been permanently diminished, the reasonable rental value for depositing such

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1 contamination on the Watson Center has been lost, past and prospective profits  
2 have and will be lost, operating expenses for the Watson Center will be increased,  
3 costs will be incurred to minimize future damages, and significant testing costs  
4 will be incurred in connection with prospective leasing of the Watson Center.  
5 Watson is further entitled to recover the value of the wrongful occupation to each  
6 defendant, and any other damages permitted by law, all in an amount to be proven  
7 at trial.

8           67. Watson is informed and believes, and thereon alleges, that  
9 defendants, and each of them, knew that unlawful discharges of environmental  
10 contaminants had occurred which would likely damage the Watson Center and  
11 the groundwater beneath the Watson Center, knew that readily available methods  
12 existed to remedy, terminate and/or mitigate such discharges, knew that if such  
13 discharges were not remediated additional damage would occur as a result of  
14 continued migration of environmental contamination through the soil and  
15 groundwater beneath the Watson Center, but nonetheless failed to remediate,  
16 terminate or mitigate such environmental contamination. Watson is informed  
17 and believes, and thereon alleges, that defendants, and each of them, knew or had  
18 reason to know that the operations which they conducted at their respective  
19 businesses in the vicinity of the Watson Center were causing environmental  
20 contamination which would likely damage the Watson Center and that such  
21 action nevertheless continued in willful and conscious disregard of the law, the  
22 rights of Watson and the safety of the waters of the State and all persons on or  
23 using water from beneath the Watson Center. As a result, Watson is entitled to  
24 recover punitive damages from defendants, and each of them, in an amount to be  
25 proven at trial.

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FOURTH CAUSE OF ACTION

(Permanent Public Nuisance Against All Defendants)

68. Watson incorporates by reference the allegations of Paragraphs 1 through 52 above, inclusive, as though set forth here in full.

69. Defendants, and each of them, unlawfully caused or permitted environmental contaminants to be released, discharged or left to migrate through or into the soil or groundwater under the Watson Center, all of which continue to migrate through and under the Watson Center. Watson is informed and believes, and thereon alleges, that by virtue of law, defendants did not have the right to release or discharge such contamination when the discharges occurred. Watson is further informed and believes, and thereon alleges, that it was unlawful to leave such contamination in the ground and the groundwater beneath the Watson Center. At no time did Watson consent to the placement of contamination on or in the soil or groundwater under the Watson Center. The creation of this contamination by the defendants in the soil and groundwater under the Watson Center violated and continues to violate Watson's exclusive right of possession to the Watson Center and interferes with Watson's use and enjoyment of the Watson Center.

70. Watson is informed and believes, and thereon alleges, that the defendants have created a public nuisance which has injured the waters of the State. Watson has been separately damaged by this public nuisance, beyond the damage suffered by the public at large, in that the contamination extending under the Watson Center has caused Watson to lose prospective tenants, has impaired Watson's ability to lease the buildings on the Watson Center, has compelled Watson to make rental concessions in order to lease buildings on the Watson Center, has caused Watson to lose profits and has impaired the value of the Watson Center for use as collateral.



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1           71. Watson is informed and believes, and thereon alleges, that the  
2 nuisance created by this environmental contamination of the Watson Center is  
3 permanent in nature in that it either cannot be completely abated or will take so  
4 many years to abate as to affect a permanent diminution in the property value of  
5 the Watson Center. As a result, defendants, and each of them, have created or are  
6 responsible for a condition on the Watson Center that constitutes a permanent  
7 nuisance.

8           72. Watson has been damaged by this permanent trespass in an  
9 amount in excess of the jurisdiction of this Court. The value of the property has  
10 been permanently diminished, the reasonable rental value for depositing such  
11 contamination on the Watson Center has been lost, past and prospective profits  
12 have and will be lost, operating expenses for the Watson Center will be increased,  
13 costs will be incurred to minimize future damages, and significant testing costs  
14 will be incurred in connection with prospective leasing of the Watson Center.  
15 Watson is further entitled to recover the value of the wrongful occupation to each  
16 defendant, and any other damages permitted by law, all in an amount to be proven  
17 at trial.

18           73. Watson is informed and believes, and thereon alleges, that  
19 defendants, and each of them, knew that unlawful discharges of environmental  
20 contaminants had occurred which would likely damage the Watson Center and  
21 the groundwater beneath the Watson Center, knew that readily available methods  
22 existed to remedy, terminate and/or mitigate such discharges, knew that if such  
23 discharges were not remediated additional damage would occur as a result of  
24 continued migration of environmental contamination through the soil and  
25 groundwater beneath the Watson Center, but nonetheless failed to remediate,  
26 terminate or mitigate such environmental contamination. Watson is informed  
27 and believes, and thereon alleges, that defendants, and each of them, knew or had  
28 reason to know that the operations which they conducted at their respective

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1 businesses in the vicinity of the Watson Center were causing environmental  
2 contamination which would likely damage the Watson Center and that such  
3 action nevertheless continued in willful and conscious disregard of the law, the  
4 rights of Watson and the safety of the waters of the State and all persons on or  
5 using water from beneath the Watson Center. As a result, Watson is entitled to  
6 recover punitive damages from defendants, and each of them, in an amount to be  
7 proven at trial.

8 FIFTH CAUSE OF ACTION

9 (Continuing Private Nuisance Against All Defendants)

10 74. Watson incorporates by reference the allegations of  
11 Paragraphs 1 through 52 above, inclusive, as though set forth here in full.

12 75. Defendants, and each of them, unlawfully caused or  
13 permitted environmental contaminants to be released, discharged or left to  
14 migrate through or into the soil or groundwater under the Watson Center, all of  
15 which continue to migrate through and under the Watson Center. Watson is  
16 informed and believes, and thereon alleges, that by virtue of law, defendants did  
17 not have the right to release or discharge such contamination when the  
18 discharges occurred. Watson is further informed and believes, and thereon  
19 alleges, that it was unlawful to leave such contamination in the ground and the  
20 groundwater beneath the Watson Center. At no time did Watson consent to the  
21 placement of contamination on or in the soil or groundwater under the Watson  
22 Center. The creation of this contamination by the defendants in the soil and  
23 groundwater under the Watson Center violated and continues to violate Watson's  
24 exclusive right of possession to the Watson Center and interferes with Watson's  
25 use and enjoyment of the Watson Center.

26 76. Watson is informed and believes, and thereon alleges, that the  
27 nuisance created and maintained by the defendants is continuing in nature in  
28 that the contamination is abatable and can be remedied using the existing

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1 technology and customary environmental practices undertaken at a reasonable  
2 cost. As a result, defendants, and each of them, have created and are responsible  
3 for a condition on or under the Watson Center that constitutes a continuing  
4 private nuisance.

5 77. Watson has been damaged by this continuing nuisance in an  
6 amount in excess of the jurisdiction of this Court in costs to assess, evaluate and  
7 test the conditions resulting from the nuisance and will continue to incur  
8 expenses to assess, evaluate, test and to repair and restore the Watson Center to  
9 its original condition. Watson has been further damaged in that the reasonable  
10 rental value for depositing such contamination on the Watson Center has been  
11 lost, past and prospective profits have and will be lost, operating expenses for the  
12 Watson Center will be increased, costs will be incurred to minimize future  
13 damages, and significant testing costs will be incurred in connection with  
14 prospective leasing of the Watson Center. Watson is further entitled to recover the  
15 value of the wrongful occupation to each defendant, and any other damages  
16 permitted by law, all in an amount to be proven at trial.

17 78. Watson is informed and believes, and thereon alleges, that  
18 defendants, and each of them, knew that unlawful discharges of environmental  
19 contaminants had occurred which would likely damage the Watson Center and  
20 the groundwater beneath the Watson Center, knew that readily available methods  
21 existed to remedy, terminate and/or mitigate such discharges, knew that if such  
22 discharges were not remediated additional damage would occur as a result of  
23 continued migration of environmental contamination through the soil and  
24 groundwater beneath the Watson Center, but nonetheless failed to remediate,  
25 terminate or mitigate such environmental contamination. Watson is informed  
26 and believes, and thereon alleges, that defendants, and each of them, knew or had  
27 reason to know that the operations which they conducted at their respective  
28 businesses in the vicinity of the Watson Center were causing environmental

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1 contamination which would likely damage the Watson Center and that such  
2 action nevertheless continued in willful and conscious disregard of the law, the  
3 rights of Watson and the safety of the waters of the State and all persons on or  
4 using water from beneath the Watson Center. As a result, Watson is entitled to  
5 recover punitive damages from defendants, and each of them, in an amount to be  
6 proven at trial.

7  
8 **SIXTH CAUSE OF ACTION**

9 (Continuing Public Nuisance Against All Defendants)

10 79. Watson incorporates by reference the allegations of  
11 Paragraphs 1 through 52 above, inclusive, as though set forth here in full.

12 80. Defendants, and each of them, unlawfully caused or  
13 permitted environmental contaminants to be released, discharged or left to  
14 migrate through or into the soil or groundwater under the Watson Center, all of  
15 which continue to migrate through and under the Watson Center. Watson is  
16 informed and believes, and thereon alleges, that by virtue of law, defendants did  
17 not have the right to release or discharge such contamination when the  
18 discharges occurred. Watson is further informed and believes, and thereon  
19 alleges, that it was unlawful to leave such contamination in the ground and the  
20 groundwater beneath the Watson Center. At no time did Watson consent to the  
21 placement of contamination on or in the soil or groundwater under the Watson  
22 Center. The creation of this contamination by the defendants in the soil and  
23 groundwater under the Watson Center violated and continues to violate Watson's  
24 exclusive right of possession to the Watson Center and interferes with Watson's  
25 use and enjoyment of the Watson Center.

26 81. Watson is informed and believes, and thereon alleges, that the  
27 defendants have created a public nuisance which has injured the waters of the  
28 State. Watson has been separately damaged by this public nuisance, beyond the  
damage suffered by the public at large, in that the contamination extending under

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1 the Watson Center has caused Watson to lose prospective tenants, has impaired  
2 Watson's ability to lease the buildings on the Watson Center, has compelled  
3 Watson to make rental concessions in order to lease buildings on the Watson  
4 Center, has caused Watson to lose profits and has impaired the value of the  
5 Watson Center for use as collateral.

6 82. Watson is informed and believes, and thereon alleges, that the  
7 nuisance created and maintained by the defendants is continuing in nature in  
8 that the contamination is abatable and can be remedied using the existing  
9 technology and customary environmental practices undertaken at a reasonable  
10 cost. As a result, defendants, and each of them, have created and are responsible  
11 for a condition on or under the Watson Center that constitutes a continuing public  
12 nuisance.

13 83. Watson has been damaged by this continuing nuisance in an  
14 amount in excess of the jurisdiction of this Court in costs to assess, evaluate and  
15 test the conditions resulting from the nuisance and will continue to incur  
16 expenses to assess, evaluate, test and to repair and restore the Watson Center to  
17 its original condition. Watson has been further damaged in that the reasonable  
18 rental value for depositing such contamination on the Watson Center has been  
19 lost, past and prospective profits have and will be lost, operating expenses for the  
20 Watson Center will be increased, costs will be incurred to minimize future  
21 damages, and significant testing costs will be incurred in connection with  
22 prospective leasing of the Watson Center. Watson is further entitled to recover the  
23 value of the wrongful occupation to each defendant, and any other damages  
24 permitted by law, all in an amount to be proven at trial.

25 84. Watson is informed and believes, and thereon alleges, that  
26 defendants, and each of them, knew that unlawful discharges of environmental  
27 contaminants had occurred which would likely damage the Watson Center and  
28 the groundwater beneath the Watson Center, knew that readily available methods

1 existed to remedy, terminate and/or mitigate such discharges, knew that if such  
2 discharges were not remediated additional damage would occur as a result of  
3 continued migration of environmental contamination through the soil and  
4 groundwater beneath the Watson Center, but nonetheless failed to remediate,  
5 terminate or mitigate such environmental contamination. Watson is informed  
6 and believes, and thereon alleges, that defendants, and each of them, knew or had  
7 reason to know that the operations which they conducted at their respective  
8 businesses in the vicinity of the Watson Center were causing environmental  
9 contamination which would likely damage the Watson Center and that such  
10 action nevertheless continued in willful and conscious disregard of the law, the  
11 rights of Watson and the safety of the waters of the State and all persons on or  
12 using water from beneath the Watson Center. As a result, Watson is entitled to  
13 recover punitive damages from defendants, and each of them, in an amount to be  
14 proven at trial.

SEVENTH CAUSE OF ACTION

(Fraud -- Concealment --Against Defendant ARCO)

15  
16  
17 85. Watson incorporates by reference the allegations of  
18 Paragraphs 1 through 52 above, inclusive, as though set forth here in full.

19 86. Defendant ARCO has defrauded Watson by concealment.  
20 ARCO was under a duty to Watson to disclose the existence of any contamination  
21 which ARCO knew or reasonably suspected to exist in the soil or groundwater  
22 beneath the Watson Center by virtue of its express contractual promise. Despite  
23 the fact that ARCO ascertained the existence of such contamination by no later  
24 than 1990 as shown in the December 14, 1990 off-site assessment report, and knew  
25 or should have known that Watson was not likely to discover the presence of such  
26 hidden contamination, ARCO concealed the existence of such contamination from  
27 Watson.

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1 87. Watson is informed and believes, and thereon alleges, that  
2 ARCO deliberately withheld information about the contamination in the soil and  
3 groundwater beneath the Watson Center for the purpose of preventing Watson  
4 from ascertaining the true facts, from acting to protect its rights with respect to  
5 the Watson Center and from taking legal action to protect its rights.

6 88. Watson is informed and believes, and thereon alleges, that  
7 ARCO refinery manager, L.L. Smith, who executed the ARCO License  
8 Agreement on behalf of ARCO, is one of the persons within ARCO who was aware  
9 of ARCO's disclosure obligations to Watson and was responsible for ensuring that  
10 ARCO provided the pertinent environmental information to Watson. Watson is  
11 further informed and believes, and thereon alleges, that other ARCO employees  
12 with responsibility for the environmental condition of the ARCO Refinery,  
13 including, without limitation, Dean S. Kirk, also had responsibility for conducting  
14 testing under the Watson Center and for notifying Watson about the specific  
15 contamination discovered by ARCO under Watson's property.

16 89. By virtue of the ARCO License Agreement and ARCO's  
17 obligations at law, Watson relied upon ARCO to supply information concerning  
18 the contamination under the Watson Center, including all information known to  
19 ARCO about potential contamination and the source of such contamination under  
20 the Watson Center. Furthermore, ARCO affirmatively represented in the Barrier  
21 Plan Report that it was conducting aquifer remediation and that it would  
22 undertake implementation of clean up of groundwater contamination caused by  
23 the ARCO Refinery. (See Pages 3-1 and 3-2 of Exhibit B.) ARCO also continued to  
24 represent that it intended to install a groundwater barrier system along the  
25 western perimeter of the ARCO Refinery by the second quarter of 1995, in order to  
26 contain groundwater contamination to the ARCO Refinery and to recover any off-  
27 site groundwater contamination, by letter dated August 5, 1994 from Dean S. Kirk  
28 of ARCO to Michael Genewick of Watson. As a result of the foregoing, Watson

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1 reasonably relied on ARCO to provide full and complete information concerning  
2 the contamination or potential contamination under the Watson Center, relied  
3 upon ARCO's representation that it would be responsible for the contamination it  
4 caused, was unaware of the existence of the contamination under the Watson  
5 Center, did not undertake steps to investigate or remediate that contamination,  
6 could not avoid the loss of profits attributable to a delay in property rentals and the  
7 loss of prospective tenants, and did not initiate any legal action to protect its  
8 property rights concerning the Watson Center.

9 90. Watson has been damaged as a result of the concealment of  
10 material information from Watson by ARCO in that Watson has lost the  
11 opportunity to lease portions of the Watson Center, and the Watson Center has  
12 been continually damaged during the intervening period as a result of the  
13 migration of the subject contamination and because Watson has been prevented  
14 from earlier initiating legal action to protect its rights.

15 91. Watson is informed and believes, and thereon alleges, that  
16 ARCO undertook the described course of conduct deliberately and intentionally  
17 and in willful and conscious disregard of the rights of Watson and willful and  
18 conscious violation of law. As a result, Watson is entitled to recover punitive  
19 damages from ARCO in an amount to be proven at trial.

#### 20 EIGHTH CAUSE OF ACTION

21 (Fraud -- Misrepresentation -- Against Defendant ARCO)

22 92. Watson incorporates by reference the allegations of  
23 Paragraphs 1 through 52 above, inclusive, as though set forth here in full.

24 93. ARCO has also defrauded Watson by making affirmative  
25 misrepresentations and providing misleading information. Watson is informed  
26 and believes, and thereon alleges, that ARCO, either directly or indirectly or  
27 through its environmental consultant, Remediation Technologies, Inc., supplied  
28 Watson with an environmental report entitled "Phase I Off Site Migration Barrier



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1 Plan, ARCO Los Angeles Refinery" ( the "Barrier Plan Report") in or around the  
2 time such report was completed. A true and accurate copy of such report as  
3 received by Watson is attached hereto as Exhibit B and incorporated herein. The  
4 extent of water table contamination caused by the ARCO Refinery is represented  
5 in a map designated as Figure 4. Figure 4 affirmatively represents that no  
6 groundwater contamination exists beneath the Watson Center.

7 94. The representation of Figure 4 of the Barrier Plan Report was  
8 false because ARCO knew by virtue of the December 14, 1990 off-site assessment  
9 report prepared by its own environmental consultant and the environmental  
10 testing in connection with such report that substantial contamination existed at  
11 that time and had previously existed on the Watson Center, and knew or should  
12 have known that Watson was not likely to discover the existence of such hidden  
13 contamination.

14 95. By virtue of the ARCO License Agreement and ARCO's  
15 obligations at law, Watson relied upon ARCO to supply information concerning  
16 the contamination of the Watson Center and trusted and accepted the information  
17 provided by ARCO to Watson as being wholly accurate and including all  
18 information known to ARCO about potential contamination under Watson Center.  
19 Furthermore, ARCO affirmatively represented in the Barrier Plan Report that it  
20 was conducting aquifer remediation and that it would undertake implementation  
21 of cleanup of the groundwater contamination caused by the ARCO Refinery. (See  
22 Pages 3-1 and 3-2 of Exhibit B.) ARCO also continued to represent that it intended  
23 to install a groundwater barrier system along the western perimeter of the ARCO  
24 Refinery by the second quarter of 1995, in order to contain groundwater  
25 contamination to the ARCO Refinery and to recover any off-site recovery  
26 groundwater contamination, by letter dated August 5, 1994 from Dean S. Kirk of  
27 ARCO to Michael Genewick of Watson. As a result of the foregoing, Watson  
28 reasonably relied on ARCO's representations that contamination from the

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1 operation of the ARCO Refinery did not exist under the Watson Center, relied  
2 upon ARCO's representation that it would be responsible for the contamination it  
3 caused, was unaware of the existence of the contamination under the Watson  
4 Center, did not undertake steps to investigate or remediate that contamination,  
5 could not avoid the loss of profits attributable to a delay in property rentals and the  
6 loss of prospective tenants, and did not initiate any legal action to protect its  
7 property rights concerning the Watson Center.

8 96. Watson has been damaged as a result of the affirmative  
9 misrepresentation to Watson by ARCO in that Watson has lost the opportunity to  
10 lease portions of the Watson Center, and the Watson Center has been continually  
11 damaged during the intervening period as a result of the migration of the subject  
12 contamination and because Watson has been prevented from earlier initiating  
13 legal action to protect its rights.

14 97. Watson is informed and believes, and thereon alleges, that the  
15 affirmative misrepresentation concerning the contamination in the soil and  
16 groundwater under the Watson Center was undertaken by ARCO with the intent  
17 that Watson rely thereon and refrain from taking legal action to protect its rights.

18 98. Watson is informed and believes, and thereon alleges, that  
19 ARCO undertook the described course of conduct deliberately and intentionally  
20 and in willful and conscious disregard for the rights of Watson and in willful and  
21 conscious violation of law. As a result, Watson is entitled to recover punitive  
22 damages from ARCO in an amount to be proven at trial.

23 NINTH CAUSE OF ACTION

24 (Equitable Indemnity Against All Defendants)

25 99. Watson incorporates by reference the allegations of  
26 Paragraphs 1 through 52 above, inclusive, as though set forth here in full.

27 100. By virtue of its ownership interest in the Watson Center,  
28 Watson has incurred and will continue to incur damages in excess of the

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1 jurisdiction of this Court to assess, evaluate, test, remove and remediate the  
2 contamination in the soil and groundwater under the Watson Center. In  
3 addition, Watson has suffered and will continue to suffer lost profits and other  
4 costs to minimize future damages.

5 101. At no time did Watson consent to or agree to be responsible for  
6 the contamination on and under the Watson Center. At no time did Watson or its  
7 tenants contribute or cause the subject contamination in issue.

8 102. Watson is informed and believes, and thereon alleges, that  
9 defendants, and each of them, were responsible for and deliberately and  
10 intentionally caused or permitted the unlawful release and discharge of the  
11 subject contaminants and permitted their continuous leaching and migrating  
12 through and under the Watson Center. Watson is further informed and believes,  
13 and on that basis alleges, that the defendants, and each of them, knew that the  
14 releases and discharges of the subject contaminants were unlawful when they  
15 occurred, that their actions would likely damage the Watson Center and the  
16 groundwater beneath the Watson Center, that readily available methods existed to  
17 avoid, remediate or mitigate the discharges or the migration of such discharges,  
18 but the defendants nevertheless knowingly and intentionally permitted the release  
19 and discharges to occur and left them concealed beneath the surface to migrate  
20 through and into the soil and groundwater under the Watson Center.

21 103. As a result of the foregoing, defendants, and each of them,  
22 have unfairly and unjustly avoided the cost of their wrongful and unlawful  
23 conduct at the expense of Watson and, therefore, in equity, the defendants, and  
24 each of them, should be made to indemnify Watson for the costs incurred as a  
25 result of the wrongs of the defendant, all in an amount to be proven at trial.

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TENTH CAUSE OF ACTION

(Unjust Enrichment Against All Defendants)

1  
2  
3 104. Watson incorporates by reference the allegations of  
4 Paragraphs 1 through 52 above, inclusive, as though set forth here in full.

5 105. At no time did Watson agree to be responsible for the  
6 contamination on and under the Watson Center. At no time did Watson or its  
7 tenants contribute or cause the contamination in issue.

8 106. Watson is informed and believes, and thereon alleges, that  
9 defendants, and each of them, were responsible for and deliberately and  
10 intentionally caused or permitted the unlawful release and discharge of the  
11 subject contaminants and permitted their continuous leaching and migrating  
12 through and into the soil and groundwater under the Watson Center. Watson is  
13 further informed and believes, and thereon alleges, that the defendants, and each  
14 of them, knew that the releases and discharges of the subject contaminants were  
15 unlawful when they occurred, that their actions would likely damage the Watson  
16 Center and the groundwater beneath the Watson Center, that readily available  
17 methods existed to avoid, remediate or mitigate the discharges or the migration of  
18 such discharges, but the defendants nevertheless knowingly and intentionally  
19 permitted the release and discharges to occur and left them concealed beneath the  
20 surface to migrate through and into the soil and groundwater under the Watson  
21 Center.

22 107. As a result, defendants, and each of them, have been unjustly  
23 enriched at the expense of Watson in that Watson has incurred and will continue  
24 to incur the costs of discharging the liabilities of the defendants. In equity, the  
25 defendants, and each of them, should be made to reimburse Watson for all such  
26 costs incurred.

27  
28

ELEVENTH CAUSE OF ACTION

(Declaratory Relief Against All Defendants)

108. Watson incorporates by reference the allegations of Paragraphs 1 through 52 above, inclusive, as though set forth here in full.

109. An actual controversy now exists relating to the legal rights and duties of the respective parties because Watson, on the one hand, contends that the defendants, and each of them, are liable and responsible for the costs and damages incurred by Watson as a result of the subject contamination attributable or caused by each such defendant. Watson is informed and believes, and thereon alleges, that defendants, on the other hand, contend that they are not responsible to Watson for such damages.

110. Watson desires the declaration of the Court affixing and determining the rights and liabilities of the parties with respect to the subject contamination and the damages resulting therefrom, including both past damages and future damages caused by the presence of the contamination in the soil and groundwater under the Watson Center.

PRAYER FOR RELIEF

WHEREFORE, Watson Land Company prays for relief as follows:

1. For damages in an amount to be proven at trial, as applicable to the cause of action proven;
2. For interest thereon;
3. For punitive damages, as applicable;
4. For attorneys' fees, as applicable;
5. For a declaration by the Court determining and affixing the rights and liabilities of the parties with respect to the Watson Center and in the groundwater beneath the Watson Center;
6. For its costs of suit incurred herein; and

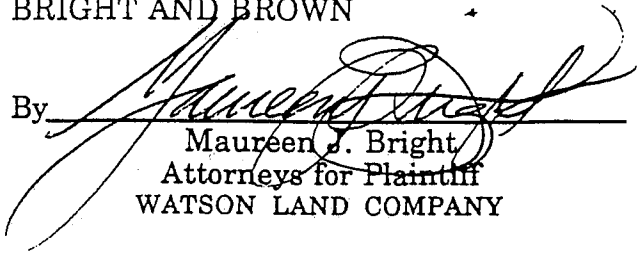
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7. For such other and further relief as the Court may deem just and proper.

BRIGHT AND BROWN

Dated: December 19, 1996

By   
Maureen J. Bright  
Attorneys for Plaintiff  
WATSON LAND COMPANY

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TEMPORARY LICENSE AGREEMENT BETWEEN  
WATSON LAND COMPANY AND ARCO PRODUCTS COMPANY

THIS LICENSE AGREEMENT is made as of December, 1990 between Watson Land Company, hereinafter referred to as "Licensor" and ARCO Products Company, a division of Atlantic Richfield Company, hereinafter referred to as "Licensee."

1. RECITALS

- 1.1 Licensor owns certain real property adjoining the west side of Wilmington Avenue between Sepulveda Boulevard on the South and Watson Center Road on the North in the City of Carson, California (the "Property").
- 1.2 Licensee desires to drill four groundwater monitoring wells ("Wells") on a portion of the Property and to perform other work on the Property as required by applicable environmental laws and regulations or required by order of regulatory agencies ("Work") at the precise locations shown on Exhibit "A" attached hereto and made a part hereof.
- 1.3 The parties desire to enter into this License Agreement to allow Licensee to install said Wells on the Property and to give access to the Property to Licensee or its representatives for the purpose of performing Work authorized by this License Agreement.

2. AGREEMENT

NOW, THEREFORE, in consideration of the mutual covenants and agreements herein contained, the parties hereto do hereby covenant and agree to and with each other as follows:

3. TERMS

- 3.1 Licensee or its representatives may drill, use, backfill and construct four Wells on the Property at its sole cost and expense. Additional wells required by a regulatory agency may be installed pursuant to the terms of this License Agreement with the prior written approval of Licensor. Licensee or its representatives may enter onto the Property for the purpose of performing the Work authorized by this License Agreement. Licensor hereby authorizes Licensee or its representatives to release any and all analytical geotechnical data and site assessment information obtained during such Work to applicable environmental agencies, and Licensee covenants and agrees that it will otherwise hold all such data and information in strict confidence and will not release any thereof to any other third party without Licensor's consent in writing.



- 3.2 Licensee agrees not to permit any liens to stand against the Property for Work done or materials furnished to Licensee, and Licensee agrees to save, defend, indemnify and hold Licensor harmless from and against any such liens for Work performed under this License Agreement and all costs and expenses related thereto including attorneys' fees. If any such lien is recorded against the Property Licensor may require Licensee to furnish to Licensor a good and sufficient Lien Release Bond in an amount at least one and a half times the amount of the lien and issued by a bonding company acceptable to Licensor.
- 3.3 If the surface of the Property or any improvements thereon shall be disturbed by the emplacement of Licensee's Wells, then said surface or improvements shall be promptly restored by Licensee to their condition just prior to such disturbance.
- 3.4 Specifically as determined and required by Licensor in writing Licensee shall, after the Wells are no longer useful to the investigation or upon termination of this License, whichever first occurs, either (i) backfill and/or close out such Wells according to applicable standards and shall remove all well casing and other related equipment and other personal property from the Property and restore the Property to its original condition that existed just prior to emplacement of each Well or (ii) leave one or more of said Wells in place in good operating condition with the well casing and other related equipment and personal property in place and otherwise back fill and/or close out such other wells and restore the Property as required above.
- 3.5 Licensee agrees to indemnify, defend, and save Licensor harmless from all liability, damage, expense, causes of action, suits, claims, judgments, loss or injuries including reasonable attorneys fees, resulting from injuries to persons or damage to the Property or to property on the Property or on adjoining streets and sidewalks which arise out of the act, failure to act, or negligence of Licensee, its agents, employees, invitees, or guests in performing Work under this License Agreement, including without limitation any environmental or other damage to the Property or other real property resulting from the penetration of any Well into the subsurface of the Property.
- 3.6 This License Agreement may be terminated by either party upon thirty (30) days' prior written notice, except where the Work contemplated by this License Agreement is not completed and is required under order of a regulatory agency in which event termination shall be effective when the work is completed or the order is no longer applicable, whichever first occurs.

- 3.7 Licensee shall construct, maintain, operate, locate, inspect and test the Wells in a manner so as not to interfere with Licensor's and its tenants' use and occupation of the Property as further specified in paragraph 3.8 below.
- 3.8 Licensee represents that the location, construction, maintenance and use of each Well as indicated in Exhibit "A" does not and will not in any way interfere with, ingress or egress to or from the Property either on foot or by vehicle or with the use of any structure located on the Property, and will only minimally interfere with the use of any parking area on the Property during installation of a Well and periodic taking of samples therefrom. If a Well is drilled through any improved surface such as cement or asphalt the specifications for the replacement cement or asphalt shall be as specified by Licensor in each case.
- 3.9 Licensor makes no representation, warranty, covenant or agreement regarding the existence of prior or superior third party rights or privileges in, on or to the various portions of the Property into which Licensee desires to drill said Wells, including without limitation, easements, licenses and rights of way and Licensee shall have the sole obligation and responsibility for determining the existence of any thereof and obtaining any necessary consents in connection therewith.
- 3.10 Licensee shall deliver immediately to Licensor, when available to Licensee, the following information regardless of whether in oral or in documentary form:
- a) any data, reports, figures, computations, analysis or other information pertaining to:
    - i) installation, development, sampling, investigation, testing or maintenance of the Wells;
    - ii) analysis of water or soil samples taken from any such Well;
    - iii) reports or documentation submitted, filed or otherwise provided to any environmental or other agency having jurisdiction over the matter pertaining to any Well or information referred to in this paragraph 3.10.
- 3.11 Each Well shall be installed by first drilling an 8 to 11-inch boring and then constructing a Well inside the boring. The boring shall be advanced using a diesel-powered, truck-mounted drilling rig with a three person crew. The boring shall be drilled using continuous flight hollow-stem auger equipment. Soil samples will be collected at periodic depth intervals and submitted to a state certified independent laboratory for analysis.

After soil sampling is completed and the boring has reached a total depth of approximately twenty-feet below the surface of the water table, the hole will be enlarged using a larger set of augers which permit the construction of the monitoring well. The well casing is installed through the center of the hollow-stem augers before the augers are pulled out of the ground.

The Well shall be constructed using flush-jointed 4-inch diameter Schedule 40 Polyvinyl Chloride (PVC) casing. A portion of the well casing shall be slotted to allow groundwater to flow into the Well. The slotted portion of the casing shall be surrounded by a gravel pack to prevent the Well from filling up with fine-grained soils. Immediately above the gravel pack a bentonite seal shall be placed which seals off the slotted zone from all upper zones which might contain moisture. The well boring shall then be cemented from the bentonite seal up to the ground surface where a flush-mount (ground level) protective cover shall be installed to protect the Well from damage by motorists (Exhibit "B"). All soil cuttings produced by the drilling activity shall be placed in 55 gallon drums and removed from the site. If subsurface conditions dictate, other materials and construction methods may be substituted in compliance with standards in California Well Standards Bulletin 74-90 (Department of Water Resources).

After the Well is completed, it shall be developed by pumping water to clean up any fine-grained soils which may have entered into the Well during construction. The water produced by development shall also be placed into 55 gallon drums and removed from the site.

The Wells will be used solely for periodic groundwater sampling to determine water quality. Licensee shall conduct this sampling program not more frequently than quarterly throughout the year. Groundwater samples will be analyzed by a state certified laboratory for the following constituents:

- Petroleum Hydrocarbons
- Aromatic Volatile Organics:
  - Benzene
  - Toluene
  - Ethylbenzene
  - Xylene
- Conductivity
- Chloride
- pH
- Phenolics
- Sulfate
- Arsenic
- Lead
- Mercury
- Nickel

Zinc

Other laboratory analyses may be performed or substituted as required by a regulatory agency:

- 3.12 From the date when Licensee or its employees, agents, contractors or subcontractors ("Licensee") first enters upon the Property for the purpose of drilling and completing a Well, Licensee shall continuously work on such Well during normal work hours on consecutive and normal work days until the Well is completed. No work of drilling or completing any Well may be undertaken or done more than 30 days after the first drilling of the first Well has commenced. All of the foregoing time limitations shall be extended by the length of time that applicable work is prevented by an event or events beyond the control of Licensee as defined above in this paragraph.
- 3.13 Licensor owns the fee interest in all lands underlying those portions of public streets that are adjacent to lands owned by Licensor in the general area where Licensee will be drilling, operating, monitoring and testing groundwater Wells, including the four Wells specifically referred to herein. Said lands are included in the term "the Property" used herein. The terms and provisions of this License shall also be applicable to all such Wells other than said four Wells specifically covered hereby, except for paragraphs 3.4, 3.6 and 3.12.
- 3.14 Licensee shall contact the occupant of each property upon which one of said four Wells will be drilled 48 hours in advance of conducting any work on such property, for the following purposes:
  - a) to notify occupant of the time when such work will commence, where the work will be done and when the work will be completed;
  - b) to make any necessary arrangements in connection with any existing security requirements that must be complied with in order to enter the property;
  - c) to make any necessary arrangements for the moving and/or safety of any equipment and other personal property of occupant that may be at the location where the work will be done.





**PHASE I OFF-SITE MIGRATION BARRIER PLAN  
ARCO LOS ANGELES REFINERY**

*Prepared For*

**ARCO PRODUCTS COMPANY**  
Los Angeles, California

*Prepared by*

**REMEDIAATION TECHNOLOGIES, INC.**  
Seattle, Washington

RETEC Project No. 3-1011-240

**MARCH 1993**

**PHASE I OFF-SITE MIGRATION BARRIER PLAN  
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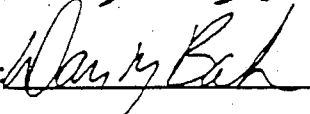
**REMEDATION TECHNOLOGIES, INC.**  
Seattle, Washington

RETEC Project No. 3-1011-240

Prepared by:



Reviewed by:



MARCH 1993

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## 1.0 INTRODUCTION

This workplan presents the scope of work to collect data necessary for the design and installation of a light nonaqueous phase liquid hydrocarbon (LNAPL) recovery and groundwater remediation system along the downgradient western perimeter of the ARCO Los Angeles Refinery (LAR). This system will be designed to function as a barrier to off-site migration of LNAPL. This workplan is being prepared for the Regional Water Quality Control Board (RWQCB) for review in accordance with "Policies and Procedures for the Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304". A copy of this bulletin is provided as Appendix A.

The barrier system proposed for the LAR area will be completed in four phases. This workplan is concerned with the tasks associated with completing Phase I of the project. Phase I will involve subsurface exploration and pump testing of a single recovery well to evaluate aquifer characteristics and groundwater flow modeling to determine appropriate pumping rates and well spacing for long term recovery. Water quality analyses will also be performed to provide data to evaluate groundwater treatment options. A full scale extraction and treatment system will be designed during Phase II based on the results of the Phase I investigation. The "barrier system" will be installed during Phase III and expanded during Phase IV.

ARCO's approach to groundwater remediation was previously presented in the submittal entitled "Groundwater Remediation Work Plan for ARCO Products Company, Los Angeles Refinery" dated April 1991 (Riedel, 1991). The workplan presented here outlines a specific approach to groundwater remediation along the western perimeter of LAR and supplements a portion of the "Reservoir 503 Remedial Action Plan" (RAP) submitted on ARCO's behalf by Mittelhauser Corporation (1992). The RAP presented a five point plan to address releases from the former reservoir. This submittal replaces Section 3.6 which proposes installation of a water table LNAPL recovery system down gradient of Reservoir 503.

## 2.0 FACILITY DESCRIPTION

ARCO Products Company owns and operates the LAR located in Carson, California. A site location map is provided in Figure 1. LAR processes approximately 240,000 barrels of crude oil per day. All crude oil is currently derived from the Alaskan North Slope. The primary products are gasoline, jet fuel and diesel. Minor products include coke, sulfur, naphtha and fuel oil.

LAR facilities are shown in Figure 2. All refining and most storage facilities are located in the area bounded by Sepulveda Boulevard, Wilmington Avenue, Alameda Street and the Dominguez Channel. The above area comprises the Main Refinery. The Main Refinery is divided into north and south zones. The northern area contains refining facilities, a warehouse and shops and is referred to as the North Property. The southern portion of the Main Refinery consists of the main tank farm located to the south and west, the cogeneration plant to the north and refining facilities to the east. Adjacent ARCO property is either currently unused or is developed and used for various purposes as discussed below.

The Southwest Tank Farm (SWTF) is located south of Sepulveda Boulevard, east of Wilmington Avenue and occupies an area of about 90 acres. The SWTF was historically used for bulk storage of liquid hydrocarbons within concrete lined reservoirs; the concrete reservoirs have not been used for storage of liquid hydrocarbon since 1970. Three of the four reservoirs have been removed; the fourth is utilized for storm water management. The majority of the property in the SWTF is currently unused. South of the SWTF on adjacent property is the ARCO Four Corners Pipe Line tank farm which contains five above ground steel storage tanks.

East of Alameda Street, north of Sepulveda Boulevard and west of the Dominguez Channel is a parcel of land used primarily for coke storage. This land is also used for parking and vehicle storage and contains ARCO's Training Center.

The Northeast Property is located north and east of the Main Refinery across the Dominguez Channel. This area is divided into a contractor's parking area to the northwest, a tank farm to the southwest, a salvage and contractor's area to the southeast and an employee athletic field to the northeast. The salvage and contractor's area is subdivided into several parcels including a fire drill area, a salvage pipe area, contractor's parking lot and contractor office trailers.

### 3.0 BACKGROUND

Petroleum refining operations have been conducted at the LAR since 1923 when the Pan American Petroleum Company began operations. In 1926, Richfield Oil Company purchased the property and expanded the refining operation. Additional parcels of land, purchased from 1926 through 1945, were added to the refinery resulting in approximately 656 acres which presently comprise the Main Refinery. The Southwest Tank Farm (SWTF) area was purchased in 1962 from Union Oil Company. The Atlantic and the Richfield Companies merged in 1967 forming the Atlantic Richfield Company (ARCO). Over the last 66 years, LAR has made a range of petroleum products including LPG, gasoline, chemicals, solvents, distillate fuels, gas-oils, lubricating oils, greases, asphalt products, bunker fuels and coke.

Subsurface geologic and hydrogeologic conditions have been investigated at the LAR by the drilling and sampling of borings at over 350 locations with subsequent installation of one or more wells at each location. These borings range up to 140 feet below ground surface (bgs). Subsurface conditions at depths greater than those penetrated by these borings were investigated by obtaining available drillers logs in the vicinity of the facility. These wells include the Los Angeles County Department of Public Works (LACDPW) observation and intrusion barrier injection wells and wells for producing groundwater for industrial purposes, nine of which are located on LAR (EEI, 1988).

Free hydrocarbon recovery activities have been conducted at the LAR since 1977. The initial focus of these activities was at the SWTF. In 1987, a separate free hydrocarbon recovery system was started up at the Main Refinery. There have been several phases of expansion at the Main Refinery since 1987 to incorporate additional recovery wells and expand the area of recovery. The SWTF recovery system has been inactive since 1989 due to the lack of a permitted method of water disposal. A total of 185,355 barrels of free hydrocarbon were recovered from 1983 to 1989 at the SWTF. Through November 1992, approximately 328,000 total barrels of free hydrocarbon have been recovered from the combined recovery systems at the LAR.

ARCO is currently conducting aquifer remediation and free hydrocarbon recovery activities under two Regional Water Quality Control Board (RWQCB) Orders. These orders are consistent with the "Policies and Procedures for the Investigation and Cleanup and Abatement of Discharges under Water Code Section 13304" as required by the State Water Resources Control Board (SWRCB). Under these guidelines ARCO is required to investigate and recover

free hydrocarbon occurring under water table conditions beneath the refinery. The following are the five basic elements of the investigation, cleanup and abatement activities:

- Preliminary site assessment
- Soil and groundwater investigations
- Proposal and selection of cleanup action
- Implementation of cleanup action and
- Monitoring to confirm effectiveness of the cleanup and abatement

The scope of work presented in this plan is considered to be the initiation of the implementation of cleanup action and represents the first step towards addressing the major concerns of ARCO's CAO: containment of LNAPL and the associated dissolved plume. By submitting this workplan ARCO is establishing their intent to install and operate a groundwater and LNAPL barrier system along the downgradient western perimeter of their LAR. The strategy for implementing the barrier system invokes a phased approach. The scope of work for later phases of the barrier system will use the results of Phase I and will be presented in future workplans.

## 4.0 SUBSURFACE CONDITIONS

The subsurface conditions beneath the LAR are discussed in the following sections.

### 4.1 GEOLOGY

Beneath fill material and site facilities, LAR is underlain by the Upper Pleistocene Lakewood Formation and Recent alluvium at shallow depths. Lakewood deposits are the uppermost native deposits present beneath the majority of the site including the entire northern half of the refinery west of the Dominguez Channel, the southwestern quarter of the refinery, and SWTF. Recent deposits are restricted to the area east of the Dominguez Channel, east of the north-northwest trending railroad tracks paralleling Main Street and the area of the former slough running along J Street.

In general, the refinery is underlain by an interbedded sequence of stratified, laterally discontinuous deposits of sand, silt and clay. At depth, these deposits are part of the Upper Pleistocene Lakewood Formation. Shallow deposits, especially those along the eastern margin of the site may be of Recent age; Recent deposits are lithologically similar to those of the Lakewood Formation and are difficult to differentiate.

A stratigraphic framework has been developed for Recent and Lakewood deposits beneath the refinery. The upper 120 feet of sediments have been divided into six zones (Simon-EEI, 1991). Each of these zones are lithostratigraphic units. A general description of each of these zones, beginning with the shallowest unit, is presented below.

Zone I (0-20 feet): Zone I is distinct from underlying units but changes laterally from a silty sand to silts and clays. It is predominantly a silty sand beneath the SWTF and the central part of the main refinery. Sand is very fine to fine. The silty sand has localized silt and clay lenses. The zone consists primarily of silt and clay along the western and eastern margins of the main refinery. Shallow portions of this unit have been disturbed by cut and fill operations.

Zone II (20-40 feet): This unit is predominantly fine to coarse sand. Localized gravel and shell horizons are present. Zone II is locally silty. Silt and clay layers are not common but occur more frequently in the northern and eastern parts of the refinery. This zone is absent beneath the easternmost part of the refinery.

Zone III (40-70 feet): Zone III is predominantly fine grained but is more interbedded than overlying units. This unit consists of silt and clay interbedded with discontinuous sand and silty sand layers. Zone III is locally absent beneath the Northeast Property.

Zone IV (70-100 feet): Zone IV is characterized by fine to coarse sand interbedded with discontinuous clay layers. Clay layers are more abundant to the north. Shells are common in this unit. Gravel lenses are also locally present.

Zone V (100-120 feet): Zone V is similar to Zone III consisting predominantly of clay and silt interbedded with sand and sandy silt layers.

Zone VI (120-? feet): Zone VI consists of sands and gravels. Sand is fine to coarse grained.

The stratigraphic framework is a simplification of subsurface conditions but is necessary to discuss site geology. Locally, zones are poorly represented or absent. This is particularly true for the Northeast Property where sand is the dominant lithology. The depths of these units apply mainly to the southern part of the main refinery. Contacts between the respective zones are often transitional as the lithologies representative of the zones are interbedded with deposits of over and underlying units. For this reason, the depths listed above are approximate. The zones tend to be deeper beneath the SWTF.

Sedimentary strata at depth beneath the site are based on water well drillers logs of variable quality and regional cross sections. The most recent production well, drilled in 1987, has the most detailed descriptions and an electric log to verify depths. Fine grained sediments were described to a depth of 130 feet bgs. This was underlain by gravels between 130 and 150 feet bgs. Silt and clay were described down to a depth of 210 feet bgs. Another gravel zone is present between 210 and 280 feet bgs. Gravelly clay, sandy clay and clay were then encountered to a depth of 480 feet bgs. Gravels and sand were noted from 480 to 740 feet bgs and then clay to the total depth of 900 feet bgs.

A cross section prepared by the California Department of Water Resources (CDWR, 1961) shows the Lakewood Formation extending down to about 160 feet bgs and the San Pedro Formation to approximately 1250 feet bgs beneath the refinery. Cross sections prepared by Zeilbauer and others (1962) cross south and east of the refinery. The Lakewood is shown to extend to between 250 and 340 feet bgs. The Upper Pliocene Pico Formation is about 1100 feet bgs beneath the SWTF.

## 4.2 HYDROGEOLOGY

The uppermost aquifer beneath LAR occurs under perched, water table and confined conditions. Traditionally, the perched zone and water table have been monitored and mapped for presentation in biannual reports. The regional water table aquifer is locally confined beneath LAR as a result of complex stratigraphy and rising water levels. Although locally confined, this continuous occurrence of groundwater is referred to as the water table aquifer. Deeper aquifers present beneath the site are not monitored as part of ARCO's aquifer remediation program. The perched zone, water table aquifer and deeper aquifers are discussed separately below.

### 4.2.1 Perched Zone

The perched zone is diminished in extent and fluid levels have declined below the screen intervals in some wells making it difficult to map. Recent investigations in the Reservoir 503 area have also shown that the perched zone consists of a number of discontinuous layers; for this reason, the perched zone can not be mapped as a single layer.

Perched conditions exist beneath much of the SWTF, the Reservoir 503 area and other isolated areas of the Main Refinery. The perched zone is discontinuous or absent beneath the southern half of the Main Refinery. The perched zone has not been observed beneath the northern half of the Main Refinery.

Perched groundwater is between 40 and 60 feet bgs in most areas, an exception is beneath Reservoir 503 where shallower LNAPL perching has been observed. The majority of the Main Refinery wells completed in the perched zone are now dry. The perched zone potentiometric surface has declined beneath the SWTF. Perching is constrained by the relationship between regional water levels in the water table aquifer and fine-grained perching layers. No perched zones have been observed beneath the north and east parts of the refinery where the regional water table is above fine-grained perching layers in Zone III.

A limited number of aquifer pump tests have been performed in the perched zone due to the relatively low permeability of sediments. Two separate tests were conducted on a SWTF recovery well. Transmissivities ranged from 100 to 150 gpd/ft (EEI, 1988). Based on these pump tests, the hydraulic conductivity is estimated to be between 1.1 and 1.7 feet/day.



#### 4.2.2 Water Table Aquifer

The water table aquifer potentiometric surface map is presented in Figure 3. The water table ranges from about 10 to 40 feet below sea level across the site. The water table aquifer is encountered between 40 and 75 feet bgs beneath the Main Refinery and SWTF. The water table aquifer is shallower (30 to 35 feet bgs) beneath the Northeast Property and Coke Storage Area.

The average gradient across the site is about 0.006 feet/foot. The gradient flattens to the south and west where it is as low as 0.002 feet/foot. The gradient is generally steeper near the Dominguez Channel and specifically beneath the western portion of the North Property and in the area of the Pool I recovery system.

The flow direction of shallow groundwater is to the south beneath the northern part of the refinery, to the west beneath the eastern part of the refinery and to the northwest beneath the SWTF. The potentiometric surface is more complex up-gradient due to the presence of the Dominguez Channel and LNAPL recovery systems. The down-gradient configuration of the water table aquifer potentiometric surface resembles a broad east-west trending trough or depression centered along the southern boundary of the Main Refinery and extending off site. This trough may be the result of injection in association with the Dominguez Gap Barrier Project interfering with the regional southward gradient. Beneath the western perimeter of the LAR, the gradient does not appear to have an off-site component of flow except at the SWTF. The gradient is very low where it is directed off site. The gradient is to the south-southwest, paralleling the property line, beneath the northern half of the Main Refinery. There is an on-site component of flow beneath the southern half of the Main Refinery toward a depression in the potentiometric surface. The depression beneath the southwest corner of the Main Refinery may be a remnant feature as a result of rising water levels and the trough in the potentiometric surface discussed above.

Water levels in the water table aquifer have been rising in recent years. The water table beneath the site rose between 20 and 30 feet from 1970 through 1987. Since 1987, the water table has, in general, continued to rise beneath the site except where influenced by the LNAPL recovery system. The rate of water table rise is greatest beneath the SWTF and is least beneath the Main Refinery.

Numerous aquifer pump tests have been conducted on the water table aquifer beneath the refinery. Transmissivity and hydraulic conductivity values are variable due to the discontinuous

nature of sand and fine-grained layers and partial penetration effects. Five SWTF wells have been tested. Transmissivity values ranged from 2000 to 74,000 gpd/ft; values of about 20,000 gpd/ft were most common. Data are available from eleven pump tests beneath the Main Refinery. Transmissivity values were relatively low ranging from 30 to 1620 gpd/ft. Hydraulic conductivities on the order of 13 to 30 feet/day have been estimated (EEI, 1988).

#### 4.2.3 Deeper Aquifers

Beneath the site, the Gage is interpreted to begin at the water table, which is as shallow as about 35 feet and extends down to a depth of at least 120 feet bgs based on site borings. Regional cross sections show the Gage aquifer to a depth of 180 feet bgs beneath the site (CDWR, 1961) and 225 feet bgs just east of the site (Zeilbauer, et al., 1962). A more recent but preliminary cross section prepared by the LACDPW extends into the refinery from the east and shows the "200-foot sand" (Gage) beginning just below the ground surface and extending to a depth of approximately 110 to 130 feet bgs. LAR stratigraphic Zone VI may represent the lower Gage.

Los Angeles County Flood Control District has prepared regional potentiometric surface maps for the Gage/Lynwood aquifer complex. The most recent available map is for 1978. The flow direction of groundwater within these aquifers is primarily to the west beneath the site. The gradient is about 0.004 feet/foot. The gradient in these aquifers which includes the water table aquifer is influenced by injection for the Dominguez Gap Barrier project. There are active recharge wells south and east of the refinery. Fresh water is injected into the Gaspar, Gage and Lynwood aquifers as part of the barrier project. Mounding from these wells which are located south and southeast of the refinery results in a northward gradient south of the site and a westward gradient east of the site.

Beneath the southeastern part of the refinery, the Lynwood aquifer is shown at a depth of 130 to 275 feet bgs by a LACDPW cross section. A gravel zone was penetrated between 210 and 280 feet bgs in ARCO water supply well No. 13 beneath the northern part of the refinery which probably corresponds to the Lynwood aquifer. Logs from other site water supply wells show a sand or sand and gravel unit ranging up to 240 feet thick. This zone is correlative with the Lynwood and begins as shallow as 115 feet bgs and extends to as deep as 350 feet bgs.

The LACDPW cross section shows the top of Silverado aquifer between 390 and 440 feet bgs, becoming deeper to the west. ARCO water supply well No. 13 penetrated a sand and gravel layer between 480 and 740 feet bgs. Other site drillers logs show a maximum Silverado

thickness of 600 feet; however, some of these wells do not penetrate the entire thickness of the Silverado. The top of the Silverado aquifer is typically about 400 feet bgs but as deep as 500 feet bgs according to logs for on-site water supply wells. In 1986, the Silverado potentiometric surface was shown to range between 60 and 80 feet bgs beneath LAR on a Los Angeles County Flood Control District regional potentiometric surface map.

### 4.3 LNAPL OCCURRENCE

LNAPL occurs under perched and water table conditions beneath the LAR; localized pockets of confined LNAPL have also been observed in the water table aquifer. The extent of LNAPL in on-site pools is shown in Figure 4. The off-site extent of LNAPL is shown to be down gradient for on-site pools. The up-gradient extent of LNAPL and occurrence of LNAPL in separate pools beneath adjacent facilities are not shown. LNAPL occurs under water table conditions in seven pools. In addition to these seven pools, a minor amount of LNAPL has been detected in off-site well 535 and in Main Refinery well 604. LNAPL characterization data were summarized in the January 1989 refinery subsurface cleanup progress report (EEI, 1989).

In general, there are two large pool (Pools I and II), one moderate sized pool (Pool IV) and four smaller pools (Pools III, V, VI and VII). Pools have been delineated for the most part, especially down gradient and off site. Each of the pools are at least partially present beneath the Main Refinery. Pool II extends to beneath the SWTF and the Four Corners Pipe Line tank farm. Pool II is also continuous with LNAPL occurrence beneath the up-gradient facility. Only half of Pool VI underlies the LAR; this pool is thought to originate from an off-site source.

The two large pools also have associated perched zone LNAPL occurrence. Perched zone LNAPL has been detected in two areas of both Pools I and II. An investigation of perched zone LNAPL occurrence beneath Reservoir 503 has been completed; preliminary results indicate that more than one layer of perched LNAPL is present.

## 5.0 APPROACH

From a technical point of view, there are a number of alternative techniques for containing and remediating free and dissolved hydrocarbons. At most such sites, site-specific conditions may favor or obviate the use of a particular technology. However, there are ordinarily several alternatives which remain viable and provide the opportunity to optimize the design of a remediation system. Unfortunately, for the subject LNAPL pools and dissolved plumes at the LAR, the site-specific constraints are numerous, and little freedom remains in selecting methods for containment and remediation.

A major goal of the barrier system will be on-site installation of extraction, treatment and disposal facilities. Owners of the bordering property west of LAR may not approve construction of facilities on their property. The presence of numerous underground pipelines beneath Wilmington Avenue will limit the ability to transfer recovered liquids across Wilmington Avenue. For this reason, ARCO will construct all facilities on site. Off-site groundwater quality will be monitored through the existing RWQCB monitoring program to evaluate the performance of on-site facilities in capturing LNAPL and containing the dissolved plume.

It appears that pumping of groundwater and removing the hydrocarbon contaminants are simple engineering problems. However, it also appears that few options exist for disposal of the water after treatment. Thus, establishing a viable method of water disposal with achievable groundwater treatment levels is the key to this project's success.

In the following sections, ARCO's approach to installation extraction and treatment systems, and disposal of groundwater are presented.

### 5.1 EXTRACTION SYSTEM

Extraction wells will be installed along the western perimeter of the LAR as necessary to establish a hydraulic barrier to off-site migration of LNAPL and dissolved constituents. Recovery well design, anticipated flow rates, well spacing and the total number of wells required will be determined during subsurface exploration, pump testing and modeling.

Wells will be installed in several phases. An initial recovery well will be installed to perform a pump test to evaluate aquifer characteristics beneath the western perimeter of the

SWTF during Phase I. The remaining recovery wells for LNAPL Pool II will be installed during Phase III along the western perimeter of the SWTF and the tank farm at the Main Refinery extending north of Reservoir 503. Recovery wells will then be added along the western perimeter of the northern LNAPL pools as necessary during Phase IV to complete the barrier system. A map presenting the Barrier System recovery well installation areas is presented in Figure 5.

The recovery system envisioned for the ARCO barrier system is a two-pump system. There are numerous advantages of a two-pump system. LNAPL is separated in the well, reducing the need for above-ground separators. In some situations, the LNAPL can be recycled without further treatment. This is because the generation of emulsions from mixing of LNAPL and water in the well are minimized. In addition, the concentrations of soluble components in pumped water are minimized which may reduce groundwater treatment costs. The most important advantage is that the system is fully automated and can be operated continuously with minimal adjustment after start-up.

## 5.2 GROUNDWATER TREATMENT SYSTEM

It is anticipated that two groundwater treatment systems will be installed. A temporary groundwater treatment system will be installed to allow extended pump testing of the initial SWTF recovery well during Phase I. Following groundwater flow modeling to constrain flow rates, a long term groundwater treatment system or systems will be designed and constructed. A feasibility study will be performed to evaluate alternatives for long-term groundwater treatment. The study will focus on identifying the process or combination of processes which provide the most efficient system of treatment to meet disposal criteria. The quality of recovered water is anticipated to vary along the western perimeter of the LAR. To facilitate treatment of groundwater of variable quality associated with different LNAPL pools and groundwater generated from north and south of Sepulveda Boulevard, more than one system may be required to provide the most efficient means of treatment.

## 5.3 WATER DISPOSAL

The biggest obstacle to operating a barrier system appears to be disposal of recovered groundwater. ARCO's existing permits for discharging waters to the Dominguez Channel and to the POTW do not have sufficient flexibility to allow the incorporation of treated

groundwaters. The POTW also has a policy against accepting groundwater from remediation projects. ARCO formerly reinjected recovered groundwater at the SWTF under Superior Court Order No. 506806; however, reinjection as previously performed is no longer permitted. To allow Phase I operation of the barrier system, ARCO has obtained a temporary WDR permit to discharge treated groundwater via the current NPDES permit to the Dominguez Channel.

One of the optimal methods for disposal of treated groundwater in the future is reuse of the recovered groundwater as part of the THUMS oil reservoir reinjection project. It is anticipated that groundwater used for tertiary oil recovery would require treatment to meet TCLP limits prior to transportation to injection wells. It does not appear as though ARCO will be able to obtain the necessary permits for this alternative at this time; however, this may be a viable disposal option in the future. In the interim, NPDES, reinjection and reuse disposal options must be considered.

#### 5.3.1 Injection Well Alternative

Another alternative for water discharge is to reactivate ARCO's permit for reinjection of groundwater to the upper aquifer. It is anticipated that the RWQCB will require ARCO to treat groundwater prior to reinjection. The treatment goals for such reinjection will require negotiation. The viability of this option will depend on the treatment levels required by the RWQCB and the feasibility of reaching those levels.

If reinjection of treated groundwater is identified as the most desirable alternative, the number and location of reinjection wells must be established using groundwater modeling as a basis for predicting future gradients and capture of reinjected water. It is anticipated that groundwater mounding from reinjection in the SWTF could be used to beneficially increase the hydraulic gradient and the flow of LNAPL to recovery wells at the SWTF and Main Refinery.

#### 5.3.2 Reuse Alternative

Another option for groundwater disposal would involve reuse of groundwater at the refinery. Groundwater quality is poor for use in most refinery processes due to salinity and hardness. In addition to treatment of organics associated with LNAPL, inorganic constituents would have to be reduced to meet refinery standards. Beneficial use and water right issues will also need to be resolved.

## 6.0 SCOPE OF WORK

### 6.1 PREPARATION

Phase I includes drilling and sampling of borings, installing monitoring wells and the initial recovery well, constructing a temporary groundwater treatment system, conducting a long-term pump test, and modeling groundwater flow. Phase I of this project is necessary because the information generated will provide the appropriate data to evaluate the optimal recovery well spacing along the property line. The aquifer testing results will be used to model flow rates and well spacings prior to installing additional recovery wells and in the design of the long term groundwater treatment system.

Prior to any work being performed at the LAR site a Health and Safety Plan will be prepared. All well permits necessary to complete the proposed scope of work will also be obtained from the appropriate agency.

Before commencing the subsurface investigation, underground pipelines and utilities will be mapped. ARCO representatives will locate subsurface lines and notify the appropriate utility locating service. Four Corners Pipelines, whom have underground pipelines in the vicinity will be contacted independently. The borings for each of the wells will first be hand augered down to a depth of at least ten feet to clear any utilities prior to drilling.

### 6.2 SAMPLING AND ANALYSIS PLAN

A sampling and analysis plan will be prepared to establish procedures for evaluating influent and effluent water quality. This plan will describe the procedures for the collection, packaging and outline the analysis for each of the water samples. Procedures for field documentation, chain of custodies, and decontamination of sampling equipment will also be provided.

### 6.3 SUBSURFACE EXPLORATION

A series of ten borings will be drilled and sampled along the western perimeter of the SWTF and southern half of the Main Refinery to evaluate subsurface conditions and to evaluate

the extent of the water table aquifer. An attempt will be made to continuously core each boring from the ground surface to the total depth. One of the SWTF borings will be advanced to Zone VI to evaluate the vertical extent of the aquifers and aquitards. Selected borings at the Main Refinery will be drilled to the base of Zone IV to constrain the extent of the uppermost aquifer. Soil lithologies will be described by a qualified geologist under the supervision of California registered geologist using a modified version of the Unified Soil Classification System. The drill cuttings from each boring will be temporarily stored in roll-off bins provided by ARCO. Bins will be lined with plastic prior to adding soils and kept covered when not in use.

Continuous cores will provide high quality stratigraphic information for the design of monitoring wells. Stratigraphic controls on LNAPL occurrence and migration will also be evaluated. Soil samples will be collected for grain size analysis to facilitate design of recovery wells. Monitoring wells will be installed in selected borings as discussed below.

#### 6.4 MONITORING WELL INSTALLATION

Monitoring wells will be installed in the area of the LNAPL Pool II barrier system to monitor and evaluate aquifer drawdown and LNAPL thicknesses during the pump tests and evaluate LNAPL recovery in the area. The monitoring wells will be installed utilizing a hollow-stem auger drilling rig.

It is anticipated that most monitoring wells will be screened in stratigraphic Zone IV which functions as the uppermost aquifer in the area. If water table conditions are encountered, wells will be screened at least five feet above and fifteen feet below the water table. This design will allow for both the regional rise in the water table and measurement of drawdown during recovery. If confined conditions are encountered, well screens will be installed to span the LNAPL bearing zone.

Wells will be constructed of four-inch diameter, Schedule 40 PVC casing with 0.020 inch slotted screen. The annulus will be packed with clean silica sand coincident with the screened interval plus a minimum of two feet above the top of the screen. A bentonite seal will be installed immediately above the filter pack. Wells will be backfilled with bentonite, capped with a water-tight well seal and completed with flush-mount well protectors firmly cemented at the ground surface. Once the monitoring wells have been installed, elevations will be surveyed and water levels measured to determine the flow direction and the local groundwater gradient.



Two monitoring wells will be installed at the SWTF. One of these wells will be installed adjacent to an existing water table monitoring well (ex. well 70) in stratigraphic Zone VI which is thought to be the equivalent of the lower Gage sand. The well will be installed at the top of the lower Gage to evaluate groundwater quality in the lower Gage and in the vertical gradient between the water table aquifer and the lower Gage.

## 6.5 RECOVERY WELL INSTALLATION

One recovery well will be completed at the SWTF facility during Phase I. The borehole for the LNAPL recovery well will be drilled utilizing mud rotary methods. The drilling mud will be thinned to allow proper well development as not to inhibit well efficiency. The mud rotary method was selected over hollow stem augers because of the tendency for the hollow stem augers to smear fines along the inside of the borehole and reduce well efficiency.

The recovery well will be constructed of eight inch diameter Schedule 40 PVC casing and stainless steel screen. The well will be designed with a five-foot PVC sump below the bottom of the screened interval to accommodate an electric submersible pump. The optimum slot size for the screened interval will be specified based on the results of grain size analysis conducted during subsurface exploration. The total depth of the recovery well is expected to be approximately 100 feet below ground surface (bgs). The annulus of the recovery well will be packed with clean silica sand coincident with the screened interval plus a minimum of two feet above the top of the screen. A bentonite seal will be installed immediately above the filter pack. The recovery well will then be backfilled with a bentonite/cement grout mixture from the top of the bentonite to the ground surface. A water tight surface vault will be installed at the well head for accommodation of the LNAPL and groundwater pumping units. These units and the associated piping will be installed coincident with the completion and development of the LNAPL recovery well.

## 6.6 WELL DEVELOPMENT

All wells will be developed by surging and bailing or overpumping utilizing a groundwater development rig. Wells will be surged to remove fines from the filter pack and screen. The wells will be bailed or pumped until the recovered groundwater becomes clear and free of sediment. Groundwater removed from the wells during development will be pumped to

a temporary holding tank and later treated and disposed of through the temporary water treatment system.

## 6.7 RECOVERY EQUIPMENT INSTALLATION

The two-pump recovery system envisioned for use in the initial recovery well includes an electrical submersible pump, capable of pumping at least 50 gpm, positioned below the groundwater table. This pump will supply sufficient drawdown to generate the necessary cone of depression. The second or upper pump will be set at or just below the initial oil/water interface and will provide the removal of the LNAPL from the groundwater surface. The upper pump will be depth adjustable so a proper balance can be maintained to facilitate optimal LNAPL recovery rates. This system will allow downhole separation of the LNAPL from the groundwater in the water table aquifer.

Interface detection probes are attached near the intakes of both pumps providing automatic cycling of the pump operation times. The upper probe is adjusted to detect both air/product and product/water interfaces to assure that the pump only recovers LNAPL and does not run dry. The lower probe is set to detect the presence of a product/water interface and shuts the pump down before it recovers any LNAPL. The reason for this type of operation is to avoid LNAPL being recovered in the lower pump. If for any reason the upper pump fails and LNAPL accumulates, forcing the interface down toward the lower pump intake, the entire system ceases to operate.

## 6.8 TEMPORARY GROUNDWATER TREATMENT SYSTEM

Water treatment during the pump test will be accomplished through use of an activated carbon treatment system to remove hydrocarbons from the groundwater. The equipment employed for this purpose will be rented, insofar as is possible, and capital expenditures will be minimized.

A 16,000 gallon Baker Tank will be used as an oil-water separator, and to provide equalization of the waters received from the pumping well. The groundwater will be pumped from the Baker Tank, through a cartridge filter for removal of solids and oil traces, to a standpipe that will establish the head necessary to provide flow through the activated carbon units.

The groundwater produced from the recovery well will be transferred via pipeline to the groundwater treatment unit outlined above in the SWTF. The treatment unit will be constructed on site for this specific purpose. Once the groundwater has been treated to standards outlined by the state and federal agencies, the treated water will be disposed of. The LNAPL will be pumped to the surface into a temporary holding tank in the SWTF. The LNAPL will then be transferred to the Main Refinery for recycling.

## **6.9 TEMPORARY PIPING INSTALLATION**

Upon the installation of the LNAPL recovery well and the monitoring wells, a temporary piping system will be constructed to tie in the recovery well to the groundwater treatment system. The piping will consist of Schedule 80 PVC of a sufficient diameter to conduct the groundwater from the recovery well to the groundwater treatment facility. Once treated the groundwater will be conducted through additional piping to the required discharge point outlined by ARCO.

## **6.10 AQUIFER TESTING**

An extended pump test will be conducted using the initial recovery well installed at the SWTF facility. This test will be conducted to characterize the water table aquifer and evaluate possible groundwater pumping rates, groundwater quality, and LNAPL production potential. Fluid levels in selected monitoring wells will be recorded continuously initially, and then daily for the duration of the test. The data from the aquifer test will be compiled and interpreted for input in groundwater flow models.

## **6.11 GROUNDWATER SAMPLING AND DISPOSAL**

It is anticipated that effluent from the temporary treatment system will be discharged into the Dominguez Channel via ARCO's NPDES permit by obtaining a temporary discharge permit (WDR). For compliance purposes, groundwater samples will be obtained from the water treatment system. This will include samples of water flowing from the recovery well into the treatment system and samples of treated water flowing from the system to the discharge point. These samples will be analyzed for BTEX (EPA Method 8020), TPH (EPA Method 8015) and other water quality parameters specified for design of the long-term treatment system. This data

will be useful when supplemented with current groundwater data in the immediate vicinity of the planned remediation system. The data will be necessary for the design of a permanent water treatment facility capable of meeting the current discharge requirements required for ARCO.

## 6.12 GROUNDWATER FLOW MODELING

Groundwater flow modeling will be performed to evaluate various recovery and injection well scenarios. Well locations and flow rates will be evaluated by generating hydraulic head and drawdown plots. Based on the results of the modeling effort, well locations and target flow rates will be proposed. The Carson Regional Groundwater Group (CRGG) regional modeling effort should address these issues. However, the current schedule for the CRGG modeling effort suggests that ARCO may have to perform groundwater flow modeling independent of the CRGG.

## 6.13 REPORT PREPARATION

Following the completion of the aquifer testing at the SWTF, a concise report of investigation will be prepared. All pumping test data generated during the investigation will be subject to internal QA/QC review then input into a computer data base for tabular and graphical presentation in the report. The report will include discussion of stratigraphic and hydrogeologic conditions relative to the presence and migration of contaminants and recommendations for the installation of a permanent LNAPL recovery system. The report will consist of but not be limited to the following;

- Analysis of pump test data to estimate aquifer properties;
- Results of groundwater flow monitoring;
- Expected amounts of LNAPL to be recovered by the full-scale system;
- Performance in meeting the water quality criteria expected for the groundwater treatment system;

- Flexibility of process for future expansion of groundwater pumping rates; and,
- An economic comparison of applicable processes for treating the groundwater over long term, including both capital and long term operating expenses.

## 7.0 SCHEDULE

The schedule for Phase I of this project is required to provide information for the design of a full scale LNAPL recovery system. Once the design is completed, the information from Phase I will be utilized to allow the earliest possible startup of the barrier system to the south where LNAPL pools have migrated farthest off site. A schedule outlining the Phase I activities for the barrier installation is provided in Figure 6.

## 8.0 BIBLIOGRAPHY

California Department of Water Resources (CDWR), 1961, Planned Utilization of the Ground Water Basins of the Coastal Plain of Los Angeles County, Appendix A: Ground Water Geology, 181 p.

California State Water Resources Control Board, 1992, Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304.

Engineering Enterprises, Inc., 1988, Annual Monitoring and Reporting Program No. CI 6744, January 29, 1988, ARCO Watson Refinery, Carson, California.

—, 1989, Annual Monitoring and Reporting Program No. CI 6744, January 31, 1989, ARCO Los Angeles Refinery, Carson, California.

Mittelhauser, 1992, ARCO Products Company, Reservoir 503 Environmental Soil Investigation Report, February 1992, Los Angeles Refinery.

Reidel Environmental Services, 1991, ARCO Products Company, Groundwater Remediation Workplan, April 1991, Los Angeles Refinery.

Simon-EEI, 1991, Refinery Subsurface Cleanup Progress Report, January 1991, ARCO Los Angeles Refinery, Carson, California.

Zielbauer, E.J., H.A. Kues, W.L. Burnham and A.G. Keene, 1962, Domiguez Gap Barrier Project, Geologic Investigation, Los Angeles County Flood Control District, 29 p.

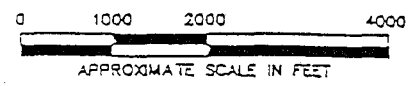
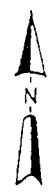
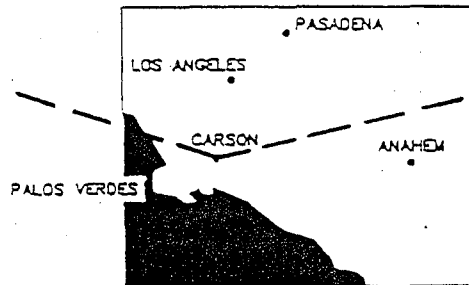
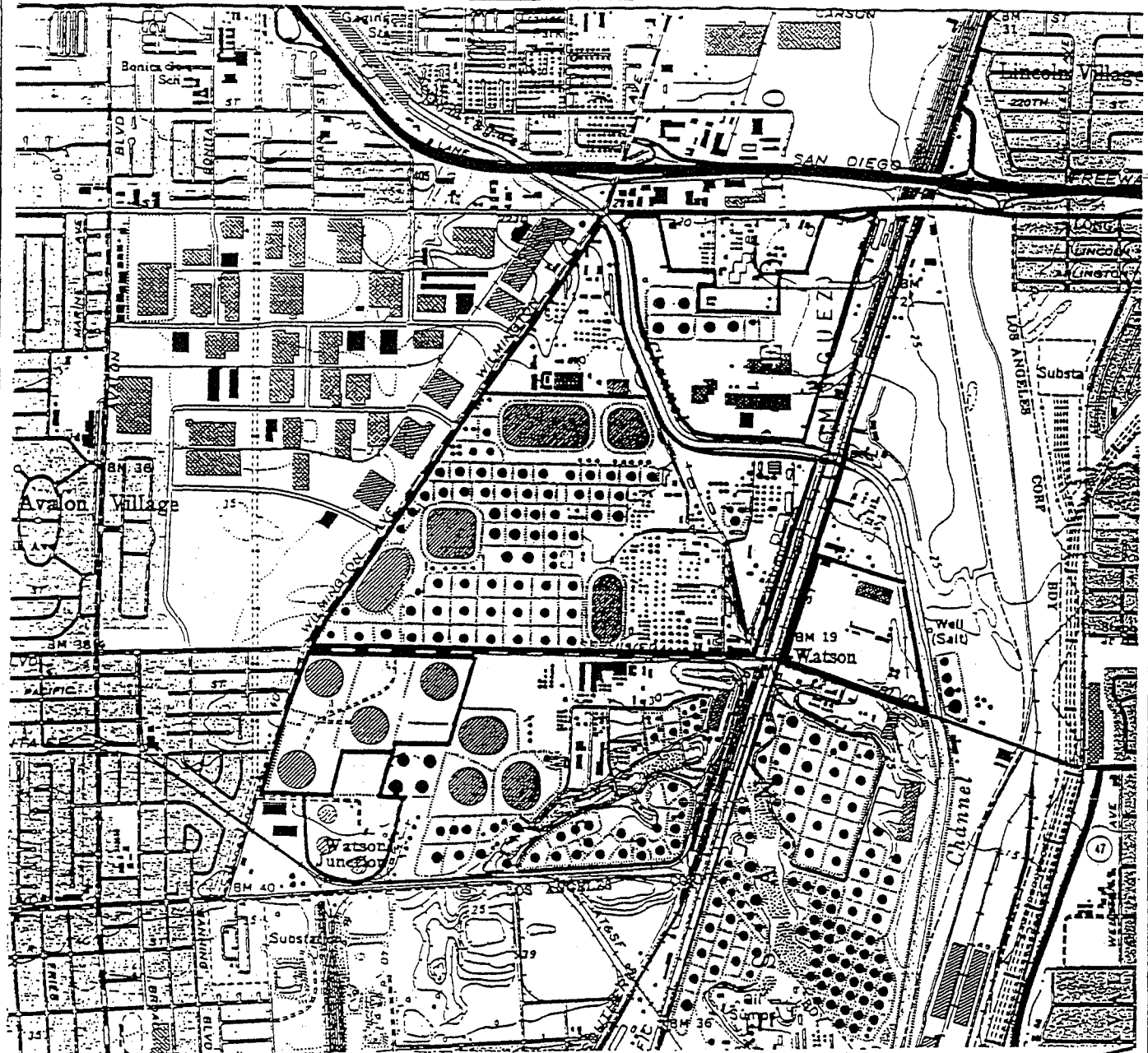
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- Figure 6 Phase I Barrier System Installation Schedule



# REFEC

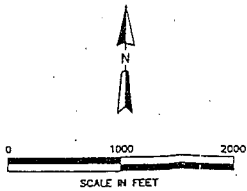
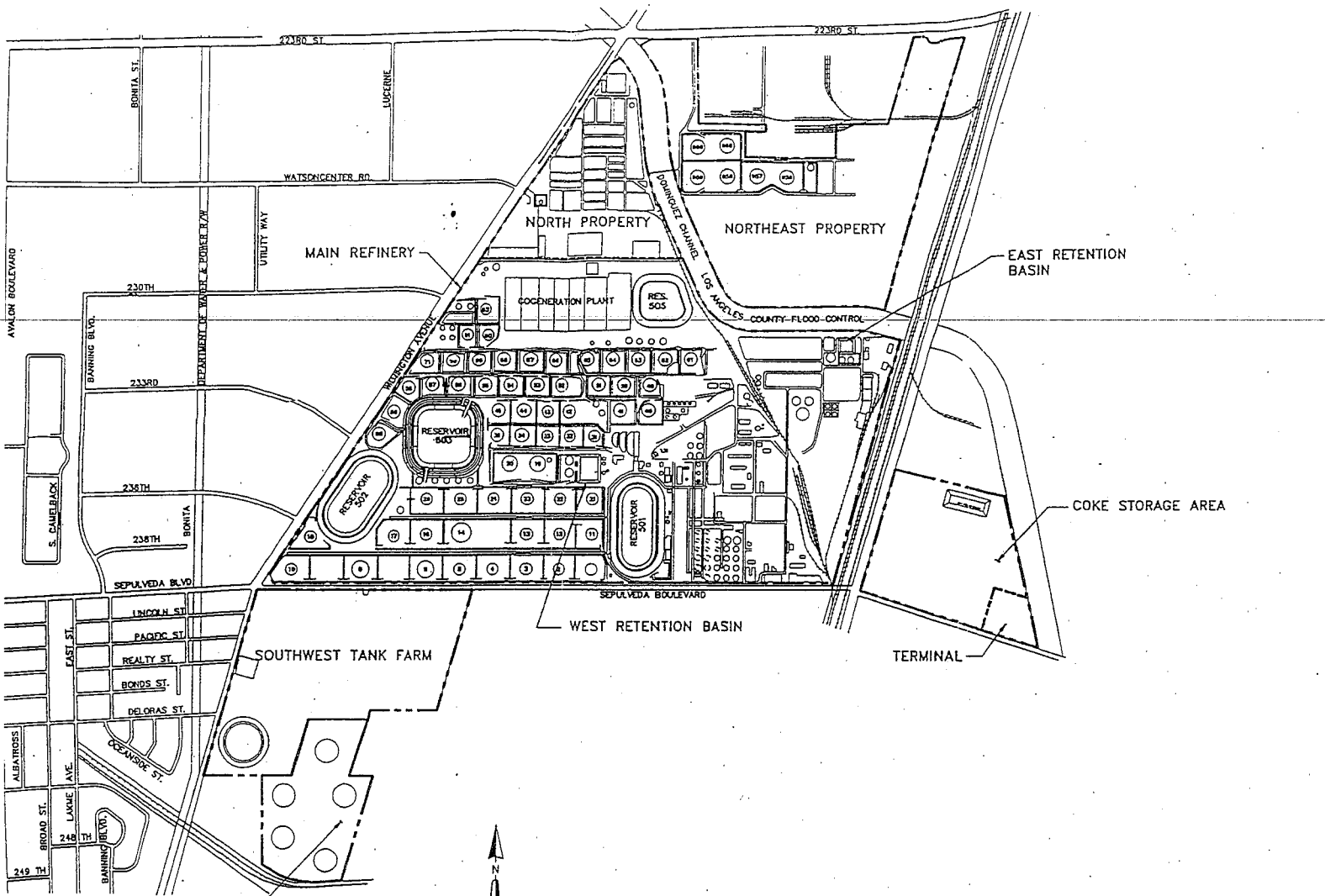


SOURCE: BASE MAP FROM USGS (LONG BEACH & TORRANCE QUADS) 7.5 MINUTE TOPO MAP

SITE LOCATION MAP  
ARCO LOS ANGELES REFINERY

FIGURE





DRAWN BY	L.Y.
DATE	1/11/93
CHK'D BY	D.B.
DATE	1/11/93
SCALE	NOTED
CAD FILE:	1101/938002

FACILITY MAP  
ARCO LOS ANGELES REFINERY



