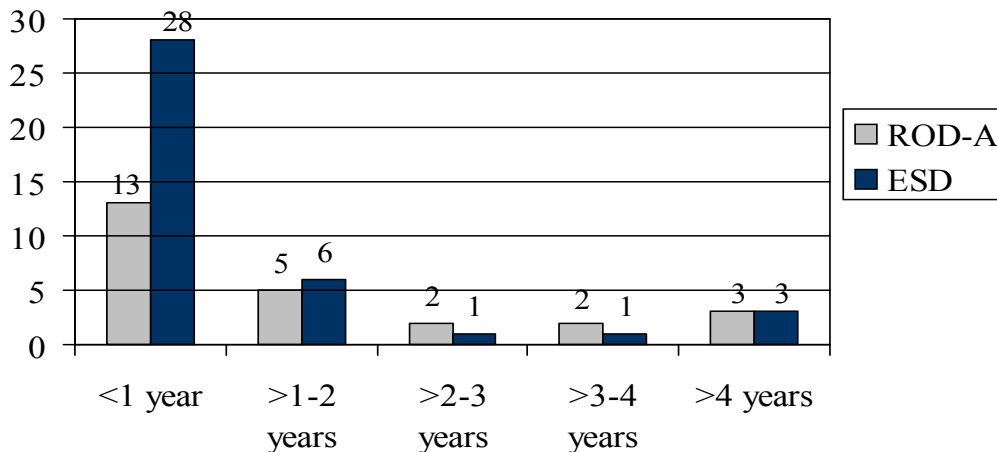


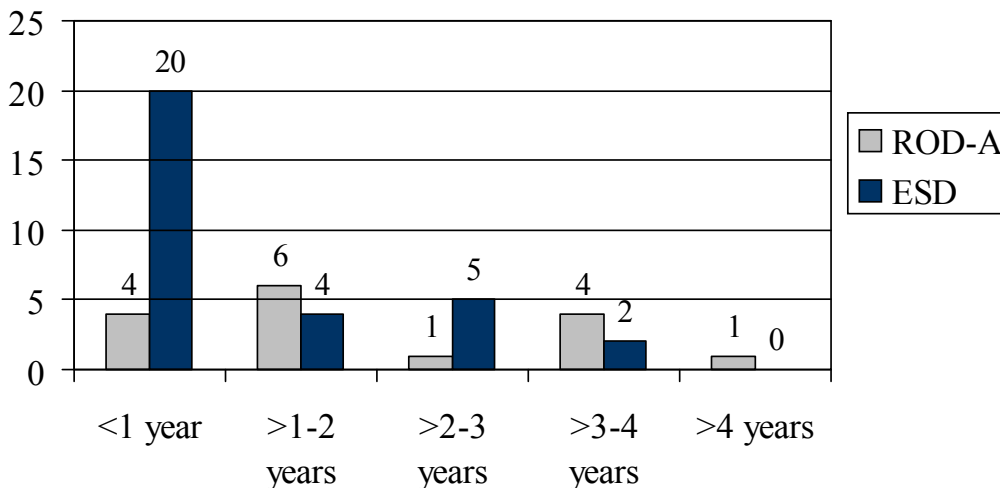
**Exhibit 2.4:
Approximate Review Time for Remedy Updates in FY00 and FY01**

Review Time for Remedy Updates in FY00



Based on 64 updates

Review Time for Remedy Updates in FY01



Based on 47 updates

- The discovery of unexpected contamination late in the remedy design phase; or
- A redefinition of land use.

Section 4.2 provides specific examples of remedy changes whose reviews lasted more than one year.

4.0 Lessons Learned

During the last two years of reform implementation, EPA has gained insight into ways of successfully updating site remedies. The following sections detail information collected regarding reform benefits, site examples, and comments from stakeholders.



4.1 Benefits

This Reform has been very successful in bringing past decisions in line with current science and technology. By doing so, these updates improve the cost effectiveness of site remediation while ensuring reliable short- and long-term protection of human health and the environment. The quantifiable results of this Reform have been announced in EPA’s testimony before Congress, described in private industry evaluations of Superfund reforms, and included in a report by the U.S. General Accounting Office. Of additional note is EPA’s overwhelmingly positive record of responding to remedy update requests made by outside parties.

4.2 Site Examples

In many cases, remedies were updated as a result of a decrease or increase in contaminant volume or an inability to achieve desired results in a test of the ROD-selected treatment or contaminant technology during the remedial design phase of the cleanup. Although all updates described in Appendix A represent site-specific situations, it is possible to use some as examples of typical remedy update situations that occurred during FY00 and FY01.

Updates Based on New Technology

Some updates were the result of new technology that was not considered at the time of the original remedy. For instance, the results of a pilot test to characterize the extent of contamination lead to a change in the remedy at the **Keystone Sanitation Landfill in Pennsylvania**. The original remedy, which included excavation and capping of the contaminated area and site access restrictions, was replaced with a new gas extraction method used in conjunction with upgrades to the existing soil cover, monitoring, and institutional controls. Consequently, the contaminated soil and landfill waste cleanup has proceeded with estimated savings of \$3.6 million.

Similarly, the results of a treatability study conducted during the Remedial Design supported a remedy update at the **New Hanover County Airport Burn Pit**

in North Carolina. A traditional ground water pump and treatment system was replaced with air sparging as an innovative technology, with resultant estimated savings of \$2,000.

New technology paved the way for a change in the remedy at the **Odessa Chromium site in Texas**. Nearly \$1 million in estimated savings were achieved with remedy updates on two operable units where a ground water pump and treat system was replaced by an innovative technology known as in-situ ferrous sulfate treatment.

Updates Based on New Performance Data

New performance data can also provide the needed basis for updating remedies. At the **Vineland Chemical Co., Inc. in New Jersey**, the changes documented in the ESD were based on new information received subsequent to the issuance of the ROD. Performance studies indicated that, by following the remedy outlined in the proposed plan, cleanup level for arsenic would not be attained in the contaminated soils. The original remedy of in-place soil flushing was replaced by excavation and soil washing in a soil washing treatment plant with clean soil re-deposited on-site. Over \$14 million in estimated savings resulted from this remedy.

Coordinating the Update

Some remedy updates involve coordination among EPA, other Federal agencies, and State and local government agencies. For example, at the **Idaho National Engineering Lab (INEEL) U.S. Department of Energy (DOE) facility**, EPA coordinated the remedy update with the State and DOE as a Federal facility. The original remedy involved a ground water pump and treat system for all zones of a contaminated plume. However, post-ROD treatability studies demonstrated that the cleanup could be conducted in less time and at a lower cost. The remedy update consisted of cleanup of a “hot spot” area at INEEL in conjunction with a pump and treatment system for part of the contaminated plume and monitored natural attenuation, with resultant estimated savings of \$1 million.

State Input in the Update

States can be either the lead or support agency for a remedy update. The remedy update was State-lead at the **Duell and Gardner Landfill in Michigan**. The results from a post-remedy investigation demonstrated that the extent of contamination in the soil and ground water was less than expected, and the size of ground water plumes either stabilized or decreased since the Remedial Investigation. Moreover, the State revised its cleanup standards which reduced the amount of soil that required excavation and disposal. By replacing the low temperature thermal desorption required in the original remedy with long-term monitoring, use restrictions or institutional controls, and landfill capping, in accordance with new State standards, estimated savings of \$3.4 million resulted.

Community Preference

Community preference can have a significant impact in addressing site contamination. For example, EPA participated in numerous community meetings at the **Rowe Industries site in New York** in an attempt to implement the original remedy. Strong and sustained community opposition to discharging all treated water directly into the surface water lead to a remedy update whereby the discharge was split between the surface water and recharge basin. This change in the remedy meant that the discharged surface water would only replace the ground water that would normally seep into the surface water if the plume was not being pumped, and resulted in undisclosed cost savings.

Another example of the effect of community involvement on remedy updates, occurred at the **Monroe Auto Equipment Co. in Arkansas**. The public was supportive of a remedy update which changed on-site containment of soils and sludges to treatment and off-site disposal because it provided greater reuse possibilities for the site. The revised remedy was as protective as the original remedy, and also resulted in undetermined cost savings.

Cost Increases

While the Reform Guidance is aimed at controlling all site costs, there are remedy updates that result in cost increases. At the **Denver Radium Shattuck Chemical site in Colorado**, the original remedy was replaced after a Five-Year Review yielded additional data on contaminated soils. Although this remedy update resulted in an estimated cost increase of \$35 million, the process incorporated facilitated meetings with State and local officials as well as community members. As a result, remedy alternatives were selected to allow for restricted use of the site following cleanup.

Similarly, at the **San Gabriel Valley site in California**, a remedy update became necessary when data revealed that concentrations of contaminants in ground water increased to unacceptable levels. The original passive remedy of monitoring only was replaced by a more active remedy for ground water containment using a pump and treat system. An estimated cost increase of \$24 million resulted, with the State sharing the cost.

Timeframe for Completing Remedy Updates

The time needed to complete an update varies with each site. In some instances, exploring other remedies takes years of review and completion. For example, at the **McKin Co. site in Maine**, a technical evaluation documented that cleanup under the original remedy within a reasonable time frame was not possible. The remedy update to achieve ground water restoration involved the use of institutional controls, long-term monitoring, and contingencies in the event that certain monitoring criteria are exceeded. Undetermined cost savings resulted from the change in remedy.

In contrast, a review for the remedy update at **Colesville Municipal Landfill site in New York** took roughly six months to complete. The results of field tests, sampling, and a treatability study lead to an enhanced remedy with resultant estimated savings of \$10 million. Moreover, the potentially responsible party at the site considered remedy alternatives with complete State involvement.